



Mountains of Controversy: Narrative and the Making of Contested Landscapes in Postwar American Astronomy

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Mountains of Controversy: Narrative and the Making of Contested Landscapes in
Postwar American Astronomy

Abstract

Beginning in the second half of the twentieth century, three American astronomical observatories in Arizona and Hawai'i were transformed from scientific research facilities into mountains of controversy. This dissertation examines the histories of conflict between Native, environmentalist, and astronomy communities over telescope construction at Kitt Peak, Mauna Kea, and Mt. Graham from the mid-1970s to the present. I situate each history of conflict within shifting social, cultural, political, and environmental tensions by drawing upon narrative as a category of analysis. Astronomers, environmentalist groups, and the Native communities of the Tohono O'odham Nation, the San Carlos Apaches, and Native Hawaiians deployed competing cultural constructions of the mountains—as an ideal observing site, a “pristine” ecosystem, or a spiritual temple—and these narratives played a pivotal role in the making of contested landscapes in postwar American astronomy.

I argue that anti-observatory narratives depicting telescope construction as a threat to the ecological and spiritual integrity of the mountains were historically tethered to the rise of environmental and indigenous rights movements in the United States. Competing narratives about the mountains' significance were politically mobilized to gain legal and moral standing, and I interrogate the historical production of these narratives to gain insight into the dynamics of power in these controversies.

By examining the use and consequences of narratives, I establish that the grassroots telescope opposition is representative of a highly influential participant in postwar Big Science: the vocal nonscientific community that objects to scientific practice done in its backyard. Marshaling divergent narratives has profoundly constricted both scientific and religious uses of the mountains, resulting in the loss of telescope projects and the increasing bureaucratization of prayer activities at the summit.

Finally, I adapt Peter Galison's concept of "trading zones" as regions of local coordination between two disparate scientific cultures to encompass the cultural worlds of scientists and nonscientists involved in the observatory debates. Through the social and material exchange of mutually understood concepts, some Native and scientific communities established fruitful communication and collaboration, but I argue that these trading zones have also effectively dissolved and homogenized the distinct cultural identities of both communities.

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Preface

In the summer of 2002, I traded the isolated natural beauty of coastal northern California for the equally stunning and far more remote Big Island of Hawai'i. As a physics and biology undergraduate strongly considering a career in astrophysics, I was delighted to spend the summer immersed in astronomy as part of a NASA pilot program called New Opportunities Through Minority Initiatives in Space Sciences (NOMISS). Along with nine other students from across the United States and Canada, I studied observational astrophysics at the University of Hawai'i at Hilo (UHH). For me, the highlight of the program was making weekly observing runs at one of the university's telescopes on Mauna Kea, a 14,000-foot volcano that hosts some of the world's finest astronomical observatories.

I didn't know it at the time, but the NOMISS program was never intended for students like me. As I would learn several years later, NOMISS was conceived as a collaborative educational outreach program between astronomers and Native Hawaiians with the stated goal of resolving tensions between these two communities. For astronomers, the mountain is an outstanding site for ground-based optical astronomy, while Native Hawaiians who recognize Mauna Kea as a sacred mountain strongly objected to telescope construction at the summit. By engaging Native Hawaiian students in astronomy, the theory went, it might be possible to narrow the cultural gaps between these alienated communities. Reflecting on the program in 2004, NOMISS Principal Investigator UHH Astronomy Professor Richard Crowe and Co-Investigator Dr. Alice Kawakami pointed out, "Hawai'i's youth are caught between the two perspectives, looking outward into space and looking inward to the land and to the traditions of

the people who inhabited this place long ago.”¹ Hawai’i’s youth may have been at a cultural crossroads, but other members of the Native Hawaiian community were less conflicted about the role of astronomy on the mountain. Just three months before my arrival on the Big Island, a coalition of Native Hawaiian elders, traditional cultural practitioners, and environmentalists had filed a contested case to block land permits for NASA’s newly proposed telescope project on Mauna Kea, charging that further astronomical development would irrevocably threaten the cultural and environmental integrity of the mountain.

Dividing my time between the UHH campus, the town of Hilo, and the Mauna Kea observatory complex placed me directly in the loci of controversy, yet I was largely oblivious to the heated debate over the management of the mountain’s spiritual, environmental, and scientific resources. Taking meals in the cafeteria or waiting out cloudy nights in the rec room at the 9,300-foot base camp on Mauna Kea known as *Hale Pohaku*, I often witnessed astronomers and Native Hawaiian staff greeting one another as old friends in the traditional Hawaiian custom of touching forehead to forehead. Because astronomers and Native Hawaiians worked side by side on the mountain and the Visitor Center showcased both Native Hawaiian and astronomy displays, I naively assumed that that the cultural worlds of astronomers and Native Hawaiians were well integrated on the mountain.

When I returned to the Big Island in the summer of 2003 to serve as an astrophysics teaching assistant for the new NOMISS cohort, I spent more time with the Mauna Kea astronomy community and casually began to delve deeper into the history of the conflict. Chatting with astronomers who lived on the Big Island, I noted that most seemed torn between an embrace of cultural sensitivity and the desire to safeguard their professional activities on the

¹Alice Kawakami and Richard Crowe, “New Opportunities Through Minority Initiatives in Space Science,” *ASP Conference Series* 319 (2004): p. 102-106; p. 103.

mountain. On the UHH campus, I began to hear critiques of astronomy on Mauna Kea comparing the white domes dotting the horizon to “pimples” that defaced the view of the mountain against the sky. I did not know then about the contested case; I could not have guessed that the objections to the domes ran deeper than aesthetic concerns, and it certainly never dawned on me that my own involvement in NOMISS was an important part of this history.

Seven years after my involvement in the NOMISS program ended, I decided to revisit the telescope controversy as a graduate student in the history of science. Early in my research, I was startled to discover that the NOMISS program had been developed for Native Hawaiian students. I am not Native Hawaiian, and there were no Native Hawaiians in my NOMISS cohort. From conversations with Dr. Crowe, I learned that following an unsuccessful effort to recruit Native Hawaiian students with adequate preparation in college math and physics, the program was expanded to include physics and astronomy students more generally.

Though my participation in NOMISS represented a disappointing failure of the pilot program, in some ways, I feel that this dissertation has brought me full circle to the original motivation behind NOMISS: to build bridges between the estranged cultural groups of astronomers and Native peoples invested in the mountain. Ultimately, my research on the conflict at Mauna Kea led me to explore similar mountains of controversy over telescope construction at Kitt Peak and Mt. Graham in southern Arizona. It is my sincere hope that for the communities most invested in these landscapes, this dissertation brings greater visibility to the diverse cultural valences of the mountains in Arizona and Hawai'i.

Introduction

In late August 1997, San Carlos Apache Wendsler Nosie received a vision that directed him to climb the summit of Mt. Graham in southern Arizona to pray for his daughter's impending passage into womanhood.¹ Upon the completion of his prayer, Nosie walked down the mountain that was once a central part of the Western Apache traditional homeland. As Nosie passed through the restricted refuge of an endangered red squirrel located near the University of Arizona's Mt. Graham International Observatory, he was summarily arrested for trespassing.² Two months later, the University of Arizona developed a permit policy that required Native Americans from federally recognized tribes to submit a written request to the observatory "at least two business days" in advance of planned prayer on the mountain.³ According to the policy, if tribal members wished to access the region of the summit occupied by telescopes and squirrels, they would first have to file a separate permit disclosing where the prayer would occur.⁴

The prayer policy was not yet a matter of public record by Nosie's misdemeanor trial in January 1998, an event that drew a sizable crowd of environmental activists, Apaches, university

¹ Barry Graham, "Sermon on the Mount," *Phoenix New Times*. 15 January 1998; Winona LaDuke, "God, Squirrels, and the Universe: the Mount Graham International Observatory and the University of Arizona," in *Recovering the Sacred: the Power of Naming and Claiming* (Cambridge, MA: South End Press, 2005): p. 19-32; p. 19-20.

² Nosie was first stopped by two U.S. Forest Rangers who informed him that he was trespassing, but did not cite him. The Forest Rangers called the University of Arizona Police Department, and Nosie was then arrested for trespassing. See Graham, "Sermon on the Mount," LaDuke, "God, Squirrels, and the Universe," p. 20; "News Announcement: Trial of Apache Indian praying near University of Arizona Telescope project set for tomorrow," Mt. Graham Coalition. 07 January 1998. Courtesy of Doug Officer.

³ See B.E. Powell to U.S. Forest Service. 07 October 1997.

⁴ Powell to U.S. Forest Service.

administrators, and curious locals.⁵ When Nosie was called to the witness stand and questioned about his motivations for entering the restricted area, he told the prosecutor, “I know it’s hard for you to understand. We’re a vision people.”⁶ Nosie was acquitted of all charges, but the incident took on new life that summer when environmentalists leaked the University of Arizona’s written prayer policy to the media after filing a Freedom of Information Request.⁷ An allied group of Apaches and environmentalists promptly issued a press release titled “Have you got your permit to pray?,” and local newspapers immediately followed suit with polarizing headlines accusing the University of suppressing Native American religious freedom.⁸ A few days later, sixteen Native Americans openly challenged the policy by gathering to pray at Mt. Graham without prior approval.⁹ Though observatory officials insisted that the so-called prayer permit had been implemented as a “good faith and honorable attempt to facilitate Native American rights to religious freedom,” the University of Arizona quietly backed away from its controversial policy, and no further arrests were made.¹⁰

The University of Arizona’s ‘prayer permit’ debacle was emblematic of a bitter conflict with San Carlos Apaches and environmentalists that was more than ten years in the making.

⁵ The unexpectedly large crowd posed a breach of fire regulations, so Judge Linda Norton moved the trial to a larger room in the courthouse basement. See Graham, “Sermon on the Mount.”

⁶ Nosie, quoted in Graham, “Sermon on the Mount.” See also “News Announcement: Trial of Apache Indian” for comments made by Nosie before the trial.

⁷ “Apache acquitted of trespassing on Mt. Graham,” *Eastern Arizona Courier*. 28 January 1998; Mt. Graham Coalition, “Letter to the Editor,” *San Carlos Apache Moccasin*. 13 January 1998.

⁸ “Have you got your permit to pray?” News Release, Mount Graham Coalition. 13 August 1998; Jim Erickson “Mt. Graham ‘prayer permit’ angers Apaches,” *The Arizona Daily Star*. 13 August 1998; Steve Yozwiak, “UA requires prayer permits for Indians on Mt. Graham,” *The Arizona Republic*. 15 August 1998; “UA demands Native Americans obtain prayer permits,” *San Carlos Apache Moccasin*. 18 August 1998. Courtesy of Doug Officer.

⁹ “Indians get to pray despite permit refusal,” *The Arizona Republic*. 19 August 1998. Courtesy of Doug Officer.

¹⁰ Buddy Powell, quoted in Erickson “Mt. Graham ‘prayer permit’ angers Apaches.”

After the University of Arizona announced plans for a new observatory complex on Mt. Graham in 1984, the project soon came under fire from environmental advocates and recreationists who feared that telescopes would jeopardize the mountain's unique "sky island" ecosystem, exterminate the endangered Mt. Graham Red Squirrel, and curtail public access to upper elevations.¹¹ The grassroots anti-observatory campaign initially led by environmentalists was later joined by San Carlos Apache tribal members who saw the mountain they called *Dzil nchaan* ("Big Seated Mountain") as a sacred site threatened by astronomical development.¹² The coalition of Apaches and environmentalists staged numerous protests and engaged in protracted legal battles to halt new telescope construction on Mt. Graham.¹³

As the prayer permit controversy reveals, the hostile relationship between the Mt. Graham astronomy community and the allied¹⁴ group of Apaches and environmentalists

¹¹ The term "sky island" refers to the interpretation of the Pinaleno range where Mt. Graham is located as an ecological island within the framework of island biogeography. The endangered subspecies of red squirrel called the Mt. Graham Red Squirrel (*Tamiasciurus hudsonicus grahamensis*) is one of eighteen species found only on Mt. Graham. See Paul J. Young, Vicki L. Greer, and Sheri K. Six, "Characteristics of Bolus Nests of Red Squirrels in the Pinaleno and White Mountains of Arizona," *The Southwestern Naturalist* 47(2002): p. 267-275; H. Reed Sanderson and John L. Koprowski, eds., *The Last Refuge of the Mt. Graham Red Squirrel: Ecology of Endangerment* (Tucson: University of Arizona Press, 2009); Donald F. Hoffmeister, *Mammals of Arizona* (Tucson: University of Arizona Press, 1986), p. 28-29. Environmentalists and recreationists both claimed Mt. Graham was a "pristine" wilderness area, while astronomers pointed out that the mountain had seen extensive logging and recreational activities over the last century.

¹² The Apache name for Mt. Graham is also written as *Dzit nchaan*.

¹³ On the spiritual importance of Mt. Graham from a San Carlos Apache, see the statement by tribal member and leader of the Apache Survival Coalition Ola Cassadore Davis in *Testimony to the United Nations' Sub-Commission on Prevention of Discrimination and Protection of Minorities, Working Group on Indigenous Peoples*. 28 July 1999.

¹⁴ It is important to point out that although I have referred to the anti-telescope campaign as an allied community of Native peoples and environmentalist groups, I do not assume that this so-called community shares an equivalent set of beliefs and values concerning the role of the mountain or the proper approach to opposing the observatory. In the Nosie trial, for example, Nosie explained that environmentalists and Native Americans did not always agree on tactics of resistance because "environmental people are more political. They can be destructive to things," while the Apaches "call on supernatural powers to do it. If we do physical damage, God will punish us." Nosie, quoted in Graham, "Sermon on the Mount." John A. Grim has noted that although Native peoples and environmentalists share a respect for plant and animal life,

provided ample fodder for the local press, which frequently vilified University of Arizona astronomers as environmentally and culturally insensitive.¹⁵ The anti-observatory movement was more than a public relations nightmare, however; it also profoundly limited scientific development on the mountain. Lawsuits, protests, and critical media coverage created costly construction delays and eroded financial partnerships with other research institutions considering an investment in the observatory.

Mt. Graham International Observatory is only one locus of a larger debate over contested landscapes in postwar astronomy involving astronomers and the often-allied communities of indigenous¹⁶ peoples and environmentalists.¹⁷ Similar controversies erupted

Native groups have often expressed a reluctance to collaborate with environmentalists, and alliances that do form can be fraught with misunderstandings such as the lack of consensus on land as “wilderness.” Environmentalists’ appropriation of Native spiritual traditions have also impeded partnerships between the two communities. See Grim, “Indigenous Traditions and Deep Ecology,” in *Deep Ecology and World Religions: New Essays on Sacred Ground*, David Landis Barnhill and Roger S. Gottlieb, eds., (Albany: State University of New York Press, 2001), p. 48. For a case study on the threat to the indigenous-environmentalist alliance centering on the Earth First! organization’s cultural borrowing of Native American spiritual practices, which has been perceived by some Native Americans as a violation of intellectual property rights and cultural integrity, see Bron Taylor, “Earthen Spirituality or Cultural Genocide? Radical Environmentalism’s Appropriation of Native American Spirituality,” *Religion* 27 (1997): p. 183-215. See also Taylor, “Resacralizing Earth: Pagan Environmentalism and the Restoration of Turtle Island,” in *American Sacred Space*, David Chidester and Edward T. Linenthal, eds. (Bloomington, Indiana University Press, 1995): p. 97-151; Bruce Ziff and Pratima V. Rao, eds., *Borrowed Power: Essays on Cultural Appropriation* (New Brunswick: Rutgers University Press, 1997). For a critique of the adaption of Native American cultural beliefs to naturalistic arguments against animal rights as a belittling and culturally damaging practice made by environmentalist philosophers such as J. Baird Callicott, see David Waller, “Friendly Fire: When Environmentalists Dehumanize American Indians,” *American Indian Culture and Research Journal* 20 (1996): p. 107-126.

¹⁵ Local newspapers such as the *Arizona Daily Star*, the *Tucson Citizen*, the *Arizona Republic*, the *Phoenix Gazette*, and the UA student newspaper the *Daily Wildcat* have fueled the controversy by running headlines and news stories characterizing UA astronomers as ruthless and unscrupulous. See, for example, John Dougherty, “Star whores: the ruthless pursuit of astronomical sums of cash and scientific excellence,” *Phoenix New Times* 24 (15, 16 June 1993): 28-36; Tim Vanderpool, “Public Relations Sleazeballs Go Too Far In Defense Of The Latest Mount Graham Telescope Project,” *Tucson Weekly*, 22-28 May 1997; Linda Ann Fundling, “Science vs. Science,” *The Arizona Daily Star*. 01 June 1986.

¹⁶ I will use “indigenous” and “Native” interchangeably throughout this dissertation to indicate historically marginalized groups that have identified themselves with this label, though it should be noted that these terms carries particular connotations about the politics of inclusion and exclusion. As Native Hawaiian scholar and activist Haunani-Kay Trask has asserted, “Beyond the question of who is and is not

over telescope construction on other sacred mountains in the United States during the second half of the twentieth century, and this dissertation contextualizes each history of conflict as a product of shifting social, cultural, political, and environmental tensions.

indigenous looms the power to define and thus to determine who we, as Native peoples, will be in the future. Imposed systems of identification are instituted to separate our people from our lands and from each other in perpetuity." See Haunani-Kay Trask, *From a Native Daughter: Colonialism and Sovereignty in Hawai'i* (Monroe, Me.: Common Courage Press, 1999), p. 104. The adoption of the category of "indigenous" by individuals and organizations seeking to advance social and political agendas in recent years is somewhat problematic, as is the lack of scholarly and popular consensus on criteria to determine who possesses indigenous status. Though the Oxford English Dictionary definition of people or products "born or produced naturally in a land or region; native or belonging naturally to" reflects one common understanding of "indigenous," the only legally binding definition is contained in the 1989 Indigenous and Tribal Peoples Convention 169 adopted by the International Labour Organization, which emphasizes that "self-identification as indigenous or tribal shall be regarded as a fundamental criterion" in establishing indigenous status. See *Oxford English Dictionary 2002*. www.dictionary.oed.com. Accessed 12 August 2010; 1989 *Indigenous and Tribal Peoples Convention 169*. Available at www.members.tripod.com/PPLP/ILOC169.html. Accessed 12 August 2010. The term 'Native' is similarly problematic. As Stefan Helmreich has observed in his study of biologists' classification of plant species, defining 'native' is "a taxing taxonomic question, especially in Hawaii, where the word native resonates with descriptors used by and for the indigenous people of Hawaii..." See Helmreich, "How Scientists Think; About 'Natives,' for Example: A Problem of Taxonomy among Biologists of Alien Species in Hawaii," *The Journal of the Royal Anthropological Institute, Incorporating MAN* 11 (2005): p. 107-128; p. 108. Two of the most commonly used racial and ethnic terms to denote peoples indigenous to what is now the continental United States are "Native American" and "American Indian." Sahnish and Hidatsa First Nations scholar Michael Yellow Bird's thoughtful and well-researched article on the relative merits and disadvantages of using both terms reveals that there is no clear consensus on a preferred term among students or faculty of Native studies programs on university campuses. See Yellow Bird, "What We Want to Be Called: Indigenous Peoples' Perspectives on Racial and Ethnic Identity," *American Indian Quarterly* 23 (1999): p. 1-21. For the sake of consistency, I have elected to use "Native American" throughout this dissertation.

¹⁷ I define "environmentalists" as individuals and groups who identify themselves as promoting a broadly defined ecological agenda centered on wilderness and wildlife preservation. Though the American impulse to conserve natural resources certainly predated World War II, the community of people who would come to envision themselves as "environmentalists" did not emerge until after the war. Indeed, as Samuel P. Hays points out, the modern sense of the term "environment" did not exist prior to World War II, and early wilderness preservation groups such as the Sierra Club and the Wilderness Society called themselves "conservationists." As I discuss in more detail beginning in chapter three, concerns about environmental pollution came to the fore in the mid-1960s, and environmentalism became a full-fledged movement by the 1970s that would splinter into 'mainstream' and 'radical' divisions by 1980. This development is detailed in chapter five. For an overview of key social and political transitions in the American environmental movement, see Samuel P. Hays, "From Conservation to Environment: Environmental Politics in the United States Since World War II," in Char Miller and Hal Rothman, eds., *Out of the Woods: Essays in Environmental History* (Pittsburgh: University of Pittsburgh Press, 1997), p. 101-126.

Situated on 200 acres of the Tohono O’odham Reservation 100 miles northwest of Mt. Graham, Kitt Peak National Observatory (KPNO) was founded in 1958 through a partnership between the National Science Foundation (NSF) and the Association of Universities for Research in Astronomy.¹⁸ Two dozen telescopes have been built on the summit of Kitt Peak on land leased from the Tohono O’odham Tribal Council for the annual amount of \$2500 per year.¹⁹ For the Tohono O’odham, Kitt Peak is a sacred mountain called *Iolkam Du ‘ag* that figures prominently in their creation story.²⁰ To some tribal members, the telescopes represent a threat to the spiritual integrity of the mountain, and after nearly fifty years of amicable relations between the Tohono O’odham and the KPNO astronomy community, the Tohono O’odham Nation filed a lawsuit against the NSF in 2005 seeking an injunction against a proposed \$13 million telescope and a revocation of the lease.²¹

¹⁸ Frank K. Edmondson, “AURA and KPNO: The Evolution of an Idea, 1952-58,” *Journal for the History of Astronomy* 22 (1991): p. 68-86.

¹⁹ President Eisenhower signed a bill authorizing the NSF to lease Kitt Peak from the Papago Indian Tribe in August 1958. Until 1986, the Tohono O’odham were known as the Papago, but the tribe reclaimed its ancestral name Tohono O’odham in 1986 for political and cultural reasons discussed in chapter two of this dissertation. See “Kitt Peak Plans Expedited; Authorization Bill signed,” *The Arizona Daily Star*. 29 August 1958, p. 4. University of Arizona Library Special Collections; “Udall submits Kitt Peak bill: measure authorizes Papago tribe to lease site for planned observatory,” *The Arizona Daily Star*. 23 July 1958. The Arizona Historical Society archives, Astronomical Observatory-- Kitt Peak. See also Resolution of the Papago Council No. 1116. 03 June 1960. University of Arizona Library Special Collections. KPNO became part of the National Optical Astronomy Observatory (NOAO) in 1982, which also operates the Cerro Tololo Inter-American Observatory in northern Chile. For a complete list of all 24 telescopes on Kitt Peak, see “The Kitt Peak Virtual Tour: Tour Itinerary.” www.noao.edu/outreach/kptour/itinerary.html. Accessed 10 January 2013.

²⁰ The translation of *Iolkam Du ‘agis* “*I’itoi’s garden*” because the mountain is named after the Tohono O’odham creator *I’itoi*. For a Tohono O’odham source relaying the tribe’s creation story, see Papago Tribe, *Tohono O’odham: Lives of the Desert People* (Salt Lake City, UT: University of Utah Printing Services, 1984). For more on the creator *I’itoi* and his relationship to the sacred mountains, see Harold Bell Wright, ed., *Long Ago Told: Legends of the Papago Indians* (New York: D. Appleton & Co., 1929), “The Beginning of All Things,” p. 7-14; Ruth M. Underhill, *The Papago and Pima Indians of Arizona* (Palmer Lake, CO: Filter Press, 1979), “The Sacred Story,” p. 41.

²¹ The legal arrangement between the O’odham, the NSF, and KPNO had become a contentious issue, since Tohono O’odham tribal members asserted that the land lease was granted when the Bureau of

Across the Pacific Ocean, the summit of Mauna Kea (“White Mountain”) on the Big Island of Hawai’i embodies an ideological divide between scientific, spiritual, and environmental values with many striking parallels to the Mt. Graham conflict.²² Managed by the University of Hawai’i’s Institute for Astronomy, the Mauna Kea Science Reserve is home to over a dozen of the world’s most sophisticated telescopes built on land that was ceded to the United States government from the Hawaiian Kingdom in 1898.²³ The summit is also home to the Native Hawaiian snow goddess *Poli’ahu* and the *Wēkiu* bug, an insect uniquely adapted to the summit’s hostile environment.²⁴ Soon after the first telescopes appeared on Mauna Kea in 1968, environmentalists vocally criticized the observatory at public hearings held on the Big Island, asserting that telescope construction destroyed critical habitat for the rare *Wēkiu* bug and limited public access to the summit. Roughly thirty years after the observatory was established, Native Hawaiians entered the debate by forming partnerships with environmentalists to protest further development of their sacred mountain. The allied group of Native Hawaiians and environmentalists fought telescope construction through a series of contested cases on the

Indian Affairs had more authority than the O’odham Nation. See statements made by Vivian Juan-Saunders, quoted in Paul L. Allen, “Tribe sues to stop telescope,” *The Tucson Citizen*. 24 March 2005; Resolution of the Tohono O’odham Legislative Council No. 06-808. 07 December 2006, and chapter two of this dissertation.

²² The name “White Mountain” is associated with the mountain’s mantle of white snow during the winter months. Mauna Kea is also referred to as “ka piko o ka moku,” which means “the navel of the island.” See *Mauna Kea Comprehensive Management Plan. Prepared for the University of Hawai’i by Ho’akea, LLC dba Ku’iwalu*. April 2009, p. i. Available at www.malamamaunakea.org. Accessed 30 December 2012.

²³ See University of Hawaii General Lease No. S-4191. The University of Hawaii (UH) currently subleases parcels of the MKSR to telescope facilities not belonging to UH, including telescopes operated by the United Kingdom, France, Canada, Japan, Taiwan, Australia, Brazil, Chile, and Argentina. For details on the management of the physical and cultural resources of the mountain by UH, see *Mauna Kea Science Reserve Master Plan, Adopted by the University of Hawaii Board of Regents on June 16, 2000*. Available at www.hawaii.edu/maunakea. Accessed 28 July 2010.

²⁴ The *Wēkiu* bug (*Nysius wekiuicola*) was identified as a unique species endemic to Hawai’i in 1983. See Peter D. Ashlock and Wayne C. Gagne, “A Remarkable New Micropterous nysius species from the Aeolian Zone of Mauna Kea, Hawai’i Island,” *International Journal of Entomology* 25 (1983): p. 47-55.

grounds that science should not “threaten a species, offend the host culture, and contaminate the aquifer.”²⁵

Astronomers in Arizona and Hawai’i were baffled by the allegations of environmental and cultural insensitivity and the sensationalized media coverage. For much of the twentieth century, astronomy could hardly be considered a controversial profession, and astronomers had entered the field aspiring to making the universe comprehensible by studying its origins, structure, and dynamics. With only a handful of good observing sites in the world, competition for observing time on the best instruments was a key factor driving astronomers to search out new telescope sites and build bigger and more sophisticated instruments. The astronomy communities that formed around Kitt Peak, Mauna Kea, and Mt. Graham sought to stay at the forefront of modern astronomy in order to expand human knowledge about the cosmos, and they were surprised and disturbed by the public animosity engendered by observatory construction. Mauna Kea’s Keck Observatory Director Frederic Chaffee likely spoke for the majority of American astronomers in 2005 when he reflected on astronomy’s intersection with the public as “something that is exciting, that lights up kids’ faces, that makes them excited about science.”²⁶

Since many astronomers conceive of themselves as preservationists of the night sky who must fight the city lights and air pollution that jeopardize clear viewing, the anti-

²⁵ Kealoha Pisciotta, quoted in Joel Helfrich, Dwight Metzger, and Michael Nixon, “Native Tribes Struggle to Reclaim Sacred Sites,” *Twin Cities* 01 June 2005. The conflict between the Native Hawaiian-environmentalist alliance and astronomers at Mauna Kea has been extensively documented in island-wide newspapers such as the *Honolulu Star Advertiser*, the *Honolulu Weekly*, and regional newspapers such as the *Hawaii Tribune-Herald* and *West Hawaii Today*.

²⁶ Frederic Chaffee, quoted in *First Light* (PBS Hawaii, 2004).

environment characterization has been particularly difficult to accept.²⁷ After coming under attack from environmentalist groups, several of the astronomers in the telescope controversies pointed to their longstanding affiliation with some of the same groups that were now targeting them as anti-environment.²⁸ For astronomers who saw their work as the noble pursuit of scientific knowledge, the charge that telescope construction was akin to destroying the environment and waging cultural genocide was shocking and unsettling, to say the least.

The still-unfolding debates on the meaning and control of the mountain landscape at Kitt Peak, Mauna Kea, and Mt. Graham have been critically shaped by social, cultural, political, and environmental movements in the United States that were largely initiated during the second half of the twentieth century. By mapping the timing of environmentalist or indigenous opposition onto developments in environmentalist and indigenous rights movements in America, I argue that the making of contested landscapes in postwar astronomy was historically contingent upon the social, cultural, and political mobilization of these groups.

Sharing a common interest in preserving the mountain's cultural and environmental resources, Native and environmentalist observatory opponents have taken legal and political

²⁷ The nonprofit International Dark Sky Association (IDA) was founded by two Tucson-based astronomers in 1988 to address the problem of light pollution. The IDA website and educational materials produced by the organization draw on environmental rhetoric, warning that light pollution is a problem "threatening astronomical facilities, ecologically sensitive habitats, our energy consumption, and our human heritage." See "The International Dark Sky Association." www.darksky.org. Accessed 12 September 2010.

²⁸ Chaffee identified himself as a lifetime Sierra Club member in a 2001 letter to Sierra Club leader Nelson Ho. See Frederic H. Chaffee to Mr. Nelson Ho. 13 February 2001 in *Environmental assessment for the Outrigger Telescopes Project: Mauna Kea Science Reserve*, Island of Hawai'i (Washington, D.C.: National Aeronautics and Space Administration, Office of Space Science, 2002). February 2002. UH Manoa: Hamilton Hawaiian Library. In a 1990 letter to Congressman Morris K. Udall about the escalation of environmentalist opposition to MGI/O, Steward Observatory astronomer Roger Angel divulged that many of his astronomy colleagues had withdrawn their membership in major environmental organizations because although they considered themselves environmentalists, they believed the environmentalist agenda was being unfairly leveraged to stop development projects such as the observatory. See Roger Angel to The Honorable Morris K. Udall. 19 March 1990, p. 1. Courtesy of Doug Officer.

action against astronomers and university science administrators in recent years by invoking the American Indian Religious Freedom Act, the National Historic Preservation Act, the Endangered Species Act, and the National Environmental Policy Act. In addition to retaining lawyers to represent their interests in court, some astronomers and universities have hired lobbyists and recruited politicians to aid in their efforts to move forward with observatory expansion. The different interest groups involved have offered conflicting court testimony on the significance of each mountain, clearly demonstrating that narrative and discourse have played a major role in shaping the outcomes of these debates. Moving beyond court documents, I trace the historical lineage of these distinct but overlapping narratives and counter-narratives by examining narratives accessible through books, articles, websites, personal communications, and oral histories to identify the multiple ways of valuing these mountains.

Narratives about the mountain are anchored to historically specific visions of nature and the environment, and thus a comparative history of the controversies surrounding observatories at Kitt Peak, Mauna Kea, and Mt. Graham offers an ideal opportunity to examine the use and consequences of divergent narratives. David Nye has shown how Americans have constructed and appropriated spaces and technologies through narratives, and my exploration of narrative constructions of mountains similarly reflects a symbolic appropriation of resources through stories.²⁹ My focus on narrative as an analytical tool is indebted to anthropological and historical literature on the relationship between story, place, and self.

²⁹ Nye establishes a link between persuasive narratives and technological failures or successes, and he notes that technologies are “contested terrains.” His far-ranging analysis provides insight into how competing narratives of technology construct spaces tied to different cultural and political contexts, ranging from the Grand Canyon to outer space. See David E. Nye, *Narratives and Spaces: Technology and the Construction of American Culture* (New York: Columbia University Press, 1997), p. 1. See also Nye, *America as Second Creation: Technology and Narratives of New Beginnings* (Cambridge, MA: MIT Press, 2003).

Following the convention established by earlier historiography on the use of narrative, I define narratives not simply as stories people tell about historical events, but stories told with emphasis on the particular details deemed most important to an individual or group. In a narrative, a personal connection to certain details accompanies the recounting of events, and narratives are often implicitly informed with assumptions about superior knowledge of those events. This kind of storytelling is distinguished from a *chronicle*, which includes details of historical events without highlighting their personal significance, such as a simple chronological list.³⁰ Narrative is a means of organizing an individual's or group's experience of the past, and in my study, narratives about the meaning and use of the mountain landscape revealed through legal documents, activist literature, scientific publications, websites, the popular press, and other published materials provide access to the historical memory of scientific, environmentalist, and indigenous communities. I am less concerned with establishing the veracity of narratives than in analyzing telling divergences and tracing the historical malleability of these narratives since, as Sally Engle Merry has persuasively argued, such inconsistencies are "neither true nor invented but are cultural interpretations of events made within particular historical contexts."³¹

³⁰ The distinction between chronicle and narrative I am drawing from here is primarily articulated in philosophy of history scholarship that addresses how historians produce their own narratives about their subjects of inquiry. See David Carr, "Narrative, Narrator, and Audience," in *Time, Narrative, and History* (Bloomington: University of Indiana Press, 1986), p. 57-64, especially p. 59; Arthur C. Danto, *Narration and Knowledge: Including the Integral Text of Analytical Philosophy of History* (New York: Columbia University Press, 1985); Louis O. Mink, "Narrative Form as a Cognitive Instrument," in *The Writing of History: Literary Form and Historical Understanding*, Robert H. Canary and Henry Kozicki, eds. (University of Wisconsin Press, 1978), p. 141-144; Paul A. Roth, "Narrative Explanations: The Case of History," *History and Theory* 27 (1988): p. 1-13; Hayden White, *Metahistory: The Historical Imagination in Nineteenth-Century Europe* (Baltimore: Johns Hopkins University Press, 1973), p. 5-7; and White, *Tropics of Discourse: Essays in Cultural Criticism* (Baltimore, Johns Hopkins University Press, 1978), p. 109-111.

³¹ Sally Engle Merry, "Kapi'olani at the Brink: Dilemmas of Historical Ethnography in 19th Century Hawai'i," *American Ethnologist* 30(2003): p.44-60.

Further, although I am principally interested in the narratives that define contested landscapes with respect to telescope construction, I acknowledge that due to the cultural heterogeneity of each community examined in this study, there is no unifying consensus on the significance of the mountains under discussion in my case studies. For instance, among the Native populations tied to each mountain, arguments rooted in either pragmatic or culturally-based concerns have resulted in conflicting narratives about the consequences of telescope construction for the mountain itself and the indigenous communities who worship there. Throughout the dissertation, I seek to represent a broad spectrum of narratives about the mountain to explore how these communities maintain cohesiveness when some members believe scientific enterprise promises economic stability while others view it as a threat to natural and cultural resources.³² At the same time, I identify dominant narratives of each interest group as the widely circulated, written accounts of the mountain's meaning and use produced by recognized representatives of observatory or activist organizations. These dominant narratives surface primarily in the form of courtroom testimony, "fact sheets" and promotional literature produced by observatories and activists, and descriptions of the mountains found on websites, correspondence, and documentaries produced by observatories and Natives.

Narratives about the mountains figure prominently in the indigenous opposition to telescope construction in Hawai'i and Arizona. In Native American and Native Hawaiian oral

³² The astronomy community has experienced similar internal conflict over the Mt. Graham controversy. According to former Kitt Peak National Observatory astronomer and current webmaster for *Storytellers: Native American Authors Online* Karen M. Strom, her objection to the astronomical development of Mt. Graham has made it difficult to maintain amicable professional relationships with her colleagues. Weighing the decision to make her opinion public, Strom concludes, "it is absolutely necessary that I make my opposition to the University of Arizona projects on Mt. Graham clear. I am sorry if this hurts some of my colleagues at U of A, but I can no longer be held hostage to their political and financial interests." See Strom, "Mt. Graham and the University of Arizona Astronomers." www.hanksville.org/voyage/misc/MtGraham.html Accessed 12 June 2010.

history traditions concerned with promoting beneficial changes in an individual's behavior, narratives are intimately connected to particular environmental features. Since story and site are so closely intertwined for many Natives, some anthropologists have observed that the geographical landscape often invokes the moral landscape of the community. As scholar of the Western Apache Keith Basso explains, "mountains and arroyos step in symbolically for grandmothers and uncles."³³

The perceived antagonism between 'science and religion' or 'science and culture' is a recurrent theme in the narratives of observatory opponents.³⁴ As this dissertation will make clear, however, these conflicts cannot easily be reduced to tales of dueling cosmologies or exemplars of the clash between science and religion. At Mt. Graham, for instance, Jesuit astronomers at the Vatican Observatory have openly questioned the legitimacy of San Carlos

³³ Keith H. Basso, "'Stalking with Stories': Names, Places, and Moral Narratives among the Western Apache," in *Text, Play and Story: The Construction and Reconstruction of Self and Society, 1983 Proceedings of The American Ethnological Society*, Stuart Plattner, ed. (The American Ethnological Society, 1984): p. 19-55; p. 43.

³⁴ Depicting the conflicts between the interests of astronomical research and cultural or environmental interests as fundamentally irreconcilable has proven an effective rhetorical strategy in some instances. Both sides of the debate have even issued 'fact sheets' with contradicting arguments and historical timelines intended to dispel common "myths" about the environmental and cultural impact of the observatories. For a representative sampling, see *Mt. Graham and the Large Binocular Telescope (LBT) Fact Sheet*, The Ohio State University Department of Astronomy. Available at www.astronomy.ohio-state.edu/LBT/facts.html. Accessed 06 July 2010; *University of Virginia Astronomy Department Fact Sheet*, 18 October 2001. available at http://www.mountgraham.org/old-site/WhitePapers/VArebuttal.html#_ftn1. Accessed 09 December 2012; *University of Minnesota Astronomy Department 2001 Mt. Graham Position Paper*, Dr. Leonard Kuhl, Chair, Department of Astronomy, available at <http://www.mountgraham.org/old-site/mnastropos.html>. Accessed 06 July 2010. As I will discuss in greater detail later in this dissertation, the successful introduction of observatory visitor centers promoting cultural awareness and observatory-sponsored astronomy outreach programs geared towards the native population at each of these sites complicates such claims of incommensurability by demonstrating that these groups have sought to coexist. One notable attempt to bridge the gap between scientific and spiritual value systems at Mauna Kea resulted in a NASA-funded pilot program intended to expose Native Hawaiian students to astronomy by highlighting the astronomical legacy of the ancient Polynesians. See Alice J. Kawakami and Richard Crowe, "New Opportunities Through Minority Initiatives in Space Science (NOMISS)," *NASA Office of Space Science Education and Public Outreach Conference 2002*.

Apache spiritual practices and claims, igniting a heated religious debate that has no counterpart at the other two sites.³⁵

The 'science vs. culture' narrative in which indigenous claims on the land are viewed as subordinate to scientific interests has also manifested through anti-colonialist rhetoric deployed at all three sites of controversy. Strikingly, members of the Tohono O'odham, Native Hawaiian, and San Carlos Apache communities have independently framed the observatories as colonialist projects. For the Native populations considered in this dissertation, telescopes have become a threatening symbol of cultural genocide linked to a colonialist past. The telescopes, perceived as the pet projects of white men, are viewed as instruments of power and conquest. As Anishinaabe scholar Winona LaDuke asserts in her analysis of the Mt. Graham controversy, the telescopes are emblematic of "the relativity of political and economic power in our society."³⁶ By identifying how the indigenous politics and dominant narratives produced by Native activists have been inscribed by the legacies of colonialism, this study fits squarely within recent Science and Technology Studies efforts to examine the role of colonialism in shaping hierarchical and racialized understandings of Native peoples, nature, and technology.³⁷

³⁵ Following a 1991 resolution passed by the San Carlos Apache Tribe declaring that Mt. Graham is sacred to the tribe, Father George Coyne, then Director of the Vatican Observatory and Associate Director of the University of Arizona's Steward Observatory, formally challenged to the sacredness of the mountain based on its lack of shrines and other physical evidence. Father Coyne issued a position paper in 1992 stating that the Apaches had failed to convince the Catholic Church of Mt. Graham's sacred status through Apache oral history and statements made by anthropologists, explaining "We are not convinced by any of the arguments thus far presented that Mt. Graham as a whole possesses such a sacred character that it precludes responsible and legitimate use of the land." Father Coyne's entire statement as well as other related statements on the religious and environmental significance of Mt. Graham are available online at the Vatican Observatory website. See George V. Coyne, S.J., Director, Vatican Observatory, *Statement on MGIO and American Indian Peoples*, Thursday 05 March 1992. Available at www.vaticanobservatory.org/index.php?option=com_content&view=article&id=105. Accessed 21 March 2013.

³⁶ LaDuke, "God, Squirrels, and the Universe," p. 20.

Scientists produce their own symbolic narratives about the mountain, and I trace the moral and spiritual dimensions of the physical landscape revealed in scientists' stories about the mountain's significance. The relationship between narrative and scientific identity has been explored by anthropologist of science Sharon Traweek, who finds a close correlation between the male-dominated field of high-energy physics and the "male tales" of its practitioners.³⁸ In her ethnography of high-energy particle physicists, Traweek analyzes physics as culture and effectively demonstrates that the social organization of physicists in the 1970s was tied to the images they constructed of themselves and their world.³⁹ In addition to evaluating scientists' narratives about the mountain, my study also delves into historically specific narratives centering on professional identity in order to evaluate the largely incompatible epistemologies of the conservation biologist and the astronomer in these debates. Namely, I shed light on how astronomers and conservation biologists defined themselves and the moral imperatives of their work from the late 1950s to the early twenty-first century to produce a multivocal account of these episodes of conflict.

³⁷ See essays in Sandra Harding, ed., *The Postcolonial Science and Technology Studies Reader* (Durham, NC: Duke University Press, 2012); Harding, *Sciences from Below: Feminisms, Postcolonialities, and Modernities* (Durham, NC: Duke University Press, 2008). Jenny Reardon and Kim TallBear find that social constructions of whiteness, property, and the human sciences related to the legacies of colonialism have enabled anthropologists and geneticists to rationalize the appropriation of Native American DNA as a "civilizing" project that benefits humanity. See Reardon and TallBear, "Your DNA Is Our History": Genomics, Anthropology, and the Construction of Whiteness as Property," *Current Anthropology* 53 (2012): p. S233-S245.

³⁸ See Traweek, *Beamtimes and Lifetimes: The World of High-Energy Physicists* (Cambridge: Harvard University Press, 1988), especially Chapter 3, p. 74-105 for more on the role of narrative in constructing scientific meaning.

³⁹ Hugh Gusterson's study of nuclear scientists probes the culture of Lawrence Livermore National Laboratory scientists through ethnographic observation in much the same way, imposing cultural anthropological frameworks such as 'rites of passage' onto scientific and bureaucratic processes such as obtaining security clearances. See Gusterson, *Nuclear Rites: A Weapons Laboratory at the End of the Cold War* (Berkeley: University of California Press, 1998). Nasser Zakariya has investigated the making of "the scientific epic," or a universal history of biological and material origins produced through scientific narratives. See Nasser Basem Zakariya, *Towards a Final Story: Time, Myth and the Origins of the Universe*, Thesis (Ph.D., Dept. of History of Science). Harvard University, 2010.

Both scientific and nonscientific stakeholders in the mountains relied on narrative to effectively mobilize communities in support or opposition of the observatories.⁴⁰ As I will show, each controversy over telescope construction is rooted in a spectrum of cultural constructions of the mountain ranging from the scientific to the spiritual, and both scientists and nonscientists have frequently relied on the discourse of “culture” in generating narratives about the mountain that have been used to settle legal issues, to garner public support, or to reinforce individual and group identity. Historians, anthropologists, and sociologists have well historicized the notion that nature is divorced from culture.⁴¹ This approach forms the cornerstone of anthropologist Stefan Helmreich’s ethnography of marine microbiologists who began to re-conceptualize the ocean as the domain of microbes.⁴² Helmreich’s scientists believe in distinct entities called ‘nature’ and ‘culture,’ yet he emphasizes that “in this process of either affirming or denying ‘culture’ as a conditioning frame for understanding ‘nature,’ these biologists produce the very idea of ‘context’ that allows them to parse the world in this way.”⁴³ Just as Helmreich has linked marine microbes to social, political, and economic visions of the ocean to show that

⁴⁰ My use of the term “stakeholders” is meant to connote the parties invested in the mountains but in no way implies that the power relations among these groups are uniform.

⁴¹ The literature on the nature/culture divide is extensive and marked by disciplinary orientations. For a sampling of perspectives from anthropology, political ecology, and religious studies, see essays in Klaus Seeland, ed., *Nature is Culture: Indigenous Knowledge and Socio-Cultural Aspects of Trees and Forests in non-European Cultures* (London: Intermediate Technology Publications, 1997); Philip P. Arnold and Ann Grodzins Gold, eds., *Sacred Landscapes and Cultural Politics: Planting a Tree* (Burlington, VT: Ashgate Publishing Company, 2001); Helaine Selin and Arne Kalland, eds., *Nature Across Cultures: Views of Nature and the Environment in Non-Western Cultures* (Boston: Kluwer Academic Publishers, 2003). In environmental history, see essays in *Uncommon Ground: Rethinking the Human Place in Nature*, William Cronon, ed., (W. W. Norton & Company, 1996). Native American scholar Jack D. Forbes dismisses the notion that nature and culture are contrasting concepts in Native American thinking. See Forbes, “Nature and Culture: Problematic Concepts for Native Americans,” in *Indigenous Traditions and Ecology: The Interbeing of Cosmology and Community*, John A. Grim, ed. (Cambridge, MA: Harvard University Press), p. 103-122; p. 122.

⁴² See Stefan Helmreich, *Alien Ocean: anthropological voyages in microbial seas* (Berkeley: University of California Press, 2009).

⁴³ *Ibid*, p. 159.

that the ocean itself is a cultural object, I will establish that the mountain is a culturally-produced artifact.

In environmental history, the ‘nature as culture’ framework has also been productively employed to show how valuations of place are historically situated. William Cronon has asserted that nature is, among other things, “a human idea, with a long and complicated cultural history which has led different human beings to conceive of the natural world in very different ways.”⁴⁴ In other words, nature can be viewed as the intersection between the outside world and the historically and culturally constructed ideas, values, and beliefs that groups project on that world. When different visions of nature collide, the result is what environmental historians term a *contested terrain*, and James D. Proctor has argued that the old-growth forests of the Pacific Northwest became “a contested moral terrain” in which the very concept of ‘forest’ embodied a view of nature that was wholly contingent upon the different values and agendas of the parties invested in its use or preservation.⁴⁵

Following the lead established by Helmreich, Cronon, Proctor, and others, I suggest that the ‘nature as culture’ framework can be usefully applied to the conception of ‘mountain’—in this case, Kitt Peak, Mauna Kea, or Mt. Graham—as a continuum of culturally constructed landscapes ranging from the sacred peak to the ideal observing site.⁴⁶ The same mountain may

⁴⁴ Cronon, “Forward,” in *Uncommon Ground*, p. 20.

⁴⁵ James D. Proctor, “Whose Nature? The Contested Moral Terrain of Ancient Forests,” in *Uncommon Ground*, p. 269-297; p. 288.

⁴⁶ I am also influenced here by key works in the history of twentieth-century American environmentalism, including Timothy Beatley and Kristy Manning, *The Ecology of Place: Planning for environment, economy, and community* (Washington, D.C.: Island Press, 1997); Theodore Catton, *Inhabited Wilderness: Indians, Eskimos and National Parks in Alaska* (Albuquerque, NM: University of New Mexico Press, 1997); William Cronon, *Nature’s Metropolis: Chicago and the Great West* (New York: W.W. Norton, 1991); Jack E. Davis, *An Everglades Providence: Marjory Stoneman Douglas and the American Environmental Century* (Athens: University of Georgia Press, 2009); Michael Egan, *Barry Commoner and the Science of Survival: the*

be described as “the sacred temple of the Supreme Being,”⁴⁷ or alternatively, as “Earth’s connecting point to the rest of the Universe”⁴⁸ because both supporters and opponents of telescope construction adhere to a system of environmental ethics based on distinct views of nature, science, and spirituality. Competing claims on the mountain landscape can thus be traced to culturally-informed beliefs about its assumed value.⁴⁹ Clearly, then, there has never been just *one* mountain, just as there has never been a single unifying set of values governing the mountain’s significance and use. Different perspectives on the meaning of ‘science’ and ‘nature’ influenced by particular systems of environmental ethics have resulted in different historical narratives about these contested landscapes. Thus by seeking to complicate the historical actors’ conceptions of the mountain as separate from or intrinsically part of culture,

Remaking of American Environmentalism (Cambridge, MA: MIT Press, 2007); Robert Gottlieb, *Forcing the Spring: the Transformation of the American Environmental Movement* (Washington, D.C.: Island Press, 2005); Andrew Hurley, *Environmental Inequalities: Class, Race, and Industrial Pollution in Gary, Indiana, 1945-1980* (Chapel Hill: University of North Carolina Press, 1995); Karl Jacoby, *Crimes Against Nature: Squatters, Poachers, Thieves, and the Hidden History of American Conservation* (Berkeley: University of California Press, 2001); Arthur F. McEvoy, *The Fisherman’s Problem: Ecology and Law in the California Fisheries, 1850-1980* (Cambridge: Cambridge University Press, 1986); Gregg Mitman, *The State of Nature: Ecology, Community, and American Social Thought, 1900-1950* (Chicago: The University of Chicago Press, 1992); John Opie, *Nature’s Nation: An Environmental History of the United States* (Fort Worth: Harcourt Brace College, 1998); Ted Steinberg, *Down to Earth: Nature’s Role in American History* (New York: Oxford University Press, 2002); Bret Wallach, *At Odds with Progress: Americans and Conservation* (Tucson: University of Arizona Press, 1991).

⁴⁷ “Protect the Sacred Temple of Mauna Kea,” KAHEA: The Hawaiian-Environmental Alliance. www.kahea.org. Accessed 13 September 2010.

⁴⁸ Institute for Astronomy, “About Mauna Kea Observatories.” www.ifa.hawaii.edu/mko/about_maunakea.shtml. Accessed 21 September 2010.

⁴⁹ Environmental ethics is concerned with analyzing the value assigned to nature. There are several well-established categorizations of value, including instrumental and intrinsic. Instrumental value in nature assigns a worth contingent upon its benefit to humans, while intrinsic value in nature refers to assigning a worth independent of human benefit. In the debate over telescope construction on sacred sites, the instrumental value of the mountain is linked to its scientific promise, while its intrinsic value is linked to its spiritual significance or the presence of important ecosystems and species. For a fuller discussion of environmental ethics, see Joseph R. Des Jardins, *Environmental Ethics: An Introduction to Environmental Philosophy* (Belmont, Calif.: Wadsworth, 1993); Susan J. Armstrong and Richard G. Botzler, eds., *Environmental Ethics: Divergence and Convergence* (New York: McGraw Hill, 1993).

my study enters into a conversation with anthropologists and environmental historians who have long argued that natural objects must also be viewed as cultural objects.

Through a comparative study of the dialectical relationship between the *cultural* construction of “the mountain” and the *physical* construction of telescopes at Kitt Peak, Mauna Kea, and Mt. Graham, I suggest that the competing claims and conflicting narratives surrounding telescope development at these three sites provides a means of exploring shifting trends in control, authority, access, and rights tied to different social, cultural, political, and environmental contexts. I will show that disputes over the ownership and rights to particular landscapes—raised at a time when members of native and environmental groups were increasingly gaining moral and legal standing—represented the changing value commitments of both scientists and nonscientists from the mid-1950s to the early twenty-first century.⁵⁰ By interrogating scientific, spiritual, and environmental interpretations of telescope development on sacred peaks, then, this dissertation provides new insight into how scientists and the people they interacted with came to conceive of their identity, their relationship to nature, and nature itself in the postwar period.

The different cultural worlds of scientists and nonscientists have produced a multiplicity of narratives about the mountain that reflect a wide range of understandings about nature. I argue that probing the historical origins of these different narratives is integral to understanding the social and cultural consequences of intersections between science and the ‘public,’ though

⁵⁰ The category of “value” has been analyzed within a wide range of disciplines, and here I am guided by the approach taken by Loren Graham’s *Between Science and Values* (New York: Columbia University Press, 1981). Graham treats value as a philosophical position referring to “what people think to be good” (p. 4). However, I do not employ Graham’s taxonomy of expansionists and restrictionists as a means of categorizing the relationship between science and values. Expansionism assumes that science can affect or reinforce values, while restrictionism assumes that science is value-free. Graham favors expansionism because he is chiefly concerned with highlighting a causal relationship between science and values in the twentieth century using examples from the physical and biological sciences. In my study, however, I am more interested the two-way relationship between science and social values.

the historical actors in this study clearly stand apart from the ‘general public’ in meaningful ways. Native and environmentalist groups are not merely a subset of the nonscientific public; their narratives about the mountain landscapes are undergirded by strong investments in the politics of land rooted in different historical and cultural contexts. Throughout this dissertation, I show how the narratives of specific Native and environmentalist communities have been fashioned and re-fashioned according to changing priorities and privileges, yet this study also has much to say about broader trends in the history of Big Science.

A comparative history of these episodes of conflict provides a means of accessing a broader social and cultural history of late twentieth-century Big Science in America centered on confrontations with the ‘public.’⁵¹ Though high-energy physics is commonly considered the prototypical Big Science field in the postwar period, astronomical practice was also reconfigured on a drastically magnified scale in the United States following World War II. The federal government sponsored the development of large, highly mechanized instrumentation, and a new influx of astronomers from a wide range of specializations engaged in multinational research programs. Historians have critically examined the sociological, institutional, and material transformations in scientific practice and identity associated with the advent of large-scale, federally funded research involving multidisciplinary and multinational teams of scientists working in collaboration.⁵² However, few studies have endeavored to show how negative public

⁵¹ It is important to note that while I am drawing upon the notion of confrontation between ‘science and the public’ as a reference point, this study will consider the ‘public’ as a heterogeneous and historically unstable entity.

⁵² On the perceived distance between experimental physicists and their instruments due to new electronic technology, see Paolo Brenni, “Physics Instruments in the Twentieth Century,” in *Science in the Twentieth Century*, John Krige and Dominique Pestre, eds., (Taylor & Francis, 1997), p. 754-755. The argument that experimentalists experienced a distressing loss of control over their research due to Big Science is found in Peter Galison, Bruce Hevly, and Rebecca Lowen, “Controlling the Monster: Stanford and the Growth of Physics Research, 1935-1962,” in *Big Science: The Growth of Large-Scale Research*

opinion has affected scientists associated with Big Science projects personally and professionally.

How did scientists make personal and professional accommodations in order to live and work within communities hostile to their science throughout this period? In the wake of major transformations in popular and legal visions of civil rights, religious freedoms, and the environment, how did opposing epistemological claims derived from expert and local knowledge influence the changing “moral economy” of science?⁵³ In other words, did unfavorable public opinion contribute to a refashioning of scientific identity, belief, and ultimately, practice? The larger implications of opposition to telescope construction on mountains viewed as sacred peaks cannot be understood solely from the perspective of the scientific community, however. These controversies also shed light on the impact of Big Science projects on neighboring communities.

Since much of the existing literature on Big Science has focused on how scientists came to terms with a new style of doing science, the reactions of nonscientists have not received wide attention, and public reactions to astronomical observatories have been virtually ignored.⁵⁴ My

(Stanford: Stanford University Press, 1992), p. 46-77, and Galison, *Image and Logic: A Material Culture of Microphysics* (Chicago: University of Chicago Press, 1997), p. 306-307.

⁵³ The term “moral economy” was first coined by E.P. Thompson in 1971 in the context of eighteenth century Britain. The concept is outlined in Thompson, *The Making of the English Working Class* (New York: Vintage Books, 1961) and Thompson, “The Moral Economy of the English Crowd in the 18th Century,” *Past & Present* 50 (1971): p. 76-136. Adapting this term to scientific practice, Lorraine Daston has argued that characteristic scientific ideologies of objectivity and empiricism necessitate moral economies in Daston, “The Moral Economy of Science,” *Osiris*, 2nd Series, Vol. 10, *Constructing Knowledge in the History of Science* (1995): p. 2-24. Patrick McCray has further articulated the dimensions of astronomy’s moral economy with respect to access to and control of astronomically valuable resources such as funding and observing time in McCray, “Large Telescopes and the Moral Economy of Recent Astronomy,” *Social Studies of Science* 30 (2000): p. 695-711.

⁵⁴ The backlash from the Menlo Park neighborhood over the construction of the Stanford Linear Accelerator Center represents one notable instance of community opposition to a Big Science project, though it has not been well chronicled. For a brief account, see W.K.H. Panofsky, *Panofsky on Physics*,

dissertation remedies this historiographical lacuna by providing a new history of Big Science that evaluates the impact of the dramatically increased scale of scientific enterprise in the postwar era by considering both the plight of scientists *and* members of the public. I consider reactions to the telescope controversies by members of the general public throughout this dissertation, but my main focus is on the environmentalist and Native populations most directly engaged in the politics of land. Analyzing the controversies that resulted from competing claims to the mountains made by these groups, I build upon the rich body of literature on public disputes over science and technology in the United States. Dorothy Nelkin has argued that “controversies matter and must be taken seriously as an indication of public attitudes towards science,” and to

Politics, and Peace: Pief Remembers, (New York: Springer Science and Business Media, 2007), p. 93. The saga of Project Sanguine, the Navy large antenna construction project first proposed in the early 1960s, provides another example of community mobilization against Big Science. Angry residents in Wisconsin and Texas who worried the large antenna would jeopardize their recreational activities and home values formed political action committees and joined with student environmental groups to oppose the project. For more on Project Sanguine, see Kelly Moore, *Disrupting Science: Social Movements, American Scientists, and the Politics of the Military, 1945-1975* (Princeton, NJ: Princeton University Press, 2008). Antinuclear activism among the communities surrounding the nuclear weapons laboratories at Lawrence Livermore National Laboratory and Los Alamos National laboratory is detailed in Hugh Gusterson’s *Nuclear Rites* and Joseph Masco’s *The Nuclear Borderlands: The Manhattan Project in Post-Cold War New Mexico* (Princeton: Princeton University Press, 2006), respectively. In these richly detailed ethnographies, Gusterson and Masco explore the moral dilemmas confronted by scientists as well as the varied attitudes about the laboratories among nonscientific groups ranging from antinuclear activists to indigenous communities. Masco’s study is discussed more fully later in this introduction and throughout the dissertation. The telescope controversies at Kitt Peak, Mauna Kea, and Mt. Graham have been explored by activist historians, including Native activists and scholars. Joel T. Helfrich, an activist who received his PhD in history from the University of Minnesota (UM) in 2010, wrote his dissertation on the history of conflict between the San Carlos Apaches and Mt. Graham International Observatory with the goal of demonstrating that UM’s involvement in the observatory perpetrated a colonialist agenda. See Helfrich, “A Mountain of Politics: The Struggle for *dził nchaá sí’an* (Mount Graham), 1871-2002.” Dissertation, University of Minnesota (2010). Native American scholar and activist Winona LaDuke’s essay on the Mt. Graham conflict takes a similar stance, associating the observatory with colonialism in LaDuke, “God, Squirrels, and the Universe.”

that end, this dissertation traces shifting moral judgments of astronomy among nonscientists invested in or following the observatory debates.⁵⁵

More generally, these episodes of conflict over telescope construction can be regarded as a form of public engagement with astronomy, and in this way, I draw from and contribute to scholarship on participatory approaches in science and technology. Much of what Sheila Jasanoff has termed the “participatory turn” in Science and Technology Studies has focused on the influence of nonscientists in science policy, or the so-called ‘top-down’ approach.⁵⁶ As discussed more fully in chapter three, the participatory turn in science and technology policy was largely stimulated by public outcry over warfare and environmental pollution.⁵⁷ This dissertation expands upon the existing historiography’s focus on the formation of scientific *policy*, showing that nonscientists also entered the scientific domain in the postwar period by mooring narratives about the threats of scientific *development* to the American legal system. My examination of the legal and political mobilization of anti-observatory narratives by Native and environmentalist groups sheds new light on the implications of public participation in science by considering citizen opposition to the development of scientific research facilities.

⁵⁵ Dorothy Nelkin, “Science Controversies: the Dynamics of Public Disputes in the United States,” in *Handbook of Science and Technology Studies*, Sheila Jasanoff, Gerald E. Markle et al., ed. (Thousand Oaks: Sage Publications, 1995): 444-456; p. 456.

⁵⁶ Jasanoff, “Technologies of Humility: Citizens Participating in Governing Science,” *Minerva* 41 (2003): p. 223-244. The literature on the development of science policies after World War II is vast. See David H. Guston, “Evaluating the first U.S. census conference: the impact of the citizens’ panel on telecommunications and the future of democracy,” *Science, Technology, & Human Values* 24 (1999): p. 451-482; Daniel Lee Kleinman, ed., *Science, Technology, and Democracy* (Albany: State University of New York Press, 2000); Alan Irwin, *Citizen Science: A Study of People, Expertise, and Sustainable Development* (London: Routledge, 1995); James C. Petersen, ed., *Citizen Participation in Science Policy* (Amherst: University of Massachusetts Press, 1984); Frank N. Laird, “Participatory analysis, democracy, and technological decision making,” *Science, Technology, & Human Values* 18(1993): p. 341-361; Malcolm L. Goggin, ed., *Governing Science and Technology in a Democracy* (Knoxville: University of Tennessee Press, 1986).

⁵⁷ See Aant Elzinga and Andrew Jamison, “Changing policy agendas in science and technology,” in *Handbook of Science and Technology Studies* (1995) and other essays in this edited volume.

By probing the cultural politics of large observatories through the exploration of indigenous perspectives, I also build upon existing scholarship at the intersection between anthropology and science studies such as Joseph Masco's post-Cold War ethnography of security debates centered on Los Alamos National Laboratory.⁵⁸ In a refreshing departure from Cold War scholarship that has primarily focused on the nuclear weapons project from the scientists' perspective, Masco explores how nuclear testing and the aftermath of the Cold War was experienced by neighboring indigenous communities and antinuclear activists. In northern New Mexico, Masco asserts that the nuclear weapons laboratory at Los Alamos was regarded as a new form of Western colonization for some members of Native American and Hispanic communities from the surrounding regions.

Particularly relevant to my dissertation is Masco's examination of the long-term effects of the bomb "on those who have lived for more than a half century within a plutonium economy that has dramatically reshaped the terms of their everyday lives."⁵⁹ Strikingly reminiscent of the objections raised by Native populations and environmentalists at mountain observatories, the indigenous groups and antinuclear activists in Masco's study have publicly decried the ecologically and spiritually damaging consequences of nuclear testing on sacred land. By broadening the scope of the historical participants in the Manhattan Project, Masco cogently argues that the different cultural experiences of the bomb reveal "how citizens engage their government and understand their long-term biological, ecological, and cultural security."⁶⁰ In much the same way, my examination of indigenous populations in Arizona and Hawai'i who confronted telescope construction on sacred mountains serves as a mirror of shifting public

⁵⁸ Masco, *The Nuclear Borderlands*.

⁵⁹ *Ibid*, p. 333.

⁶⁰ *Ibid*, p. 39.

understandings of science while simultaneously highlighting the changing contours of social and political agency among American minorities as new legal and social categories of identity and citizenship gradually emerged.⁶¹

My approach is further guided by studies of race, class, and gender in grassroots and popular movements in the United States during the latter part of the twentieth century. Charles M. Payne's *I've Got the Light of Freedom: the Organizing Tradition and the Mississippi Freedom Struggle* departs from standard histories of the civil rights movement centered on great leaders by focusing instead on the success of the movement through ordinary people involved in grassroots activism.⁶² Payne's approach does not represent an entirely new interpretation of the dominant narrative of the civil rights movement, but rather, a retelling from the bottom up.

Similarly, Belinda Robnett overturns the traditional view that male leaders were responsible for successful outcomes in the civil rights movements of the 1950s and 1960s.⁶³ Instead, Robnett chooses to highlight African-American women's participation in the civil rights movement, drawing the unexpected conclusion that gender exclusion from leadership positions actually strengthened the movement by creating a social space for local leadership. Ironically,

⁶¹ Unlike the astronomers featured in my study, who continue to grapple with the consequences of building observatories on mountains valued for environmental and cultural resources, Masco's scientists have characterized their work with increasing moral detachment from the consequences of nuclear weapons since virtual detonations supplanted the visceral impact of actual detonations. Another key difference between Masco's community of nuclear scientists and the astronomy communities in this dissertation is the nature of the science itself. Nuclear science is shrouded in secrecy and has the potential to affect the health of neighboring populations, which has fueled a distrust of science and fears about health and safety among the local communities most directly affected by the lab's activities. The Pueblo population has been shown to have elevated cancer rates linked to participation in cleanup from nuclear testing, and archaeological sites have been destroyed through the expansion of the lab's radioactive waste site. See Masco, *The Nuclear Borderlands*, p. 138; 140-141; p. 149.

⁶² Charles M. Payne, *I've Got the Light of Freedom: the Organizing Tradition and the Mississippi Freedom Struggle* (Berkeley: University of California Press, 1996).

⁶³ Belinda Robnett, "African-American Women in the Civil Rights Movement, 1954-1965: Gender, Leadership, and Micromobilization," *American Journal of Sociology* (May 1996): p. 1661-1693.

Robnett finds that women were empowered by the inability to take on formal leadership roles because they could mobilize politically with relative autonomy. Building upon the insights provided by Payne and Robnett, I am interested in a bottom-up history of socially and politically marginalized groups such as Native Americans and Native Hawaiians.

Much of the relevant historiography on indigenous peoples has been produced by Western scholars using English-language sources. In recent years, however, Native scholars have examined archival materials in Native languages and drawn from oral histories and personal experiences as indigenous rights activists to provide insights into indigenous identity, land rights, and sacred sites struggles from a non-Western perspective. Native scholars have argued that the kinds of histories chronicled in this dissertation must be told from a Native viewpoint because historians and anthropologists have frequently ignored Native voices. In this way, many Native scholars make a compelling argument for the turn to Native scholarship as a means of “decolonizing” indigenous research methodologies and dominant historical narratives.⁶⁴

While Native scholars are best positioned to re-interpret indigenous histories shaped by uneven power relations, this dissertation aspires to contribute to this emergent focus on preserving Native voices in scholarly writing by highlighting the stories and perceptions of Native groups and individuals whenever possible. I also rely on the perspectives of Native scholars and activists such as Haunani-Kay Trask, Noenoe Silva, Winona LaDuke, Vine Deloria, Jr., John R.

⁶⁴ Māori scholar Linda Tuhiwai Smith makes this argument well in *Decolonizing Methodologies: Research and Indigenous Peoples* (London: Zed Books, 2012). See also Susan A. Miller and James Riding In, eds., *Native Historians Write Back: Decolonizing American Indian History* (Lubbock, TX.: Texas Tech University Press, 2011); Devon Abbott Mihesuah and Angela Cavender Wilson, eds., *Indigenizing the Academy: Transforming Scholarship and Empowering Communities* (Lincoln, NE: Bison Books, 2004); Jodi A. Byrd, *The Transit of Empire: Indigenous Critiques of Colonialism* (Minneapolis, MN: University Of Minnesota Press, 2011).

Welch, and others.⁶⁵ Instead of locating the achievements of environmentalist or indigenous rights movements squarely in legislative acts, then, my study of rights-based grassroots campaigns centered on science and technology concerns draws on academic and nonacademic Native perspectives to point to a more nuanced history of agency among Native communities.

This dissertation also draws from and contributes to the growing scholarship derived from anthropology, religious studies, and environmental history that explores connections between religion and ecology, or spiritual ecology. The most prominent example of spiritual ecology scholarship is the *Religions of the World and Ecology* series edited by Mary Evelyn Tucker and John A. Grim, produced by the Harvard University Center for the Study of World Religions after three years of interdisciplinary conferences at Harvard on the intersection between religion and ecology.⁶⁶ The essays in these volumes analyze the integration of religious

⁶⁵ Key works authored by Native scholars consulted in this dissertation include Trask, *From a Native Daughter: Colonialism and Sovereignty in Hawai'i*; Noenoe Silva, *Aloha Betrayed: Native Hawaiian Resistance to American Colonialism* (Durham: Duke University Press, 2004); Jonathan Kay Kamakawiwo'ole Osorio, *Dismembering Lāhui: a history of the Hawaiian nation to 1887* (Honolulu: University of Hawai'i Press, 2002); LaDuke, "God, Squirrels, and the Universe," Vine Deloria, Jr., *Behind the Trail of Broken Treaties: An Indian Declaration of Independence* (Austin, TX: University of Texas Press, 1974); John R. Welch, "White Eyes' Lies and the Battle for dzil nachaa si'an," *American Indian Quarterly* 21 (1997): p. 75-109; Welch and Ramon Riley, "Reclaiming Land and Spirit in the Western Apache Homeland," *American Indian Quarterly* 25 (2001): p. 5-12; Chip Colwell-Chanthaphonh, "Western Apache Oral Histories and Traditions of the Camp Grant Massacre," *The American Indian Quarterly* 27 (2003): p. 639-666, p. 641. See also Colwell-Chanthaphonh, *Massacre at Camp Grant: Forgetting and Remembering Apache History* (Tucson: The University of Arizona Press, 2007); Colwell-Chanthaphonh, "The Camp Grant Massacre in the Historical Imagination," *Journal of the Southwest* 45 (2003): p. 349-369.

⁶⁶ The three-volume series *Religions of the World and Ecology* consists of *Buddhism and Ecology: the Interconnection of Dharma and Deeds*, Mary Evelyn Tucker and Duncan Ryūken Williams, eds. (Cambridge, MA: Harvard University Center for the Study of World Religions, Distributed by Harvard University Press, 1997); *Confucianism and Ecology: the Interrelation of Heaven, Earth, and Humans*, Mary Evelyn Tucker and John Berthrong, eds. (Cambridge, MA: Harvard University Center for the Study of World Religions, Distributed by Harvard University Press, 1998); *Indigenous Traditions and Ecology: the Interbeing of Cosmology and Community*, John A. Grim, ed. (Cambridge, MA: Harvard University Center for the Study of World Religions, Distributed by Harvard University Press, 2001). Similar approaches are found in *Deep Ecology and World Religions: New Essays on Sacred Ground*, David Landis Barnhill and Roger S. Gottlieb, eds. See also Laurel Kearns and Catherine Keller, eds., *Ecospirit: Religions and Philosophies for the Earth. Transdisciplinary Theological Colloquia, 1st ed.* (New York: Fordham University Press, 2007), especially "Grounding Theory-Earth in Religion and Philosophy," p. 1-20 and Jay McDaniel, "Ecotheology and World

practice and landscape use in diverse cultural and geographic settings, which is central to my study of the making and use of narratives in the telescope controversies. However, much of the existing literature is highly polemical since many scholars of spiritual ecology believe their research should promote an environmentalist agenda of “expanding the growing dialogue regarding the role of the world’s religions as moral forces in stemming the environmental crisis.”⁶⁷

While claiming to reject the myth of the ecologically ‘noble savage,’ much of this literature has nonetheless tended towards reification of non-Western indigenous groups as uniquely equipped to manage natural resources sustainably.⁶⁸ Shepard Krech has taken a more critical view, noting that the myth of the “ecological Indian” is a common stereotype that has been leveraged by Native communities and environmentalists to make land rights claims or to wage environmentalist campaigns, respectively.⁶⁹ Yet much of this historiography typically fails to present a balanced historical treatment of the interface between religion and ecology,

Religions,” p. 21-44; Lee Irwin, *The Dream Seekers: Native American Visionary Traditions of the Great Plains. The Civilization of the American Indian Series. Vol. 213* (Norman: University of Oklahoma Press, 1994).

⁶⁷*Indigenous Traditions*, Series Forward, xviii.

⁶⁸ The ‘ecologically noble savage’ terminology refers to the projection of a model of superior environmental consciousness on Native populations, an assumption that anthropologists have found increasingly problematic in recent years, yet it is largely embraced by scholars of spiritual ecology. To cite one characteristic example, Leslie Sponsel cautions that it is best “to avoid any simple or automatic acceptance” of the assumption that indigenous societies promote conservation and sustainability of their natural environment due to their spiritual beliefs. In his evaluation of Hawaiian spiritual practices, however, he concludes that “the Hawaiians had far less impact on the environment than subsequent colonists” and their “intimate and constant association with nature...must have facilitated the monitoring of natural resource fluctuations and environmental changes, including their own impact on ecosystems.” See Sponsel, “Is Indigenous Spiritual Ecology Just a New Fad?” in *Indigenous Traditions and Ecology*: p. 159-174; p. 163; 165.

⁶⁹ Shepard Krech, *The Ecological Indian: Myth and History* (New York: W. W. Norton & Co., 1999). See also Harvey A. Feit, “Myths of the Ecological Whitemen: Histories, Science, and Rights in North American-Native American Relations” in *Native Americans and the Environment: Perspectives on the Ecological Indian*, Michael E. Harkin and David Rich Lewis, eds. (Lincoln: University of Nebraska Press): p. 52-92.

instead narrowly recasting histories of world religions in terms of environmental ethics. Still, my study borrows from key questions posed by scholars of spiritual ecology. How do religious beliefs become intertwined with ecological systems? In other words, how does the *spiritual* ecology of an individual or community influence the *historical* ecology of a particular site? I contribute to this developing body of literature by forming a dialogue between histories of scientific and technological interventions in indigenous culture and studies of religion and the environment.

Related to the themes of spiritual ecology scholarship are gendered studies of natural resource management that seek to destabilize normative constructions of masculine and feminine identities. Here I am guided by the arguments found in 'ecofeminist' historiography that account for the symbolic and cultural domination of both women and nature through a conflation of women's identities and the natural world.⁷⁰ In much the same way, this dissertation challenges assumptions about relationships between the environment and identity in Western and non-Western populations by closely interrogating the environmental values of the participants in the telescope debates.

As I have shown, this dissertation is intended as a cross-disciplinary endeavor that rests on perspectives from anthropology, environmental history, literature on narrative, the history of astronomy and Big Science, and social and cultural history of the United States to probe the making of contested landscapes in postwar American astronomy. Throughout the following

⁷⁰ For a survey of ecofeminist critiques, see Karen Warren and Nisvan Erkal, *Ecofeminism: Women, Culture, Nature* (Bloomington: Indiana University Press, 1997), Rosemary Radford Ruether, "Deep Ecology, Ecofeminism, and the Bible," in *Deep Ecology and World Religions*, p. 229-241; Maria Mies and Vandana Shiva, *Ecofeminism* (London: Zed Books, 1993); Mary Mellor, *Feminism and Ecology* (Cambridge: Polity Press, 1997); Val Plumwood, "Feminism and Ecofeminism: Beyond the Dualistic Assumptions of Women, Men and Nature," *The Ecologist* 22 (1992): p. 8-13; Plumwood, *Feminism and the Mastery of Nature: Opening Out* (New York: Routledge, 1993); Noël Sturgeon, *Ecofeminist Natures: Race, Gender, Feminist Theory, and Political Action* (New York: Routledge, 1997).

chapters, I make three central arguments that draw in particular from narrative as a productive category of analysis.

First, I argue that anti-observatory narratives were only made possible when environmental and indigenous rights movements began to gain momentum in the United States. At Mauna Kea and Mt. Graham, the environmentalist narrative that telescopes were harmful to a “pristine” and fragile mountain ecosystem surfaced much earlier than Native objections depicting observatory development as a cultural and spiritual threat. American environmentalism was already well entrenched by the founding of those observatories in the late 1960s and late 1980s, respectively, which provided the essential social and political support for the mobilization of narratives about the “pristine” wilderness environment. At all three sites, the Native communities waited several years to speak out against the telescopes, but these historically marginalized groups lacking political recognition and power gradually began to mobilize through indigenous rights movements. Thus I show that the timing and form of anti-observatory narratives was historically tethered to the legal and political strength of environmental and indigenous rights movements.

Second, I assert that the formation or absence of “trading zones” at Kitt Peak, Mauna Kea, and Mt. Graham must be understood as a function of the mutability of narrative. Peter Galison has shown that even when two parties disagree about broader meanings, they may develop a “social, material, and intellectual mortar” to overcome cultural barriers.⁷¹ These regions of local coordination can be thought of as what Galison terms “trading zones,” and one of the chief goals of this dissertation is to explain how conflicting interpretations of landscape

⁷¹ See Peter Galison, *Image and Logic: A Material Culture of Microphysics* (Chicago: University of Chicago Press, 1997), chapter 9, p. 802.

boundaries and proper land use have nonetheless resulted in social and material trading zones where communication and even collaboration becomes possible.

At each site of conflict, I examine the physical and social environments of observatory-affiliated Visitor Centers, educational facilities, and public outreach programs for clues to extended collaborations between the astronomy and Native communities. For example, I locate observatory signs and artwork that merge Native and astronomical imagery as well as museum displays that integrate both scientific and indigenous perspectives. I suggest that at Kitt Peak and Mauna Kea, the astronomy communities modified central narratives about the mountain's significance to honor and accommodate Native perspectives, while the narratives issued by the Mt. Graham astronomy community formally denied the cultural construction of the mountain as a sacred site. Correspondingly, I argue, narratives formed the basis for successful trading zones at KPNO and the Mauna Kea International Observatory, while the relationship between Apaches and MGIO remains largely antagonistic.

Still, as I will show, efforts to bridge cultural gaps were often little more than symbolic gestures, and these regions of local coordination have not remained constant over time. Trading zones often rise and fall according to fragile social networks that depend on establishing a sustained cross-cultural dialogue through observatory employment or collaborative educational projects. In some cases, attempts to submerge cultural gaps in a common discourse of mutually agreed-upon concepts has effectively erased meaningful markers of cultural identity for both communities. Thus bridging the world of scientists and nonscientists through trading zones depends on both narrative and shifting social, economic, and political circumstances.

Finally, I argue that the communities of environmentalists and Natives who opposed telescope construction are representative of a little-explored, often invisible, yet highly

influential participant in postwar Big Science: the vocal nonscientific community that is a stakeholder in scientific practice done in its backyard. I show that when narratives are mediated by the American legal system, stories about the mountain are frequently imbued with the power to reshape or limit scientific development. Consequently, these episodes of conflicting narratives about science on a sacred mountain also reveal how public attitudes evolved towards science more generally from the 1950s to the early twenty-first century as Big Science became less heroic and more problematic for the American public.

A great privilege of doing recent history is engaging with the historical actors in one's study, and after establishing email correspondence with several of the participants in the observatory debates, I was fortunate to have the opportunity personally to witness the varied intersections between astronomy and Native communities at all three observatory sites. Whether tangibly aware of the tension and hostility between Native Hawaiians and scientists as an observatory board meeting briefly devolved into an angry shouting match, taking a personal tour of an observatory and noting the friendly interactions between Native employees and astronomers, or spending the night on Mauna Kea in the company of traditional cultural practitioners in anticipation of a Native Hawaiian equinox ceremony, these experiences immeasurably informed my understanding of this troubled history. To capture some of the complex cultural, scientific, and social resonances of the conflicts over the mountains, I have chosen to begin each chapter with a brief anecdote drawn from my observations and experiences carrying out this research.

Chapter Outline

Chapter One: People of the Desert, People of the Stars: Founding Kitt Peak National Observatory

In chapter one, I discuss the negotiations to secure land for a national observatory on Kitt Peak in 1958 on the Tohono O’odham (then called Papago) Reservation.⁷² By the close of the nineteenth century, American astronomy had risen to great prominence with the institutionalization of astrophysics at newly established observatories during a period that coincided with the rise of the United States as an economic-industrial manufacturing power. In the early twentieth century, American observatories no longer lagged behind their European counterparts and were widely recognized as leading centers of ground-based optical astronomy. The sudden dominance of American astronomy in the first half of the twentieth century is a puzzle typically explained by historians as a function of a uniquely American way of doing astronomy distinguished by a system of private patronage, amateur participation, the adoption of large reflecting telescopes instead of refractors, and the preference for observation over theory.⁷³ After World War II, the practice of astronomy in the United States was no longer

⁷² At this time, the Tohono O’odham were known as the Papago, a name originally given by conquistadores that means “tepany bean-eater,” but the tribe later reclaimed their ancestral name Tohono O’odham, which means “People of the Desert.”

⁷³ See Ronald E. Doel, *Solar System Astronomy in America: Communities, Patronage, and Interdisciplinary Research, 1920-1960* (Cambridge: Cambridge University Press, 1996); David DeVorkin, *Henry Norris Russell: Dean of American Astronomers* (Princeton: Princeton University Press, 2000); Stephen G. Brush, “Looking Up: The Rise of Astronomy in America, 1800-1950,” *American Studies* 20, 2 (1979): p. 41-67; Norriss S. Hetherington, “Mid-Nineteenth-Century American Astronomy: Science in a Developing Nation,” *Annals of Science* 40 (1983): p. 61-80; John C. Greene, “Some Aspects of American Astronomy, 1750-1815,” *Isis* 45 (1954): p. 339-358; John Lankford, with the assistance of Ricky L. Slavings, *American Astronomy: Community, Careers, and Power, 1859-1940* (Chicago: University of Chicago Press, 1997); Alexander Pang, “Technology, Aesthetics, and the Development of Astrophotography at the Lick Observatory,” in *Inscribing Science*, Timothy Lenoir, ed., (Stanford, CA: Stanford University Press, 1998), p. 223-248; Howard Plotkin, “Henry Tappan, Franz Brunnov, and the Founding of the Ann Arbor School of Astronomers, 1852-1863,” *Annals of Science* 37 (1980): p. 287-302; Marc Rothenberg, “Organization and

defined by these formerly characteristic elements as the discipline experienced dramatic changes in patronage patterns brought about by a great surge in federal funding and increasing specialization.⁷⁴

I begin this chapter by sketching the changing moral and political economy of astronomy for American astronomers and observatory administrators during the second half of the twentieth century. Patrick McCray has defined the “moral economy of astronomy” as unifying set of values, traditions, and expectations that dictates how the astronomy community approaches the distribution of coveted resources such as observing time and funding.⁷⁵ Within this competitive atmosphere, establishing a new national observatory was a contentious proposition within the American astronomy community.

After detailing the site selection process for KPNO, I trace the historical relationship of the Tohono O’odham to Kitt Peak and examine the federal Indian policies that established the Papago Indian Reservation and its early political structure. Astronomers initially characterized the lease negotiations with the Tohono O’odham as an arduous process, but later recalled the

Control: Professionals and Amateurs in American Astronomy, 1899-1918: *Social Studies of Science* 11 (1981): p. 305-325.

⁷⁴ For more on the issues dividing the postwar American astronomy community, see Doel, *Solar System Astronomy in America*; David DeVorkin, “Who Speaks for Astronomy? How Astronomers Responded to Government Funding After World War II,” *Historical Studies in the Physical and Biological Sciences* 31 (2000): p. 55-92; Patrick McCray, *Giant Telescopes: Astronomical Ambition and the Promise of Technology* (Cambridge, MA: Harvard University Press, 2004). The concern that federal funding would result in a loss of autonomy over astronomical research is conveyed by Gerard Kuiper, quoted in Otto Struve, “The General Needs of Astronomy,” *Publications of the Astronomical Society of the Pacific* 67 (1955): p. 214-223; p. 218. See also Robert W. Smith, with contributions by Paul A. Hanle, Robert H. Kargon, Joseph N. Tatarewicz, *The Space Telescope: A Study of NASA, Science, Technology, and Politics* (New York: Cambridge University Press, 1989).

⁷⁵ McCray, “Large Telescopes and the Moral Economy of Recent Astronomy.”

deliberations as “a simple matter.”⁷⁶ This chapter contextualizes the triumphal astronomers’ narratives of KPNO’s founding within the social and political climate of the early Cold War, when astronomers made themselves the heroes of a “scientific adventure story.”⁷⁷

Chapter Two: An Aging Observatory and a Sovereign Nation: the Changing Identities of Kitt Peak National Observatory and the Tohono O’odham

As chapter two makes clear, the questions about accountability, responsibility, and rights that would afflict later observatory planners looked very different at the time of KPNO’s founding. Although the Indian Citizenship Act of 1924 guaranteed citizenship to all Native Americans, the Tohono O’odham of the 1950s did not benefit from a unified indigenous rights movement. Thus the decision-making process surrounding KPNO’s founding was carried out largely by Tribal Council members, and I draw from O’odham sources to gain insight into how the lease negotiations were perceived by the Tohono O’odham. The Papago Tribal Council was consulted by Association of Universities for Research in Astronomy representatives, and tribal leaders initially refused to comply with the terms of the lease, but later signed an agreement approving the perpetual lease of Kitt Peak to the NSF.

In the years that followed, two sharply contrasting narratives emerged about the circumstances of the agreement. According to the KPNO website, after astronomers invited tribal leaders to visit the UA’s Steward Observatory, “the impressed tribal council” decided to

⁷⁶ Interview of Dr. Frank K. Edmondson by Dr. David DeVorkin on 2 February 1978, Niels Bohr Library & Archives, American Institute of Physics, College Park, MD USA. Available at www.aip.org/history/ohilist/4588_2.html#6. Accessed 10 Oct 2011.

⁷⁷ Morgan Monroe, Consultant, Public Information, National Science Foundation to Aden Meinel. “Background material and Kitt Peak National Observatory.” c. 1959. The University of Arizona Special Collections.

give their endorsement to the observatory project.⁷⁸ Roughly fifty years later, Tohono O’odham members presented a different version of this history in a lawsuit against the National Science Foundation (NSF), claiming that their interests were unfairly represented because the agreement was drafted at a time when the Bureau of Indian Affairs had greater influence over the terms of the lease. Due to the NSF’s stewardship of KPNO, an analysis of these different narratives serves as a lens into questions about how the state recognized the changing status of indigenous groups from the 1950s to the first decade of the twentieth century. Chapter two concludes with an analysis of the strengths and weaknesses of the trading zones established through the KPNO Visitor Center.

Chapter Three: From a Temple of the Gods to a Temple for the Stars: Colonialism, Environmentalism, and the Making of Mauna Kea International Observatory

Chapter three focuses on the competing claims to Mauna Kea, founded a decade after KPNO in a markedly different cultural and political climate. This chapter is primarily invested in analyzing the environmentalist opposition to the telescope project, which was almost immediate. However, the methods of navigation by stars employed by the ancient Polynesians would later come to dominate the narratives of both Native Hawaiians and astronomers as they argued for different uses of Mauna Kea, so I begin with a discussion of the history of the settlement of the Hawaiian Islands.

As I chronicle the transition from the Hawaiian monarchy to the annexation of the Kingdom of Hawai’i, I trace Mauna Kea’s historical significance to Native Hawaiians by incorporating Native Hawaiian narrative traditions called *mo’olelo*. I then describe how and why the first telescopes were built on Mauna Kea and the subsequent environmentalist accusations

⁷⁸ See “The Kitt Peak Virtual Tour: Tohono O’odham.” www.noao.edu/outreach/kptour/kpno_tohono.html. Accessed 28 September 2010.

of 'piecemeal' construction that triggered the development of multiple land-use plans. It is through this chapter that I begin to establish my argument that the modern environmental movement reconfigured observatory building and transformed astronomical practice by requiring astronomers to directly engage with the public through the Environmental Impact Statement process. In this chapter, I also note the malleability of astronomers' narratives, as entering into a sustained dialogue with concerned nonscientists prompted new narratives framing astronomy as environmentally sensitive. Ultimately, the environmentalist anti-observatory campaign led to a critical State Audit in 1998 that prompted a comprehensive new Master Plan. It was through the drafting of the 2000 Master Plan that Native Hawaiians were given an opportunity to voice their objection to the observatories on the grounds that Mauna Kea had historical and current religious value.

Chapter Four: Collaboration and Conflict: How Narrative, Identity, and Power Defined the Cultural Landscape of Mauna Kea

Many members of the Mauna Kea astronomy community felt blindsided by the sudden Native Hawaiian critique, and an exploration of the Native Hawaiian and astronomers' narratives about the mountain forms the subject of chapter four. Nearly thirty years elapsed before Native Hawaiians declared that Mauna Kea was a sacred site in town hall meetings and other public forums. This chapter argues that the nationalist movement known as the Hawaiian Renaissance was critical to establishing a Native claim on the mountain. From the beginning, the anti-telescope activism at Mauna Kea has been inscribed with a uniquely Hawaiian politics of sovereignty as the Office of Hawaiian Affairs, the Hawaiian Environmental Alliance, and other organizations have embedded the Mauna Kea controversy in the rhetoric of exploitation against

Native Hawaiians by Westerners.⁷⁹ Further, though the University of Hawai'i's Institute for Astronomy operates the multi-national Mauna Kea Science Reserve where the observatories are located, many Native Hawaiian groups hold the federal government equally accountable for perceived cultural and legal transgressions, so this controversy affords insight into conflicts between the state and indigenous groups on multiple registers.

After situating the Native Hawaiian opposition within the Hawaiian Renaissance, I turn my attention to sketching the geothermal energy controversies on the Big Island in the 1980s. As I will demonstrate, the geothermal energy debates established several important precedents for the Native-environmentalist alliances that would later coalesce around telescope opposition. Though Native Hawaiian opposition to telescope construction persists on the Big Island, several educational centers and public outreach programs fostered the development of unique trading zones that respectfully accommodated the narratives of both astronomers and Native Hawaiians. I argue that these successful trading zones have been established in large part due to the narrative shifts of the Mauna Kea astronomy community. Corresponding to different historical moments in the observatory conflict, astronomers' narratives ranged from neutrally framing the mountain as an ideal observing site to "a scientific umbilical cord to the mysteries of the universe."⁸⁰

This chapter also provides an opportunity to examine how observatory-building has changed in response to activist narratives. In my analysis of the proposed Thirty Meter

⁷⁹ For more on the changing political identities of Native Hawaiians, see Sally Engle Merry and Donald Brenneis, ed., *Law & Empire in the Pacific: Fiji and Hawai'i* (Santa Fe: School of American Research Press, 2003), especially chapters 5 and 7; Michael Kioni Dudley and Keoni Kealoha Agard, *A Call for Hawaiian Sovereignty* (Honolulu: Na Kane o Ka Malo Press, 1990).

⁸⁰ *Mauna Kea Comprehensive Management Plan. Prepared for the University of Hawai'i by Ho'akea, LLC dba Ku'iwalu*. April 2009, p. iii. Available at <http://www.malamamaunakea.org>. Accessed 30 December 2012.

Telescope project, I argue that virtually every element of telescope planning has been influenced by activist narratives, and I argue that this transformation is emblematic of the new publicly-engaged style of doing astronomy in the twenty-first century.

Chapter Five: Battle Over Earth and Sky: Environmental Opposition to the Mt. Graham International Observatory

When MGIO was first proposed in 1984, astronomers and science administrators instantly faced a strong environmentalist backlash because the observatory site was located in the only known habitat of the Mt. Graham Red Squirrel, a subspecies that was placed on the Endangered Species list shortly thereafter. By the 1980s, the environmental movement was in full swing, and a radical strain of environmentalists who advocated acts of ‘ecoterrorism’ to oppose development projects had recently emerged in the Southwest. Earth First! was responsible for bringing early attention to the observatory, and these radical environmentalists soon formed an uneasy alliance with more traditional environmental advocacy groups to thwart telescope construction.

This chapter juxtaposes the narratives of ‘mainstream’ environmentalist groups such as the Sierra Club, the environmental extremist group Earth First!, conservation biologists, and outdoor recreationists against narratives issued by the Mt. Graham astronomy community. I argue that narratives framing the mountain as a “pristine” wilderness, a “priceless biological museum,” or an ideal site for astronomy were leveraged to further the diverse agendas of multiple stakeholders in the fate of the mountain.

To make progress on the observatory after years of delays due to the grassroots environmentalist opposition, the Mt. Graham astronomy community sought a controversial

rider that was attached to the 1988 Arizona-Idaho Conservation Act.⁸¹ Through the rider, Congress permitted observatory development to proceed immediately without further adherence to the conditions of the Endangered Species Act and the National Environmental Policy Act. This decision was widely condemned by environmentalist groups across the United States and eventually sparked several lawsuits and a Congressional oversight hearing. In this chapter and the one that follows, I problematize the historical actors' narratives framing the debate as a battle between science and culture, arguing instead that the controversy is rooted in less obvious conflicts between *science vs. science*, *religion vs. religion*, and *culture vs. culture*.

Chapter Six: Squirrels, Spirits, Scopes, and the Pope: Defining the Sacred at Mt. Graham

Chapter six examines how sacred space was culturally constructed and continually renegotiated by radical environmentalists, San Carlos Apaches, and astronomers at Mt. Graham. I first chart the relationship of the Western Apaches to Mt. Graham to provide historical context for the Apaches' delayed entry into the Mt. Graham debates. Preserving Native heritage sites had not yet become a widespread social and political movement by the early 1980s when MGIO was first proposed. The American Indian Religious Freedom Act of 1978 aimed to protect the "inherent rights" of Native Americans to practice their traditional religions, "including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites,"⁸² but in practice, it afforded little protection to Native American claims on non-reservation land. After the San Carlos Apaches stepped forward to assert a religious claim on Mt. Graham, they formed an alliance with the longstanding

⁸¹ S. 2840 (100th): Arizona-Idaho Conservation Act of 1988. 18 November 1988.

⁸² Public Law 95-341 95th Congress. SJ. Res. 102. *Joint Resolution: American Indian Religious Freedom*. 11 August 1978.

environmentalist opposition and began to issue narratives constructing Mt. Graham as a 'sacred mountain' and a 'sacred ecosystem.'

In fact, both telescope opponents *and* advocates repeatedly deployed narratives describing Mt. Graham's sacrality. One antagonism that is entirely unique to the Mt. Graham case is the religious conflict involving Catholic astronomers associated with the Vatican Observatory and the traditional religious interests of the Apache. At KPNO and Mauna Kea, the sacred status of the mountains has never been in question. By contrast, after the Director of the Vatican Observatory declared that Mt. Graham was not a sacred site with religious or cultural significance, it became necessary for the Apaches to prove that they had always used the mountain for religious purposes. Supported by Forest Service records, the University of Arizona and the Vatican Observatory have produced an account of land use on Mt. Graham that is strikingly different than the Apaches' version of events.

While the Vatican has correlated a lack of ruins, shrines, and houses of worship on Mt. Graham with a lack of sacredness, the Apaches have argued that prayers and ceremonial traditions require privacy from outsiders, so the tribe was deliberately secretive about the use of the mountain until the MGIO was proposed. One of my goals in this chapter is to evaluate both narratives for the diversity of spiritual understanding and practices they represent. Through my examination of the discourse on the contested mountain landscape, I argue that conflicting interpretations of the mountain's sacred geography have profoundly limited both scientific and spiritual activities on Mt. Graham. This chapter also sheds light on the changing professional identities of astronomers. Local newspaper headlines widely condemned the Mt. Graham astronomy community, and astronomers frequently wrote letters to the editor to

combat their negative image, reflecting a broader trend in American astronomy toward defending the profession to the general public.

Conclusion: Narrative, Communication, and Conflict: the Making of Contested Landscapes in Postwar American Astronomy

In the concluding chapter, I draw comparisons between the histories of controversies at Kitt Peak, Mauna Kea, and Mt. Graham in order to provide a fuller account of the consequences of these disputes for the scientists and nonscientists involved. By interweaving these distinct histories of conflict, I trace the changing moral economy of American astronomy, which once revolved more exclusively around the allocation of scarce resources such as observing time and funding for much of the twentieth century. While these conditions continue to dominate and shape American astronomical practice, I contend that the telescope controversies also established new moral conventions governing resource allocation within the American astronomy community. As the American environmental and indigenous rights movements gained momentum, establishing new observatories or erecting telescopes meant demonstrating cultural and environmental sensitivity, even in the absence of preexisting cultural or environmental claims on the landscape. Astronomers negotiated these new challenges confronting their profession by formally establishing Education and Public Outreach (EPO) programs across the country in 2000, which played a major role in facilitating trading zones at Kitt Peak and Mauna Kea.⁸³

I also revisit the concept of the trading zone in this final analysis. How have seemingly incompatible views of nature, science, and spirituality have been negotiated at these sites to allow for effective cooperation? Have these widely disparate cultures been integrated into the

⁸³ See The National Aeronautics and Space Administration Office of Space Science Education and Public Outreach Annual Report FY 2001, p. 3. Available at science.nasa.gov. Accessed 08 December 2012.

social and physical landscape of the mountain geography through Visitor Centers and educational outreach programs, or are sacred places truly “rivalrous resources” in which one group’s use limits another’s?⁸⁴ Returning to my central argument, I show that while intractable narratives *defined* contested landscapes in postwar American astronomy, culturally inclusive narratives also led to trading zones of social, cultural, and material agreement.

⁸⁴ This characterization of sacred sites is made by Michael F. Brown in *Who Owns Native Culture?* (Cambridge, MA: Harvard University Press, 2003), p. 9. Government or university-sponsored programs that use astronomy as a catalyst for connecting Native cultural practices with science are common to all three observatories.

Chapter One

People of the Desert, People of the Stars: Founding Kitt Peak National Observatory

“...many individuals played important parts in the establishment of KPNO. One hopes that they will all be given recognition when a proper history of the observatory is written...The Tribal Council of the Papago Indians, on whose reservation Kitt Peak is located, deserves respect and appreciation for recognizing the importance of allowing astronomical research to be done on their sacred mountain.” –Leo Goldberg, Director of Kitt Peak National Observatory, 1971-1977 ¹

“I didn’t foresee the highly visible array of telescopes that would grow over the ensuing years. Neither did I anticipate the awful scar from the public access highway marring the western side facing Sells. If I had told them what can now be seen, the result might have been different.—Aden Meinel, first Director of Kitt Peak National Observatory²

Rising 6,875 feet above the Sonoran desert, the summit of Kitt Peak is adorned with silverleaf oak, pine trees, Manzanita bushes, and telescopes. Nearly thirty telescopes belonging to the National Optical Astronomy Observatory, including the four telescopes of Kitt Peak National Observatory, are scattered across the mountain’s upper elevations. As dusk approaches, several carloads of tourists make their way up the winding seven-mile access road that connects the observatory complex to the valley floor and the city of Tucson far below. As the cars pull into the visitor parking lot to participate in that evening’s public stargazing program, they are greeted by a curious artifact, one hybridizing astronomical and indigenous cultures. Painted on a 14-foot concrete donut that long ago served its purpose as a replica of a delicate telescope mirror, a large mural dominates one corner of the parking lot. The circular mural prominently features Tohono O’odham, the Native Americans who share their sacred mountain with this site of modern astronomy. The O’odham are depicted engaging in traditional cultural activities: gathering prickly pear fruit for their annual saguaro wine festival, weaving baskets from native grasses, and fashioning pottery. Above these idyllic scenes of O’odham life, a starry night sky is filled with instantly recognizable images of the planets in the solar system. People take turns snapping photos in front of the mural before leaving this symbol of coexistence between astronomers and the O’odham to explore the rest of the observatory.³

¹ Leo Goldberg. Harvard University Archives Series HUGFP 83.25 Publications and Presentations, 1941-1975, “Correspondence relating to Publications and Presentations, 1941-1975” Box 2, “The Founding of KPNO (Sky & Telescope),” p. 26.

² Aden B. Meinel, Marjorie P. Meinel, and Barbara Meinel Jacobs, *The Golden Age of Astronomy: The Kitt Peak Years* (2008). Unpublished manuscript, p.27. Courtesy of Helmut Abt.

³ These observations are drawn from my visit to the National Optical Astronomy Observatory at Kitt Peak in June 2012. Dean Ketelson, a longtime employee of Kitt Peak National Observatory (KPNO) and the University of Arizona’s Mirror Lab, led me on a tour of the major observatories, the KPNO Visitor Center, and other areas not accessible to the general public. My research agenda was focused on joining the Nightly Observing Program to witness how KPNO docents broach the subject of the observatory’s relationship with the Tohono O’odham in their interactions with the public, but I also had the opportunity to meet with a Tohono O’odham employee at the Visitor Center gift shop and museum and to dine with astronomers at the cafeteria earlier in the day.

More than fifty years earlier, the land that has become a parking lot was the site of a different merger between the cultural worlds of astronomers and the O’odham.⁴ Under an oak tree that has long since been chopped down and paved over, two scientists heading the site survey team for the newly proposed national observatory sat around a campfire with their Tohono O’odham companions and shared their respective names for the constellations glittering overhead. The conversation marked the tentative beginnings of a new relationship between the “People of the Desert,” as the Tohono O’odham are known, and the people who studied the stars that would have lasting consequences for both communities.

In the spring of 1956, astronomer Aden Meinel and engineer Harold Thompson rode to the summit of southern Arizona’s Kitt Peak on horseback, a journey that was the culmination of an exhaustive site survey to determine the location of a new national astronomical observatory.⁵ Kitt Peak is located on the *Schuk Toak* District of the Tohono O’odham Reservation (then *Papago*), and it is known to the Tohono O’odham as *Iolkam Du ‘ag*, or “*I’itoi’s garden*” after their creator *I’itoi*.⁶ After two unsuccessful attempts to persuade the Schuk Toak District Council to grant permission for site testing on Kitt Peak, astronomers had finally received

⁴ Aden Meinel stated that the campsite was “located right in the middle of what is now the parking lot” in his retrospective essay on the founding of Kitt Peak. See Meinel, Meinel, and Jacobs, p. 28.

⁵ Kitt Peak was named by Arizona surveyor George J. Roskrige after his sister Felipa Kitt. The ascent of Kitt Peak occurred on 14 March 1956. See Frank Edmondson, “AURA—KPNO Chronology, 1950-60,” p. 4. Files of Edward H. Spicer, Arizona State Museum. box 8, folder 47.

⁶ Until 1986, the Tohono O’odham were known as the Papago, but the tribe reclaimed its ancestral name Tohono O’odham in 1986 for political and cultural reasons discussed in chapter two. At this time, the tribe also adopted the name the ‘Tohono O’odham Nation’ (often abbreviated as TON). For a more detailed discussion of this transition, refer to chapter two. Through personal correspondence with Ofelia Zepeda, a Tohono O’odham scholar, poet, and Professor of Linguistics at the University of Arizona, I learned that referring to the “Tohono O’odham people” is considered redundant because “O’odham” means “the People,” so unless I am quoting another source, I refer to the people known as the Tohono O’odham by their chosen name, “Tohono O’odham” or simply “the O’odham.” As Native Hawaiian scholar and activist Haunani-Kay Trask observes, “most indigenous nations simply say they are the ‘people’ or the ‘people of the land,’ or ‘human beings.’ The sense of this identity is an attachment to place and a differentiation from other living things in the natural world.” See Trask, *From a Native Daughter: Colonialism and Sovereignty in Hawai’i* (Monroe, Me.: Common Courage Press, 1999). To avoid confusion, I refer to the historical entities by the names they were then assigned, such as the ‘Papago Tribal Council’ and the ‘Papago Reservation’. For time periods after 1986, I also employ the term ‘Tohono O’odham Nation’ or simply, ‘the Nation’ where relevant. Two final orthographical notes: there is no official consensus on the spelling and pronunciation of the O’odham’s name for Kitt Peak, so it appears as *Iolkam Du ‘ag* and *Iolgam Du ‘ag*, but I have chosen the former spelling for the sake of consistency in this dissertation. All O’odham words are italicized on their first use.

tribal approval to climb the mountain. Meinel and Thompson were accompanied on the trek to the summit by two Tohono O’odham guides, Al Martines and Raymond Lopez, as well as a journalist who chronicled the overnight expedition for a local newspaper. Two years later, the tribe signed a perpetual lease of their sacred mountain to the National Science Foundation (NSF) for the purposes of building an astronomical observatory.

This momentous event is chronicled on the Kitt Peak National Observatory (KPNO) webpage, which prominently displays a photo of the signing of the lease.⁷ Construction began immediately, and the first telescope was completed in 1960 with Tohono O’odham leaders present for the dedication ceremony. Today, Kitt Peak hosts two dozen telescopes belonging to KPNO and other American observatories and research institutions.⁸ The KPNO webpage dedicated to explaining the observatory’s relationship with the Tohono O’odham asserts that the observatory “continues to benefit the Tohono O’odham nation today” by providing jobs and selling traditional goods at the Visitor Center, a view that is certainly supported by some tribal members.⁹ Interviewed for a 2011 *Indian Country Today* article highlighting Kitt Peak’s open house for Tohono O’odham Nation members, a longtime Tohono O’odham employee at KPNO assured a reporter that “Kitt Peak has been good to us O’odham who have been employed there.”¹⁰ However, some tribal leaders believe the observatory’s economic boon to the tribe is

⁷ “Kitt Peak National Observatory: Tohono O’odham.” The Association of Universities for Research in Astronomy, Inc. Copyright 1999. www.noao.edu/outreach/kptour/kpno_tohono.html. Accessed 28 July 2010.

⁸ KPNO became part of the National Optical Astronomy Observatory (NOAO) in 1982, which also operates the Cerro Tololo Inter-American Observatory in northern Chile. For a complete list of all 24 telescopes on Kitt Peak, see “The Kitt Peak Virtual Tour: Tour Itinerary.” www.noao.edu/outreach/kptour/itinerary.html. Accessed 10 January 2013.

⁹ “Kitt Peak National Observatory: Tohono O’odham.”

¹⁰ Don Mendez, quoted in Jacelle Ramon-Sauberan, “Kitt Peak National Observatory and Native Americans Go Way Back,” *Indian Country Today*. 20 October 2011.

overshadowed by the destructive impact of erecting metal structures on a sacred site.¹¹ Though astronomers and observatory administrators maintain that they have proceeded with telescope development in full compliance with the terms of the land lease from the Tohono O’odham reservation, many tribal members demur that the boundaries of their sacred space cannot be so clearly delineated. According to Ernest Moristo, an anti-observatory leader of the O’odham Nation, “the whole mountain is l’itoi’s. When you harm a part of it, it hurts everything.”¹² As recently as 2005, the Tohono O’odham Nation filed a lawsuit against the National Science Foundation (NSF) seeking an injunction against a proposed \$13 million telescope and a revocation of the lease, belying the simple notion that the terms of the lease have remained acceptable to the tribe. To some tribal members, the telescopes dotting the horizon of Kitt Peak have come to symbolize a profound threat to traditional spiritual practices, while other tribal members and the astronomy community at KPNO argue that the observatory’s relationship with the tribe is one of mutual benefit. The KPNO narrative of positive relations between the scientific community and the O’odham Nation has remained fairly static over the years, but a unified Tohono O’odham narrative depicting an unfair representation of interests only emerged forcefully in 2005. Why did Kitt Peak become a contested landscape after nearly fifty years of amicable relations between the astronomy and O’odham communities?

In this chapter and the one that follows, I address this key question by situating a pivotal moment in American astronomy—the founding of a national observatory—within the context of the Native American rights movement in the United States. Much of the literature on the history of KPNO has been produced by astronomers who participated in its development, and

¹¹ “Kitt Peak National Observatory: Tohono O’odham.”

¹² Ernest Moristo, quoted in Joel Helfrich, Dwight Metzger, and Michael Nixon, “Native Tribes Struggle to Reclaim Sacred Sites,” *Twin Cities* 01 June 2005.

these accounts have largely overlooked or downplayed the role of the Tohono O’odham in shaping the establishment of the national observatory. Overwhelmingly hagiographic and institutional in focus, the historical actors have concentrated on the pioneering efforts of astronomers who secured O’odham reservation land for the new observatory in 1958. This historiography has devoted little attention to the complex political and cultural factors influencing the lease negotiations, however, and I seek to remedy these historical lacunae.¹³

In these two chapters, I argue that narratives issued by the scientific community and the Tohono O’odham Nation about the lease negotiations, the mountain landscape, and KPNO were politically and culturally-embedded artifacts of the interactions between Native Americans and the federal government from the late 1950s to the present. Before the new national observatory on Kitt Peak was even proposed, both the American astronomy and Tohono O’odham communities had independently reached a crossroads between adhering to traditional practices and adapting to changing economic, social, and scientific opportunities. Much was at stake with the founding of KPNO, an observatory that promised to further destabilize long-established community standards for members of both groups. After the lease was signed,

¹³ The published scholarship on the history of KPNO is quite limited and the involvement of the Tohono O’odham is frequently relegated to a brief sentence or paragraph on the signing of the lease. See, for example, Frank K. Edmondson, “AURA and KPNO: The Evolution of an Idea, 1952-58,” *Journal for the History of Astronomy* 22 (1991): p. 68-86; Edmondson, *AURA and its US National Observatories* (Cambridge: Cambridge University Press, 1997), p. 43; James Kloeppel, *Realm of the Long Eyes: A Brief History of Kitt Peak National Observatory* (Univelt, Inc., 1983), p. 17-20. Patrick McCray offers a more balanced history of KPNO, but makes no mention of the lease negotiations with the Tohono O’odham. See McCray, *Giant Telescopes: Astronomical Ambition and the Promise of Technology* (Cambridge, MA: Harvard University Press, 2004), p. 34-42. Joan April Suwalsky’s unpublished undergraduate honors thesis is highly critical of the historical interactions between the astronomy community and the Tohono O’odham, arguing that the O’odham were persuaded to sign the lease as a show of good citizenship. See Suwalsky, *Somewhere Touching Earth to Sky: The Lease of Kitt Peak and the Intersections of Citizenship, Science, and the Cultural Landscape*. Honors thesis. (Barnard College, 2005). The Arizona State Museum archives. For an overview of the struggles involved in building the National Radio Astronomy Observatory on Kitt Peak, which is not discussed in this dissertation, see astronomer M.A. Gordon’s personal account in Gordon, *Recollections of ‘Tucson Operations’: the Millimeter-Wave Observatory of the National Radio Astronomy Observatory* (Norwell, MA: Springer, 2005).

Tohono O’odham narratives about the relationship between the observatory and the tribe changed from generation to generation due to the shifting parameters of Native self-determination, economic necessities, and the advent of indigenous rights movements promoting the reclamation of land and identity. As I will show, Kitt Peak was culturally constructed by the Tohono O’odham as a source of employment and as a sacred mountain in different political and cultural contexts. Though initially anchored to popular attitudes about science and the space age during the late 1950s, astronomers’ narratives, on the other hand, remained relatively fixed. Even as Cold War concerns about demonstrating the superiority of American science became less urgent, astronomers persisted in constructing Kitt Peak as an ideal observing site. Narratives about the lease negotiations, however, proved to be more fluid for both astronomers and the Tohono O’odham due to changing community identities tied to the decline of the Cold War and the rise of Native American sovereignty movements in the United States.

The narrative of the lease negotiation was first culturally constructed by astronomers as a heroic adventure story demonstrating the triumph of American scientific superiority and later as a “simple” process of securing approval from the Tohono O’odham. Thirty years after the ‘Red Power’ movements of the 1970s spawned a cultural and political awakening in the Tohono O’odham Nation, tribal members began to formally characterize the lease negotiations and the perpetual lease itself as a relic of an era when Native American self-determination had not yet fully materialized. When the Tohono O’odham Tribal Council declared its opposition to the VERITAS project at KPNO in 2005, the observatory became both a symbol and a cause of a larger struggle to assert tribal sovereignty and cultural identity through land.

I begin this chapter by sketching the contours of the moral and political economy of astronomy during the immediate postwar years leading up to the site survey. I then provide a brief history of the Tohono O'odham with particular focus on their historical ties to Kitt Peak. I discuss the intersection of federal Indian policy and the path to tribal sovereignty in the first half of the twentieth century to lay the foundation for an analysis of the tribe's first encounters with the astronomy community and the subsequent lease negotiation. Immediately following the early negotiations, astronomers produced triumphant accounts of overcoming significant barriers related to O'odham spiritual beliefs. In the years that followed, astronomers slightly modified their narratives by minimizing the challenges of securing an agreement between the Tohono O'odham and the NSF. This chapter concludes with an analysis of both sets of narratives to support my contention that these discrepancies are rooted in the anxieties and aspirations of scientists in Cold War America.

The Moral Economy of Postwar Astronomy

Over a century before the founding of KPNO, John Quincy Adams proposed the notion of a federally funded astronomical observatory, but the idea was met with considerable resistance in Congress and in the popular press.¹⁴ With federal patronage out of the picture, early American observatories were instead founded largely through philanthropic ventures and most were associated with either small private colleges or with major universities such as the University of California and the University of Chicago. This unusual system of private patronage became one of the hallmarks of American astronomy, and it held distinct advantages. After lagging behind Europe for much of the nineteenth century, American astronomy rapidly rose to

¹⁴ On the controversy over John Quincy Adams' plans to encourage astronomy in the United States through a federally funded observatory, see Marlana Portolano, "John Quincy Adams's Rhetorical Crusade for Astronomy," *Isis* 91 (2000): p. 480-503.

a prominent position in the first half of the twentieth. Historians have attributed the sudden dominance of American astronomy to a uniquely American way of doing astronomy distinguished chiefly by private patronage, amateur participation, the adoption of large reflecting telescopes instead of refractors, the ready institutionalization of astrophysics, and the preference for observation over theory. Coinciding with the rise of the United States as an economic-industrial manufacturing power, American observatories were widely recognized as leading centers of ground-based optical astronomy by the early twentieth century.¹⁵

Prior to World War II, then, American astronomy was essentially synonymous with optical ground-based astronomy that was wedded to a philanthropic patronage system. The transition from a profession characterized in the United States by a small number of isolated individuals to a community of professional astronomers practicing world-class science would seem to be a remarkable success story, but the American astronomy community was beset by problems unique to its unusual structure. Due to the private patronage system, access to observatories was generally limited to researchers affiliated with the institution that operated the observatory, and thus a large percentage of U.S. astronomers were effectively excluded from participating in the field throughout the first half of the twentieth century. The entrenched exclusivity of the American system of astronomy had a profound impact on what

¹⁵ For an overview of the scholarship on early American astronomy, see David DeVorkin, *Henry Norris Russell: Dean of American Astronomers* (Princeton: Princeton University Press, 2000); Stephen G. Brush, "Looking Up: The Rise of Astronomy in America, 1800-1950," *American Studies* 20, 2 (1979): p. 41-67; Norriss S. Hetherington, "Mid-Nineteenth-Century American Astronomy: Science in a Developing Nation," *Annals of Science* 40 (1983): p. 61-80; John C. Greene, "Some Aspects of American Astronomy, 1750-1815," *Isis* 45 (1954): p. 339-358; John Lankford, with the assistance of Ricky L. Slavings, *American Astronomy: Community, Careers, and Power, 1859-1940* (Chicago: University of Chicago Press, 1997); Alexander Pang, "Technology, Aesthetics, and the Development of Astrophotography at the Lick Observatory," in *Inscribing Science*, Timothy Lenoir, ed., (Stanford, CA: Stanford University Press, 1998), p. 223-248; Howard Plotkin, "Henry Tappan, Franz Brunnov, and the Founding of the Ann Arbor School of Astronomers, 1852-1863," *Annals of Science* 37 (1980): p. 287-302; Marc Rothenberg, "Organization and Control: Professionals and Amateurs in American Astronomy, 1899-1918: *Social Studies of Science* 11 (1981): p. 305-325.

Patrick McCray has called the “moral economy of astronomy,” or the tacitly understood set of traditions, expectations, and moral conventions that governs how the astronomy community approaches the distribution of resources.¹⁶ Resource allocation in astronomy hinges on the community’s acceptance of certain commonly-understood values and relationships. As McCray explains, “These standards are not defined explicitly by members of the community. However, they are understood tacitly and frequently reconsidered, redefined and renegotiated.”¹⁷

During the first half of the twentieth century, the moral economy of astronomy was centered on scarce and coveted resources, which generated intense competition among American astronomers. The most desirable commodities within astronomical practice ranged from access to large telescopes through adequate funding and observing time, resources to build and operate new facilities and instruments, autonomy over research programs, authority to determine the overall agenda of astronomy, and institutional affiliation. Because practicing their science is contingent upon the use of large and costly instruments, astronomers with institutional affiliations granting easy access to telescopes occupied a privileged position within the American astronomy community.

In 1940, Otto Struve of the University of Chicago’s Yerkes Observatory and the University of Texas’s McDonald Observatory proposed that collaboration, not competition, was the best solution to the problem of increasingly scarce commodities within the astronomical trade.¹⁸ In an article for *The Scientific Monthly*, Struve made a persuasive case for the cooperative agreement between Yerkes and McDonald. The unusual collaborative relationship

¹⁶ McCray, “Large Telescopes and the Moral Economy of Recent Astronomy,” *Social Studies of Science* 30 (2000): p. 695-711.

¹⁷ Ibid, p. 688.

¹⁸ Otto Struve, “Cooperation in Astronomy,” *The Scientific Monthly* 50 (Feb. 1940): p. 142-147.

between the two observatories marked a successful attempt to navigate the moral economy of American astronomy by pooling important resources. Struve warned, “I fear that unless something is done toward equalizing the research opportunities of all astronomers there will be a gradual deterioration of many observatories which, in the past, have been able to carry on investigations of a quality comparable to that of the largest institutions.”¹⁹

However, it was not until after World War II that the steadily increasing fragmentation of astronomy prompted some astronomers to call for the democratization of the field because planetary and stellar branches were increasingly divided by unequal patronage and strains over access issues.²⁰ No longer the subject of scorn and ridicule, the prospect of collaborative work at a truly national observatory now began to seem immensely more appealing to many members of the astronomy community, though its genesis would not be without controversy.

A “Permanent Desert Observatory”

American astronomy emerged from World War II with a newly fractured identity. The war led to increasing specialization and introduced new participants to the discipline after American astronomers were recruited for the war effort and worked alongside engineers and other scientists, and the war also spawned the entirely new fields of radio and space-based astronomy. In the decades following World War II, the practice of astronomy in the United States gradually transcended its heritage as a privately funded, ground-based optical enterprise, and as the Cold War progressed, the most distinctive feature of American astronomy—its long-

¹⁹ Struve, “Cooperation in Astronomy,” p. 145.

²⁰ See Ronald E. Doel, *Solar System Astronomy in America: Communities, Patronage, and Interdisciplinary Research, 1920-1960* (Cambridge: Cambridge University Press, 1996).

entrenched system of private patronage—would finally bow to a new surge in federal funding in the wake of the launch of *Sputnik I* in 1957.²¹

The political economy of astronomy would be radically altered by the launch of *Sputnik*, but in the immediate postwar period, astronomers had seemingly little to offer the state when compared to high-energy physicists. Although the NSF was founded in 1950 and contributed modest funding to astronomy in the early postwar years, American astronomy was in crisis because it lacked a major source of reliable patronage.²² Reflecting on the sorry state of the discipline during these years, astronomer Leo Goldberg recalled that “Aside from their unfavorable locations, nearly all university observatories were in badly run down condition, after fifteen years of economic depression and war, and the prospects for training graduate students in observational astronomy looked grim indeed.”²³ Astronomers had no reason to believe increased funding would materialize, so “it was natural that astronomers should begin to think about the cooperative use of telescopes.”²⁴ This widely shared dismal outlook on the prospects of American astronomy, along with the prevailing competitively-driven moral economy of astronomy in the 1950s, were key factors in establishing a niche for a new kind of observatory that would finally offer an alternative to the privately funded, elite practice of astronomy.

²¹ On postwar American astronomy, see Doel, *Solar System Astronomy in America*; McCray, *Giant Telescopes: Astronomical Ambition and the Promise of Technology*; Robert W. Smith, with contributions by Paul A. Hanle, Robert H. Kargon, Joseph N. Tatarewicz, *The Space Telescope: A Study of NASA, Science, Technology, and Politics* (New York: Cambridge University Press, 1989).

²² See Doel, *Solar System Astronomy in America*.

²³ Goldberg, “The Founding of KPNO (Sky & Telescope)” p. 3.

²⁴ *Ibid*, p. 6.

The subject of a new type of observatory that would diminish the monopoly of leading eastern and western observatories surfaced in a 1952 *Science* article authored by John B. Irwin that marked the beginning of the pendulum swing toward a national observatory.²⁵ Irwin argued that to address questions of current interest in the field such as determining the internal density distribution of stars, existing photographic methods had to be supplanted by photoelectric observations. Not content to simply make a case for photoelectric astronomy, Irwin pushed the limits of traditional thinking by advocating for a new location distant from eastern and western strongholds. Irwin explained, “if one is willing to admit that seeing is of secondary importance, then the whole problem of seeking the ideal photoelectric site in this country becomes very much simpler: one needs, at first, only to look for moderately high mountains located in a region of minimum cloudiness.”²⁶

After identifying promising regions based on annual percentages of sunny days, Irwin boldly concluded that “the desert peaks in southeastern California and southwestern Arizona near Yuma are probably almost a factor of two better for photoelectric research than other large existing American observatory sites.”²⁷ Although he acknowledged that “the desert is not usually thought to be an ideal place to live and work,” Irwin believed that with modern conveniences such as air conditioning, water, and electricity, “it can be both comfortable and satisfying.”²⁸ Speaking to the issue of competition between eastern and western strongholds of astronomy, Irwin emphasized that a desert observatory with a 36-inch reflecting telescope

²⁵ John B. Irwin, “Optimum Location of a Photoelectric Observatory,” *Science*, New Series, Vol. 115, No. 2983 (Feb. 29, 1952): p. 223-226.

²⁶ Irwin, “Optimum Location of a Photoelectric Observatory,” p. 224.

²⁷ *Ibid.*, p. 225.

²⁸ *Ibid.*

“would also provide a real opportunity for guest investigators from the Middle West and the East, who are seriously handicapped at present by their climate and often by city lights.”²⁹ Even well-established American observatories would benefit from the establishment of “a permanent desert observatory devoted to photoelectric research.”³⁰

Irwin’s article struck a nerve within the American astronomy community, particularly since the NSF had convened a panel that same year to consider how the agency could best support astronomical observatories. The panel determined that a new observatory should be funded initially by the NSF and later maintained by a consortium of universities.³¹ Although the panel did not have a specific research project to consider and the NSF budget for that year was insufficient to support a major new institution, the consensus among members of the panel was that the NSF should contribute to optical astronomy. In response to this evaluation, an “Astronomical Photoelectric Conference” was arranged by the NSF in the summer of 1953 at the Lowell Observatory in Flagstaff, Arizona where the agenda included evaluating the need for a new desert observatory.³²

At Flagstaff, Irwin and thirty-four colleagues debated the location of the new observatory as well as other pressing questions: how many telescopes should be constructed? How big should they be, and what types of telescopes should the new observatory contain? Leo Goldberg, then chair of astronomy at the University of Michigan, first introduced the concept of

²⁹ Irwin, “Optimum Location of a Photoelectric Observatory,” p. 226. Throughout this dissertation, I employ the historical terminology when describing the diameter of the telescope’s main mirror. American astronomers typically referred to telescope size in English units (e.g., the 36-inch telescope) until around 1970, when most telescopes were measured in metric units.

³⁰ Ibid.

³¹ Edmondson, “AURA and KPNO: The Evolution of an Idea,” p. 70-71.

³² Irwin, *Proceedings of the National Science Foundation Astronomical Photoelectric Conference, held at Lowell Observatory, Flagstaff, Arizona, August 31-September 1, 1953*.

an “all-purpose National Observatory” at the Flagstaff conference, and although his suggestion was well-received by conference attendees, the conference closed without any definitive plans for such an observatory.³³

Though the conference attendees had concluded that the need for a national observatory was outside their domain, a panel for a National Astronomical Observatory (NAO) was nonetheless appointed in 1954 based upon recommendations of Flagstaff conference members.³⁴ Flagstaff attendee Robert R. McMath of the McMath-Hulbert Observatory chaired the new committee, which also consisted of fellow attendees I.S. Bowen of Mt. Wilson and Palomar Observatories, Otto Struve of University of California, and A.E. Whitford of the University of Wisconsin. The panel was charged with advising the NSF on the general astronomical needs that could be met through the NAO by making specific recommendations on research and education programs, possible sites, instrument designs, organization of the facility, and both an initial budget and a plan for continued operation.³⁵ The University of Michigan Observatory, representing the NAO panel, submitted its proposal to the NSF for ‘phase one’ construction of the observatory on 13 June 1955. The first two telescopes proposed were a 36-inch telescope and an 80-inch reflector, and studies were recommended for the construction of a large solar telescope. However, the first order of business was to locate potential sites for the new national observatory.

³³ Goldberg, “The Founding of KPNO (Sky & Telescope),” p.10.

³⁴ Ibid, p. 10-11.

³⁵ Ibid, p. 11.

Declaring a Winner: “a scientific elimination contest which left nothing to chance”³⁶

The NSF released grants to the University of Michigan in 1955 to finance a site survey that would identify a mountain with good seeing conditions.³⁷ At that time, the world’s three largest observatories were located in southern California on Palomar Mountain, Mt. Hamilton, and Mt. Wilson. In addition to the criteria outlined at the Flagstaff conference, a southwest site with clear winter skies would complement the weather cycles in California, which typically brought clouds and precipitation in the winter.³⁸ Arizona mountain ranges were given priority, and Yerkes Observatory astronomer Aden Meinel relocated from Chicago to Phoenix to helm site survey operations with his Yerkes colleague Helmut Abt’s assistance.³⁹ Aided by his wife, Marjorie, who was also an astronomer, Meinel pored over topographical maps and existing rocket photography to locate promising mountain ranges throughout the southwest.⁴⁰ Abt continued the search by plane after locating a former World War I pilot from Texas who was willing to fly him over mountains of interest in his two-seat Cessna-140 for ten cents per mile.⁴¹ Through this often-perilous aerial survey conducted during 1955, 150 potential observatory sites were identified on mountain ranges in Arizona, New Mexico, Nevada, and Utah. Early on, Kitt Peak stood out among the aerial observations as a mountain with a nearly level summit region.

³⁶ Morgan Monroe, Consultant, Public Information, National Science Foundation to Aden Meinel, c. 1959. *Background material on Kitt Peak National Observatory: “How the observatory site was selected.”* The University of Arizona Special Collections.

³⁷ Goldberg, “The Founding of KPNO (Sky & Telescope),” p. 15.

³⁸ Meinel, Meinel, and Jacobs, p. 4; Interview with Helmut Abt. 04 June 2012.

³⁹ Meinel, Meinel, and Jacobs, p. 7-8.

⁴⁰ Ibid, p. 7.

⁴¹ Interview with Helmut Abt. 04 June 2012.

At 6,875 feet, Kitt Peak towers over the desert valley of cactus, palo verde, and mesquite trees, and it was ideally located about 40 miles southwest of Tucson.⁴² Despite its close proximity to the city, however, because Kitt Peak was part of the Papago Indian Reservation, the encroachment of city lights would not be a factor to contend with in the future, unlike other potential sites.⁴³ After further investigation, including off-roading excursions by Jeep, the five remaining sites selected for further testing were narrowed down to just two: Hualapai Mountain in Kingman, Arizona, and Kitt Peak.⁴⁴

Kitt Peak had emerged as one of the frontrunners for this bold new experiment in cooperative astronomy, but there were a few major hurdles to overcome before the NSF would agree to fund an observatory there. Abt's aerial reconnaissance had shown there was no road or trail leading to the summit, and there was still much to be learned about the suitability of the site for ground-based optical astronomy. The time had come to install two small telescopes on the summit that would take measurements of observing conditions, and this meant members of the American astronomy community would need to meet with the Tohono O'odham to solicit their approval for site testing. In a retrospective essay on the founding of KPNO, Meinel recalled that an astronomer colleague warned him to take "a careful approach" with the Tohono O'odham to avoid "offended sensibilities."⁴⁵

⁴² Meinel, Meinel, and Jacobs, p. 7; Interview with Helmut Abt. 04 June 2012.

⁴³ Mt. Graham, the site of the observatory discussed in chapters five and six, was ruled out because it was too high for consideration. The NAO panel had set an upper limit of 8,000 feet for the observatory to avoid the difficulties associated with working and living at high altitudes. See Meinel, Meinel, and Jacobs, p. 7.

⁴⁴ *Ibid.*, p. 15.

⁴⁵ *Ibid.*, p. 20.

Meinel and most of the other astronomers invested in evaluating Kitt Peak's feasibility for hosting the national observatory knew very little about the people who were then known as Papagos. Would they welcome the news that their mountain had been selected as a promising site for a new observatory, or would the request to place instruments on the summit be regarded as an unwanted intrusion? If the tribe was unwilling to grant permission for site testing, would astronomers have to abandon Kitt Peak as a potential site? As Meinel and his team prepared to meet with Tribal Council members for the first time, they were well aware that the continued growth of a large segment of the American astronomy community hinged on the answers to these questions.

The tribe's initial assessment of the proposal to do site testing on Kitt Peak was critically shaped by cultural and political factors ranging from how tribal members defined the physical and spiritual geography of the mountain to the tribe's recently-won authority as a federally recognized tribe to determine how the mountain was used. In order to shed light on the early encounters between astronomers and the Tohono O'odham, it is essential to delve into the history of the O'odham's changing relationship with the mountain that became known as Kitt Peak while simultaneously tracking the changing political and legal status of the Nation in the late nineteenth and twentieth centuries.

Moving Mountains: the Tohono O'odham and Shifting Control of Sacred Peaks

Geographically, the Tohono O'odham Nation is the largest Native American nation within the United States today, consisting of eleven districts with over 28,000 enrolled members in 2011.⁴⁶ The capital of the Nation is located southwest of Tucson in Sells, a small town near the Mexican border that is the site of the 2.5 million-acre main reservation and nine of the

⁴⁶ "About Tohono O'odham Nation," Official Web Site of the Tohono O'odham Nation. www.tonation-nsn.gov/about_ton.aspx. Accessed 12 December 2011.

eleven districts. Members of the Nation reside both on and off the main reservation at Sells and smaller reservations in the districts of San Xavier near Tucson, San Lucy near Gila Bend, and Florence Village.⁴⁷ The Baboquivari mountain range lies along the eastern fringes of the main O'odham reservation in the Schuk Toak district and contains the sacred mountains Baboquivari Peak and Kitt Peak.

In the O'odham origin legend, Baboquivari is the home to the creator I'ittoi, who led the O'odham ancestors to the land from the underworld, and Kitt Peak is known as Iolkam Du 'ag, or I'ittoi's Garden.⁴⁸ As the domain of I'ittoi, also called 'Elder Brother' or 'Earth Maker,' Baboquivari Peak is considered the center of the O'odham spiritual universe. In the words of one Tohono O'odham

Elder Brother told the Papagos to remain where they were in that land which is the center of all things. And there these Desert Indians have always lived. They are living there this very day. And from his home among the towering cliffs and crags of Baboquivari, the lonely, cloud-veiled mountain peak, their Elder Brother, *I'ittoi*, spirit of goodness, who must dwell in the center of all things, watches over them.⁴⁹

The boundaries of the Nation are clearly both physical and spiritual for the O'odham. However, the current dimensions of the O'odham Nation reflect a more rigidly defined territory that is the product of a long history of land disputes between the O'odham and the federal government.

The historical trajectory of the O'odham's changing relationship with the land paralleled the

⁴⁷ "Location," Official Web Site of the Tohono O'odham Nation. www.tonation-nsn.gov/location.aspx. Accessed 12 December 2011.

⁴⁸ Ruth M. Underhill, *The Papago and Pima Indians of Arizona* (Palmer Lake, CO: Filter Press, 1979), "The Sacred Story," p. 41. Another key source relating the Tohono O'odham creation story is Papago Tribe, *Tohono O'odham: Lives of the Desert People* (Salt Lake City, UT: University of Utah Printing Services, 1984). On the creator I'ittoi and his relationship to the sacred mountains, see Harold Bell Wright, ed., *Long Ago Told: Legends of the Papago Indians* (New York: D. Appleton & Co., 1929), "The Beginning of All Things," p. 7-14.

⁴⁹ Bernard L. Fontana, *Of Earth and Little Rain* (Tucson: The University of Arizona Press, 1989), p. 19.

Nation's path to sovereignty, and as I discuss in chapter two, this transition paved the way for the rejection of the lease of their sacred mountain early in the twenty-first century.

On a vast expanse of what would later be known as the lower Sonoran Desert, the Tohono O'odham dwelled for thousands of years in relative isolation until their first sustained contact with Jesuit missionaries in 1692, when Father Eusebio Francisco Kino built a mission near the base of Baboquivari Peak.⁵⁰ The Spaniards soon learned that the people who called themselves the Tohono O'odham were known to neighboring tribes as the *pavi au'autam* ("the bean-eating people"), which the missionaries translated as "*Papabotas*" or "*Papagos*" and called the O'odham lands the *Papageria*.⁵¹ With the goal of Christianizing the Indians, Father Kino oversaw the construction of multiple missions using the O'odham and other tribes as forced labor, and many O'odham embraced Catholicism by incorporating the worship of patron saints into their religious practices.⁵² Spanish control of Tohono O'odham villages in the Papageria followed from the missionary presence, marking a profound political shift in tribal organization from the independence of consensus government to the dependence of centralized control by outsiders. Contact with Spanish settlers had major economic consequences for the O'odham as well, since the introduction of cattle and horses brought subsistence grazing to O'odham lands,

⁵⁰ Archaeologists generally agree that the Tohono O'odham are the descendants of the Hohokam (*Huhugam O'odham*, "People who have vanished"), who arrived in the Sonoran desert from central Mexico by A.D. 300 and underwent cultural decline beginning sometime in the mid-fifteenth century. See David Rich Lewis, *Neither wolf nor dog: American Indians, environment, and agrarian change* (New York: Oxford University Press, 1994), p. 119-120; Daniel McCool, "Federal Indian Policy and the Sacred Mountain of the Papago Indians," *Journal of Ethnic Studies* 9 (1981): p. 58-69; p. 58.

⁵¹ See Lewis, p. 118. The ancestral name Tohono O'odham can be translated as "People of the Desert" or "Thirsty People," and the Tohono O'odham also commonly referred to themselves simply as "the People." See Papago Tribe, *Tohono O'odham: Lives of the Desert People*, p. 3.

⁵² See Lewis, p. 135. The San Xavier del Bac mission was one of the first missions built by Father Kino. The Tohono O'odham and their close neighbors the Pimas staged a revolt in 1751 that resulted in the destruction of the San Xavier del Bac mission, but this mission was rebuilt and would become the site of the first Tohono O'odham reservation in 1874.

eventually replacing the centuries-old tradition of subsistence farming with a new economic dependence on the cattle trade.⁵³

After Mexico gained its independence from Spain in 1821, the Mexican government became responsible for governing the O'odham, but the control of O'odham people and their lands did not remain with Mexico for long. In the wake of the Mexican-American War and the Treaty of Guadalupe Hidalgo in 1848, the U.S. gained territory in present-day New Mexico, Arizona, California, Colorado, Utah and Nevada.⁵⁴ In 1853, the newly appointed U.S. Minister to Mexico, James Gadsden, was sent to Mexico City to resolve the dispute over the new border between Mexico and the U.S.⁵⁵ The Gadsden Purchase effectively split the ancestral land of the O'odham into two regions. Half of the tribe found itself south of the border, immediately separated from the Baboquivari region that was so integral to the tribe's religious identity, while the O'odham living north of the border were now subject to U.S. federal policy that continually threatened to undermine the integrity of O'odham lands.⁵⁶ Under the Gadsden Purchase, all acquired lands were to be controlled by the U.S. General Land Office. As political scientist Daniel McCool has noted, "suddenly, the sacred mountain Baboquivari and the Papagueria had

⁵³ Papago Tribe, *Tohono O'odham: Lives of the Desert People*, p. 8. Kino's missionary presence also introduced Old World seed crops such as wheat, barley, lentils, cabbage, and grapes into the O'odham's subsistence cycle. See Lewis, p. 134.

⁵⁴ Treaty of Guadalupe-Hidalgo [Exchange copy], February 2, 1848; Perfected Treaties, 1778-1945, Record Group 11, General Records of the United States Government, 1778-1992, National Archives. The Treaty of Guadalupe-Hidalgo ended the war, but generated new tensions between Mexico and the U.S. due to competing claims to the Mesilla Valley resulting from errors on the map used to survey the new international border.

⁵⁵ William L. Marcy, "The Avalon Project: Gadsden Purchase Treaty: December 30, 1853," The Avalon Project: Documents in Law, History and Diplomacy. Yale Law School Lillian Goldman Law Library, available at http://avalon.law.yale.edu/19th_century/mx1853.asp. Accessed 13 December 2011.

⁵⁶ McCool, p. 60. See also Papago Tribe, *Tohono O'odham: Lives of the Desert People*, p. 20; Winston P. Erickson, *Sharing the Desert: The Tohono O'odham in History* (Tucson: The University of Arizona Press, 1994), p. 69.

become the possession of a federal bureau 2,500 miles away."⁵⁷ However, as historian David Rich Lewis has observed, the O'odham did not record this redistribution of their ancestral lands on the village calendar sticks, the staffs made from the saguaro cactus that were inscribed annually with important tribal events. Lewis concludes, "few Tohono O'odham knew or cared about these events of international import, for the treaty and purchase had little effect on their daily lives."⁵⁸

The O'odham had transitioned from the hegemony of Spain and Mexico to the U.S. by the mid-nineteenth century, but despite this political upheaval, the physical boundaries of the Nation were never formalized throughout this period. The unforgiving yet predictable desert seasons had long dictated that the O'odham follow the water supply from desert basin to mountain ridges, and the tribe continued its seasonal migration habits and managed to maintain a large geographic presence because border policies were not yet widely enforced. However, when the U.S. opened up the public lands in the southern Arizona Territory to homesteaders in 1862 and allowed mining on those lands four years later, the O'odham in the Tucson area began to grow concerned about encroachment upon the land they had occupied for centuries. Worried about the impact of settlers who were farming, grazing cattle, and using the water supply, the O'odham requested formal recognition of their lands from the U.S. government for the first time.⁵⁹

The Indian Appropriations Act authorizing the creation of Indian reservations had been passed by Congress in 1851, a highly controversial policy that enabled the federal government

⁵⁷ McCool, p. 60.

⁵⁸ Lewis, p. 135.

⁵⁹ Erickson, p. 77-78.

to relocate tribes from their ancestral territory to other parcels of land.⁶⁰ President Grant's "Peace Policy" of the 1860s and 1870s sought to prepare tribes for eventual citizenship by replacing government officials on reservations with religious leaders who taught Christianity and oversaw Indian agencies. The San Xavier mission thus represented an ideal candidate for a reservation intended to further the goal of cultural assimilation through Christianization. In 1874, President Grant's Executive Order created the reservation at San Xavier with 69,200 acres surrounding the San Xavier mission designated for O'odham use, marking the first formal recognition of the Papago as a legal entity by the federal government.⁶¹ Protection of their lands was not an automatic by-product of formal recognition, however, since legal protection was only afforded to the Papago who resided within the newly created reservation, and land and water use by outsiders continued without penalty.

A second reservation was established by an executive order in 1882 at Gila Bend, but the creation of this smaller reservation also failed to address the ongoing problems the O'odham experienced with miners, homesteaders, farmers, and squatters competing for grazing land and water.⁶² The government agency responsible for administering the lands was located over 100 miles outside the reservations in the town of Sacaton, and could not adequately oversee trespassing issues.⁶³ Just three years after the Gila Bend reservation was established, Congress passed the Dawes Act, also known as the General Allotment Act, in 1887.⁶⁴ Under

⁶⁰ Elmer Bennett (2008). *Federal Indian Law. The Lawbook Exchange.* p. 201–203.

⁶¹ Erickson, p. 78.

⁶² Erickson, p. 78; Lewis, p. 138.

⁶³ Erickson, p. 87.

⁶⁴ An Act to Provide for the Allotment of Lands in Severalty to Indians on the Various Reservations (General Allotment Act or Dawes Act), Statutes at Large 24, 388-91, NADP Document A1887.

President Hayes, the General Allotment Act brought an end to the disastrous “Peace Policy” practice of granting large parcels of land to tribes. Instead, reservation lands were subdivided into privately owned plots owned by individual Native Americans, with the remaining reservation land made available for purchase by white settlers.⁶⁵

Land ownership was a concept first introduced to the O’odham through contact with the Spanish in the sixteenth century, but the O’odham had long maintained their traditional view of land as mutually owned. After the federal government began the allotment of land at San Xavier in 1890, the O’odham initially resisted the newly imposed boundaries. Many O’odham were uninterested in the artificially divided land because the reservations represented only a small percentage of the territory that the O’odham had always called home, and the majority of the O’odham still lived off the reservations on land they now had no legal right to occupy.⁶⁶

The turn of the century brought even more drastic changes in the O’odham way of life as the federal government continued to impose its political authority and the rapid industrialization of the U.S. introduced new economic opportunities. When the Bureau of Indian Affairs (BIA) secured funding to dig several wells in order to create a reliable source of water on the reservations, the permanent water supply meant that the O’odham tradition of living in small migratory groups was no longer essential for survival. Instead, O’odham formed larger year-round settlements around the new wells, a disruption in the centuries-old nomadic patterns of the O’odham that profoundly threatened their cultural autonomy.⁶⁷ Though tribal

⁶⁵ Erickson, p. 91. Allotment was also part of the federal government’s Indian policy of cultural assimilation. See Lewis, p. 139.

⁶⁶ Erickson, p. 93.

⁶⁷ Lewis, p. 141; Erickson, p. 96.

elders initially voiced concerns that drilling for the wells would end the seasonal migrations that were the cornerstone of O’odham cultural identity, once the wells were constructed in the 1910s and 1920s, they were widely used by everyone in the villages.⁶⁸ New migratory patterns also emerged in the late nineteenth and early twentieth century that were centered on the ebbs and flows of the cattle and mining industries as the O’odham increasingly began to supplement farming and trade with wage work.⁶⁹

The O’odham’s relationship with the land was further fractured by the federal government in 1906, when Theodore Roosevelt established the Baboquivari Forest Reserve in 1906, prohibiting settlement of the mountain range.⁷⁰ Following their traditional migratory patterns, the O’odham had always lived in small groups and moved to the mountains for water during the winter months, but they were now unable to retreat to villages in the mountain peaks. Executive Order 908 was issued in 1908 to transfer control of the Forest Reserve, now renamed the Garces National Forest, to the U.S. Forest Service, but as McCool notes, “while control of Baboquivari was transferred from the Grazing Service to the Forest Service, it is doubtful that either agency realized they were in possession of a sacred mountain.”⁷¹

It was not until 1916 that the O’odham regained the rights to their sacred mountains through the formation of a large reservation that encompassed roughly a quarter of the land then occupied by the O’odham. The small reservations of San Xavier and Gila Bend had largely been established to promote cultural assimilation by granting legal protection to O’odham that

⁶⁸ Lewis, p. 146.

⁶⁹ Erickson, p. 97; Lewis, p. 152.

⁷⁰ U.S. Statute Volume 34, p. 3251, in S. La Jacono, *Establishment and Modification of National Forest Boundaries: A Chronologic Record, 1891-1973* (U.S. Forest Service, Division of Engineering, 1973).

⁷¹ McCool, p. 61.

had adopted Christianity, but the new reservation was the product of Progressive Era political pressures.

In 1882, a group of Philadelphia-based Progressives concerned about the displacement of Indian populations and the allotment system established by the Dawes Act founded an advocacy group called the Indian Rights Association. The organization was dedicated to preparing Indians for citizenship through “complete civilization,” and acted as a congressional lobbying group for the Board of Indian Affairs and the Board of Indian Commissioners.⁷² When Indian Rights Association members focused their activism on the protection of O’odham land rights, they persuaded Congress that a large plot of land would be needed to accommodate cattle ranching on O’odham lands.⁷³ President Woodrow Wilson responded by setting aside 3.1 million acres for the Papago Indian Reservation in 1916, a region that included the Baboquivari range.⁷⁴ After being claimed by Spain, Mexico, the U.S. General Land Office, and the U.S. Forest Service, “Baboquivari had come home,”⁷⁵ but the Executive Order did not permit the O’odham full control of the land. McCool asserts, “there were so many limitations attached to the creation of the reservation that the stated purpose of the originating Executive Order begins to look like a declaration of the White Man’s rights to Papago land. The intent was to create a

⁷² In 1911, the Indian Rights Association supported the formation of a group called the Good Government League, composed mainly of O’odham who had grown up off the reservations in boarding schools. Although it proved to be an influential political group, The Good Government League did not constitute true political mobilization for the O’odham because it frequently supported federal policies implemented through the Bureau of Indian Affairs that many O’odham opposed. Another group of O’odham later formed the League of Papago Chiefs to oppose the Good Government League. See Lewis, p. 143; Erickson, p. 101; 130.

⁷³ Erickson, p. 103.

⁷⁴ Executive Order 2300, 4 January 1916. See Erickson, p. 104; Papago Tribe, *Tohono O’odham: History of the Desert People*, p. 31.

⁷⁵ McCool, p. 62.

sanctuary for Papagos, but the realized application of the law was to create a sanctuary for mining companies and to guarantee them a vast depository of potential mineral wealth.”⁷⁶

‘Walking on Gold’: Federal Indian Policy and the First Tribal Constitution

Although the O’odham were denied mineral rights to their land, non-O’odham residents of southern Arizona apparently did not view the creation of the reservation as a “declaration of the White Man’s rights to Papago land” at the time because it immediately sparked a strong public outcry over the size and location of the land granted to the O’odham.⁷⁷ Caving to criticism from local newspapers, ranchers, and elected officials and following a public hearing in Washington, President Wilson removed a 475,000-acre portion of land running through the center of the reservation in 1917 through another Executive Order.⁷⁸ The newly configured Papago Reservation not only had the peculiar feature of consisting of separated parcels of land; it also bisected the Baboquivari mountain range because the boundaries of the reservation extended only to the crest of the mountains.⁷⁹ The Tohono O’odham effectively had rights to only *half* of their sacred mountains Kitt Peak and Baboquivari Peak, with the other half belonging to the federal government. Written records authored by Tohono O’odham during this period are virtually nonexistent, so gauging the immediate impact of this land redistribution from the O’odham perspective is somewhat speculative. However, a speech made by an

⁷⁶ McCool, p. 63.

⁷⁷ See *Tucson Citizen*. 21 January 1916, p. 1.

⁷⁸ Executive Order 2524, 01 February 1917. See also Lewis, p. 148. The *Arizona Daily Star* was then owned by the Copper Queen Consolidated Mining Company, and the editor of the paper vocally opposed the reservation established by Wilson on the grounds that the rich ore deposits on the reservation would belong to a people who had no intention of mining the land. See Allan J. McIntyre, ed., *The Tohono O’odham and Pimeria Alta* (Charleston, SC: Arcadia, 2008), p. 8.

⁷⁹ Erickson, p. 107. The O’odham sought to reclaim the eastern side of Baboquivari in 1998 with legislation introduced by Representative Ed Pastor. See Mark Muro, “Tribe Seeks its Key Peak,” *High Country News*. 22 June 1998.

O'odham elder to a group of white men sometime between the establishment of the Papago Reservation and the late 1930s contains several revealing clues to how the loss of part of their sacred mountain range to the federal government was received among the O'odham.

Anthropologist Ruth Underhill worked for the Bureau of Indian Affairs in the 1930s and did extensive fieldwork with the Tohono O'odham. In the Preface to her ethnography *A Papago Calendar Record*, she records a description of the O'odham's valuation of their mountains through an elder who professes

Every stick and stone on this land belongs to us. Everything that grows on it is our food—cholla, prickly pear, giant cactus, Spanish bayonet, mesquite beans, amaranth, all the roots and greens. The water is ours, the mountains. There is gold in the mountains. Everywhere I go I walk on gold; I lie down at night as though on a bed of gold, my head rests on gold and silver. These mountains I say are mine and the Whites shall not disturb them.⁸⁰

Land ownership was not only a meaningful concept for the O'odham by the early twentieth century; they were now staking a claim on the mountains as a resource that was as valuable to their people as gold and silver.

The O'odham lands removed from the reservation in 1917 were regained during the next two decades, which marked a period of unprecedented political growth for the O'odham. With the goal of preserving traditional O'odham values, village headmen formed the League of Papago Chiefs in 1925 to counter the growing political power of the Good Government League, which now represented all three reservations.⁸¹ The Papago Chiefs began a campaign to reclaim the lands splitting the reservation, but it was not until the Great Depression that cattle ranchers

⁸⁰ Ruth Underhill, *A Papago Calendar Record* (Albuquerque: The University of New Mexico, 1938), Preface.

⁸¹ Most members of the League of Papago Chiefs were Roman Catholics who worked with Father Bonaventure Oblasser to restore the lost strip of the reservation. See Papago Tribe, *Tohono O'odham: Lives of the Desert People*, p. 59; Erikson, p. 130.

were desperate enough to relinquish their grazing territory. The federal government purchased land from the ranchers between 1931-1933, once again uniting the northern and southern parts of the reservation, although the O'odam still had only surface rights to the land.⁸² This represented a major victory for the O'odam, but an even more transformative change came as a result of a shift in federal Indian policy effected by President Franklin D. Roosevelt's commissioner of Indian affairs, John Collier.

Collier was the driving force behind the passage of the Wheeler-Howard Act, also known as the Indian Reorganization Act, in 1934.⁸³ This act gave tribes the right to create their own governments after submitting constitutions and by-laws for approval by the BIA. Prior to the Indian Reorganization Act, the O'odam had already begun the process of adopting a more centralized form of government in order to take legal action against the U.S. To obtain legal counsel, the Secretary of the Interior required the O'odam to elect representatives who would have the ability to sign legal contracts on behalf of the tribe. Complying with this stipulation resulted in the election of four O'odam men to a newly organized General Papago Council in 1929.⁸⁴ While the General Papago Council had limited political authority, it was nonetheless controversial among the O'odam at the time because it was the first step toward abandoning the system of conducting tribal affairs that had sustained the O'odam for countless generations.

⁸² Erickson, p. 141. The O'odam eventually gained full mineral rights to their lands in 1955 through an act of Congress. See Erickson, p. 161, and the discussion later in this chapter.

⁸³ S. 3645. 48 Stat., 984. 18 June 18 1934.

⁸⁴ Papago Tribe, *Tohono O'odham: Lives of the Desert People*, p. 59.

The early O’odham system of government consisted of village consensus with nightly meetings held by the men of the village in a ceremonial Big House.⁸⁵ Even with the creation of the Papago Reservation, the introduction of wells, and the proliferation of wage work off the reservation that had taken place within the first two decades of the twentieth century, Lewis maintains that “the people maintained central features of their cultural matrix” by continuing traditional agricultural practices, performing tribal medicine rituals, and relying on village headmen and decision by consensus.⁸⁶ While the ad hoc nature of the General Papago Council’s authority did not significantly undermine the O’odham way of life, the passage of the Indian Reorganization Act represented a true cultural crossroads for the tribe.

The O’odham were faced with the decision of whether to continue resolving tribal business through these traditional methods or to accept the provisions of the act, including an end to the allotment system, the establishment of a credit fund, and the ability to organize as a corporation. Although the act included a problematic clause reserving mineral rights on the Papago Indian Reservation for non-Indians, the O’odham chose to accept the terms of the act by a majority vote, which meant the federal government would finally recognize the tribe as a political unit.⁸⁷ The Papago Tribe of Arizona, as it was then known, became a legal entity after the O’odham developed a tribal constitution and by-laws in 1934. Eleven political districts were created, with district council members voted upon within each district. Two district council members were to represent each district at a tribal council, headed by a tribal chairman and

⁸⁵ Papago Tribe, *Tohono O’odham: Lives of the Desert People*, p. 30.

⁸⁶ Lewis, p. 153.

⁸⁷ There were 1,340 in favor of the reorganization and 580 against, representing a 48 percent turnout of eligible voters. See Papago Tribe, *Tohono O’odham: History of the Desert People*, p. 61; Erickson, p. 149.

vice-chairman chosen by people from all the reservations, a system of self-government that persists today.⁸⁸

Meeting With the 'Long Eyes'

As a newly-independent state-within-a-state, the O'odham continued to sustain new threats to cultural integrity during the waning years of the Great Depression, World War II, and the postwar period. Increasingly forgoing the old ways of forging a livelihood through farming, gathering, and trading, the O'odham plunged further into the cash economy by taking advantage of New Deal programs, though the reservations remained sites of great poverty even as the U.S. experienced economic recovery. For O'odham both on and off the reservations, seeking wage work, pursuing education, and dealing with the federal government resulted in new pressures to speak English instead of the O'odham language. The increasing prevalence of radio and later television programs facilitated learning English while simultaneously exposing the O'odham to popular culture beyond the borders of the O'odham Nation. World War II brought further cultural disruption as many O'odham left the reservations for war-related work.

As it turned out, the war was pivotal for the O'odham because it provided not only much-needed jobs, but also a new impetus to the quest to advance their civil rights. Roughly 500 O'odham served in the war, and upon returning home, like other Native American veterans, they began to criticize policies that prohibited them from voting.⁸⁹ The American Indian Movement would not gain momentum for another two decades, but the young Native Americans who had served their country during the war were decidedly more vocal than

⁸⁸ The eleven districts corresponded to preexisting divisions of linguistic groups among the O'odham. Erickson, p. 149.

⁸⁹ Alison R. Bernstein, *American Indians and World War II: Toward a New Era in Indian Affairs* (University of Oklahoma Press, 1991), p. 136.

previous generations when it came to calling out the federal government. Two years after the war ended, the O’odham elected Thomas Segundo as tribal chairman, a 28-year old who had served with the Army Corps of Engineers and embodied the new generation of O’odham tribal government.⁹⁰

When astronomers Abt and Meinel found themselves in the position of seeking approval from the Papago Tribal Council in 1955 to gain access to Kitt Peak for site testing, the governing body had been managing tribal affairs for just over two decades. Most recently, the Tribal Council had achieved an important milestone in political sovereignty by pushing Congress to restore the mineral rights that had been denied to the tribe under Indian Reorganization Act’s special clause.⁹¹ After fighting for mineral rights from 1952-1955, tribal members were hopeful that obtaining mineral rights to their lands would finally bring economic security to the tribe.⁹² At the same time, the Tribal Council was seeking reparations for wrongfully taken lands after filing a petition with the Indian Claims Commission in 1951, though this claim would not be fully resolved until 1976.⁹³ These legal confrontations with the federal government had begun to

⁹⁰ Bernstein, p. 135.

⁹¹ Public Law 47. 84th Congress.

⁹² See Michael S. Adams, *Every Stick and Stone: A History of the Papago People* (Alpha Graphics, 1979), p. 253. A few years later, Papago Administrative Assistant Chester Higman determined that “the income from this source has been disappointingly small.” Higman pointed out that even if the tribe successfully secured mining leases from outside parties, “it wouldn’t be able to use the money from them because the Bureau of Indian Affairs requires such income to be deposited in the Treasury where it is impounded. This is based on the Bureau’s contention that since the Papagos didn’t have mineral rights to the Reservation at the time their Constitution was adopted, a Constitutional amendment is necessary stating how funds received from mineral leases are to be distributed. See Chester Higman, “Economic Developments on the Papago Reservation,” Talk to Tucson Civic Unity Committee. 15 September 1958, p. 5-6. University of Arizona Library Special Collections.

⁹³ The Indian Claims Commission was created by Congress in 1946 to settle disputes between the U.S. and Indian groups. It was authorized to settle disputes with money but not to return land, so when the commission eventually rendered its judgment that the O’odham had aboriginal title to lost lands that the U.S. had failed to protect, a monetary settlement of \$26 million was reached with individual O’odham landowners. See Erickson, p. 34.

establish the Papago Tribal Council as a political entity to be reckoned with, and Meinel approached his first tribal interactions with great caution.

First, Meinel drafted a letter about the site survey plans to the Phoenix BIA Area Director F.M. Haverland detailing the necessity of constructing a road and an instrument tower on the summit of Kitt Peak. When Haverland received Meinel's letter, he in turn sent the letter to Superintendent of the Papago Agency Albert M. Hawley. It was Hawley who first broached the subject of conducting a site survey on Kitt Peak with Tribal Council Chairman Mark Manuel, and Manuel agreed to meet with Meinel in person. In preparation for the meeting, Meinel enlisted the support of anthropologists from the University of Arizona who had previous experience with O'odham culture. Meinel later recalled that the anthropologists urged him to

Talk little and listen a lot. If I had a date to meet with any tribal body, go on time but don't expect the meeting to start on time. They will begin to appear close to the set time, but the entire council probably wouldn't be there for an hour or two later. They will be watching to see if I showed any signs of getting impatient. 'Just relax!'⁹⁴

Meinel's first meeting with the O'odham occurred at the BIA office near the reservation, where he was introduced to Chairman Manuel. Meinel asked Manuel for permission to climb Kitt Peak to see if it would be suitable for the observatory, and Manuel informed him that he did not have the authority to grant permission himself. Meinel would need to receive approval directly from the Schuk Toak District Council since Kitt Peak fell within its jurisdiction, and the tribal elders of the *Pan Tak* village within that district would also have to give their approval before any astronomers could ascend the mountain.⁹⁵ Meinel waited for Manuel to report back on the District Council's decision, and when he got the phone call a month later, the news was

⁹⁴ Meinel, Meinel, and Jacobs, p. 20.

⁹⁵ Ibid.

rather ambiguous: the District Council wanted to meet with Abt and Meinel at the Shuk Toak schoolhouse to discuss Kitt Peak's significance.⁹⁶ It was the first of several key meetings that would take place at the reservation schoolhouse.

Reinforcing the advice Meinel had received from the anthropologists, a Sells BIA agent met with Abt and Meinel just before the District Council convened and cautioned the astronomers not to expect an immediate response.⁹⁷ Abt later recalled that "the meetings took a lot of patience" because instead of entering into a discussion about Kitt Peak directly, each tribal elder would speak at length about various tribal issues before outsiders were addressed.⁹⁸ Several hours after the meeting commenced, the Chairman asked Meinel to explain why the astronomers were interested in their mountain. Speaking directly to the Chairman as he had been instructed, Meinel described Kitt Peak as a special mountain that might permit astronomers to see to the edge of the universe, and he needed permission to climb the mountain and place two telescopes there.⁹⁹ According to Meinel, after the Chairman had translated Meinel's response for the District Council, the BIA agent whispered, "That's interesting. He translated telescope into 'long eyes' and you to the 'man with the long eyes.'"¹⁰⁰

The Tribal Council was being asked to consider the possibility of establishing a foreign presence on one of the Tohono O'odham's most sacred mountains, a subject that may well have interested tribal members outside the fifteen-member panel, but these discussions were completely inaccessible to many people on the reservation. Though much of the Tribal Council

⁹⁶ Meinel, Meinel, and Jacobs, p. 20.

⁹⁷ Ibid.

⁹⁸ Interview with Helmut Abt. 04 June 2012.

⁹⁹ Meinel, Meinel, and Jacobs, p. 20.

¹⁰⁰ Ibid.

business was conducted in O’odham, the meeting minutes that were mailed out to District Council representatives summarizing the meetings were typed in English, imposing a language barrier on many tribal members who did not read or understand English. In 1959, District Council members began to translate the meeting minutes into O’odham within each District, but this system still depended on the English proficiency of District Council representatives.¹⁰¹ For this reason, it is difficult to determine whether Abt’s and Meinel’s first Tribal Council meeting and the ones that followed were widely disseminated across the reservation.

The meeting concluded with the District Council’s decision to consult a Pan Tak tribal elder who was the keeper of the village’s calendar stick. Meinel and Abt learned that Kitt Peak was particularly sacred to Pan Tak villagers, who made offerings to the rain cloud god at the summit to ensure a good rainy season and believed the mountain’s petroglyphs provided good luck in hunting.¹⁰² From Meinel’s perspective, the meeting seemed to have gone well, but when the Schuk Toak District Council convened a few weeks later, the request for the site survey was voted down.¹⁰³

¹⁰¹ The Tribal Council noted that the language barrier was preventing many people on the reservation from staying informed on Tribal Council affairs in 1959 and subsequently decided to change its existing practices of communicating meeting minutes. See Minutes of the Papago Council. 06 November 1959, p. 8. University of Arizona Library Special Collections.

¹⁰² Meinel later reported that the offering pots were found inside a cave at the summit by the wife of a physicist before KPNO was completed, and she removed them from the cave and submitted them to University of Arizona archaeologist Emil Haury, who placed them in basement storage. Though Meinel did not mention specific names, he was probably referring to the wife of physicist Joseph Pereue, Jr., who visited Kitt Peak from Wesleyan University’s Scott Laboratory to conduct cosmic ray research at that time. Meinel later returned the offering pots to the mountain by housing them within the museum at the summit. He recalled, “we were fortunate that we didn’t discover or move either the offerings or the petroglyphs during our first occasions on the mountain or trouble would surely have followed had these actions become known.” Meinel’s children discovered the petroglyphs depicting sheep and deer on a hike in 1957. See Meinel, Meinel, and Jacobs, p. 22-23.

¹⁰³ Edmondson, *AURA and its US National Observatories*, p. 43. Astronomers’ recollections of the events that followed this first encounter between Meinel, Abt, and the District Council are somewhat divergent. In Meinel’s account, it was just one month later that he received the welcome news that the Schuk Toak

The Pan Tak tribal elder was opposed to placing instruments on a mountain with important recreational and spiritual uses. Elders were concerned that the astronomers were proposing to build structures that would disturb the homes of their sacred deities, and this could not be permitted. When the subject of the observatory site was broached again, the District Council voted it down a second time.¹⁰⁴

“A brilliant plan”: the People of the Desert Visit the People of the Stars

Working with the O’odham Nation to obtain access to their mountain was undeniably critical to making continued progress toward constructing a national observatory that would forever alter the moral and political economy of American astronomy. Once the Schuk Toak District Council had rendered its negative verdicts on the site survey, University of Arizona President Richard A. Harvill called for a meeting of the university’s anthropologists and astronomers to find a way to convince the tribe that the testing should be allowed. At this meeting, it was decided that the O’odham might be more receptive to the notion of an observatory constructed on their mountain if they were able to view celestial bodies through a telescope similar to the one that would be built on Kitt Peak. The Pan Tak elder was still opposed to the astronomers’ proposition, and though Meinel had learned that people in the younger generation of O’odham were more receptive to the idea, the elder’s veto jeopardized any chance for astronomers to visit the mountain. In Meinel’s view, there were two events most directly responsible for changing the astronomers’ fate: “first, the old man of Pan Tak

District had granted the astronomers permission to climb the summit. He then reports making an unsuccessful attempt to reach the summit with Abt in mid-December of 1955, followed by a successful ascent accompanied by O’odham guides in the spring of 1956. In Meinel’s chronology, the Steward Observatory demonstration was integral to securing the tribe’s approval of the *lease*, not the site testing, but this sequence of events does not conform to the chronology established by contemporaneous newspaper articles and other published sources. For this reason, I have interpreted Meinel’s observations primarily as a valuable firsthand account of early interactions between the O’odham and the astronomy community at Kitt Peak. See Meinel, Meinel, and Jacobs, p. 23-25.

¹⁰⁴ Kloepfel, *Realm of the Long Eyes*, p. 20.

died, removing his veto. Then Dr. Carpenter got together with Dr. Spicer and came up with a brilliant plan. They invited both Councils to come to Steward Observatory and look through the 36-inch telescope.”¹⁰⁵

Edwin F. Carpenter was the Director of the University of Arizona’s Steward Observatory, and he asked the Tribal Council members to visit the 36-inch telescope, a request that was greatly facilitated by the involvement of University of Arizona anthropologist Rosalind Spicer, who had worked with the O’odham a decade earlier and maintained a good relationship with Tribal Chairman Manuel. The Schuk Toak District Council and Papago Tribal Council members agreed to pay a visit to the Steward Observatory after both Spicer and Carpenter extended the invitation. On 28 October 1955, a date selected to take advantage of the first quarter moon, Carpenter hosted the O’odham at the Steward Observatory.¹⁰⁶ In Abt’s recollection, the O’odham’s concerns were greatly relieved by the viewing because

They realized that it was not going to be harmful. We promised that if we built on the mountain, Kitt Peak, that we would make a minimum amount of apparent damage... we wouldn’t just bulldoze and leave a big bare spot or something like that, but we tried to keep all the trees and things like that. And they also learned that this is only to learn more about what’s in the sky, and of course, they were interested in the sky, too, so it was a passive occupation to learn something about things in the sky and therefore not likely to be harmful to the mountain.¹⁰⁷

O’odham accounts of the Steward Observatory demonstration are not recorded in the Tribal Council minutes for this period, so Abt’s and other astronomers’ assessments of the tribe’s interpretation of the demonstration must be considered speculative. However, it can be inferred that tribal members enjoyed the telescope viewing because just six weeks later, Meinel

¹⁰⁵ Meinel, Meinel, and Jacobs, p. 27.

¹⁰⁶ Edmondson, *AURA and its US National Observatories*, p. 43.

¹⁰⁷ Interview with Helmut Abt. 04 June 2012.

received the welcome news that the Schuk Toak District Council had made a positive recommendation to the Papago Tribal Council.¹⁰⁸ Meinel was overjoyed. After a comprehensive site selection process and months of uncertainty following the first meeting with Chairman Manuel, Meinel would finally have a chance to set foot on one of the most promising locations for the new national observatory.¹⁰⁹ The final deciding vote by the Tribal Council would not take place until early January, but the matter was essentially a done deal because the Tribal Council was required to support the District Council's decisions regarding leases.¹¹⁰

Eager to regain lost time, Meinel and Abt made an attempt to reach the summit in mid-December of 1955, just one week after receiving the District Council's decision.¹¹¹ Unprepared for the rough wintertime conditions, however, the astronomers were forced to turn back prematurely. On 06 January 1956, Kitt Peak was formally approved as a test site by the Papago Tribal Council, and Meinel was finally able to climb to the summit in March by horseback, accompanied this time by his site survey engineer, Harold Thompson, two O'odham guides, and a *Tucson Daily Citizen* science reporter.¹¹² The expedition was well-documented, with a *Tucson Daily Citizen* science reporter present to take photos and film footage taken by Meinel. The film shows the party gathering at the corral and later stopping for coffee before reaching the summit. Baboquivari, the center of the O'odham universe, looms in the distance.¹¹³ Years later,

¹⁰⁸ Edmondson, "AURA—KPNO Chronology, 1950-60."

¹⁰⁹ Meinel, Meinel, and Jacobs, p. 23.

¹¹⁰ Edmondson, *AURA and its US National Observatories*, p. 44.

¹¹¹ Meinel and Abt's attempt to reach the summit on foot took place on 20 December 1955. See Edmondson, "AURA—KPNO Chronology, 1950-60," p. 3.

¹¹² Papago Tribal Council Resolution No. 860. The ascent occurred on 14 March 1956. See Edmondson, *AURA and its US National Observatories*, p. 45; Meinel, Meinel, and Jacobs, p. 24.

Meinel fondly reflected on the night spent camping under the stars and trading stories about the constellations with his O’odham guides, recalling, “they seemed to appreciate that it was also a special place for us, as it was for them.”¹¹⁴

For Meinel, the trip to the summit confirmed that Kitt Peak was a strong candidate for the observatory, and the next step was to set up instruments on the summit. The O’odham granted permission for the construction of a test site on the mountain so astronomers could further evaluate important conditions such as wind velocity, relative humidity, and temperature fluctuations. Sky conditions at the test site were monitored by Leon Salanave using a 6-inch telescope, and the results showed that Kitt Peak was indeed an excellent site for observational astronomy.¹¹⁵ Sixteen years after Struve had lamented the lack of a system of cooperative astronomy in the U.S., the groundbreaking national observatory project was close to becoming a reality for American astronomers.

Enter AURA: a Cooperative of Universities for a Cooperative Observatory

The proposed observatory marked an attempt to democratize American astronomy by reducing competition within the U.S. while simultaneously enabling the nation to retain its competitive edge worldwide, but it was not seen as a win-win by many astronomers. In the moral economy of astronomy, McCray has observed that “what is accepted as an equitable

¹¹³ NOAO astronomer John Glaspey located the lost reels of 16 mm film footage in the KPNO archives and had them converted to a digital format. Glaspey plans to place the edited five-minute video clip showing the highlights of the trek up the summit on the KPNO website. As Glaspey has observed, Meinel decided to capture not only the relevant topological features of the mountain that would be useful in making the site selection but other details that preserved the overall experience of climbing the mountain with the O’odham guides. Glaspey attributes this deliberate effort to Meinel’s desire to document the expedition as an important historic moment in the history of the founding of the national observatory. Interview with John Glaspey. 04 June 2012.

¹¹⁴ Meinel, Meinel, and Jacobs, p. 25.

¹¹⁵ Goldberg, “The Founding of KPNO (Sky & Telescope),” p. 19-20.

distribution of resources is contested frequently and in different ways by astronomers and science administrators. The historical tradition with regard to resources in postwar American astronomy is a divide between the 'haves' and the 'have nots'. This pattern of resource distribution creates strong emotions among both groups of astronomers."¹¹⁶ The pursuit of a national observatory represented an altogether new era in the moral economy of American astronomy in which the balance of resources would be affected for the first time by substantial federal funding. Not surprisingly, then, the subject of a national observatory was a source of great contention within the astronomy community because it represented a dramatic departure from the established system of private patronage and exclusivity that had characterized and sustained American astronomy since the late nineteenth century. The quest to construct a new kind of observatory that would provide 'universal access' to all researchers exposed a profound schism in the increasingly stratified American astronomy community, with the 'haves' threatened by the loss of prestige and resources associated with institutional affiliation and the 'have-nots' enthusiastically embracing the opportunity to establish a more equitable system of observing.

Since the concept of a national observatory was first proposed at Flagstaff in 1952, the ongoing and bitter debate among members of the American astronomy community had hinged not only on issues of access and control, but also institutional prestige. Concerns about the loss of prestige also played a key role in influencing the NSF's decision to fund a national observatory in the first place. While the national observatory had been in the planning stages for several years, the escalation of Cold War anxieties signaled by the launch of *Sputnik* in October 1957 ultimately made a compelling case for investing federal dollars into astronomy at unprecedented levels. With American scientific prestige at stake, a new managing organization

¹¹⁶ McCray, "Large Telescopes and the Moral Economy of Recent Astronomy," p. 686.

called the Association of Universities for Research in Astronomy (AURA) incorporated just three weeks after the launch of Sputnik to operate the new national observatory for the NSF.¹¹⁷

AURA was a nonprofit educational corporation consisting of seven universities (California, Chicago, Harvard, Indiana, Michigan, Ohio State, and Wisconsin) that had first coalesced earlier in the year through an organizing committee convened in Ann Arbor, Michigan, where Leo Goldberg chaired the astronomy department at the University of Michigan. Goldberg later recalled

The 'old boys' on the Committee, namely, McMath, Bowen, and Struve, had decided how it was going to be done and the rest of us more or less went along, at least for the moment. I remember being invited in the evening to McMath's top floor suite in the Green Hotel where he and Struve informed me that I was the obvious person to organize the formation of an appropriate university consortium. It was always very hard to say no to Struve; he had a way of fixing you with almost baleful, unblinking eyes and explaining in somber tones that you were absolutely the only person in the world who could possibly do whatever it was he was asking you to do at the moment.¹¹⁸

Goldberg reluctantly accepted his leadership role, and the committee agreed that several universities should form a consortium called AURA with offices in Phoenix. A proposal was submitted to the NSF for the "construction and operation of a cooperative astronomical observatory,"¹¹⁹ and in the wake of the launch of *Sputnik* and AURA's incorporation in October 1957, Kitt Peak was selected by AURA as the site of the new observatory in early 1958.¹²⁰

¹¹⁷ The AURA Articles of Incorporation were signed and filed in Phoenix on 25 October 1957. See Edmondson, "AURA—KPNO Chronology, 1950-60."

¹¹⁸ Goldberg, "Happenings in Astronomy, 1933-80." Harvard University Archives Series: HUGFP 83.26 Preprints and lectures, 1942-1979. Reflections on NRAO and KPNO, p. 17.

¹¹⁹ Goldberg, "The Founding of KPNO (Sky & Telescope)," p. 24-25.

¹²⁰ Though Hualapai Mountain was judged an equally good site for observational astronomy, Kitt Peak was a more attractive site when it came to recruiting top astronomers because it was located close to Tucson and had an international airport as well as the established academic community of the University of Arizona. See Meinel, Meinel, and Jacobs, p. 17. AURA officially declared that Kitt Peak was the chosen site

‘A Simple Matter’?: Astronomers’ Narratives of the Kitt Peak Lease Negotiation

The painstaking decision of where to construct the national observatory had been made, but with Kitt Peak located squarely on the Papago Reservation, the issue of securing the land for the NSF still remained. The Papago Tribal Council had first been made aware of the project when Abt and Meinel had requested permission to climb to the summit of Kitt Peak three years earlier. The O’odham had also been consulted when it was time to build the test site at Kitt Peak, and AURA officials representing the NSF now contacted the Papago Tribal Council and the Schuk Toak District Council once again to seek their approval of a lease that would grant 200 acres of the reservation to the NSF. The lease presented to the O’odham by the NSF dictated that the tribe would approve the observatory “as long as the land is used for astronomical study and research and related scientific purposes.”¹²¹ The lease further allowed for a one-time \$25,000 payment to the tribe for the site, \$10 an acre annually for 200 acres of the summit, and 25 cents per acre for rental of a perimeter region of 2200 acres. In a concession to the sacred status of the mountain, the lease also stipulated that caves near the summit of Kitt Peak are restricted to outsiders because *l’ittoi* may be inside. Finally, the lease required the Visitor Center to be constructed at a later date to sell O’odham crafts with the proceeds going directly to the tribe.¹²²

With the fate of the observatory possibly at stake, it would not be surprising if the task of negotiating an equitable arrangement with the O’odham was regarded as a daunting challenge, since building a major scientific facility on reservation land was unprecedented. Yet

for the national observatory on 01 March 1958. See Edmondson, “AURA—KPNO Chronology, 1950-60,” p. 5.

¹²¹ Public Law 85-816, 72 Stat. 981. 28 August 1958.

¹²² *Ibid.*

curiously, an examination of astronomers' and former AURA administrators' narratives about the process of leasing Kitt Peak produced many years after the event suggests that the astronomy community did *not* consider the Tohono O'odham even a minor threat to their plans to proceed with a new national observatory. Indeed, the lease negotiation with the Tribal Council is a frequent lacuna in many of these narratives, and in other cases, this part of the history of KPNO is downplayed or presented with very few details.

The primary academic treatment of the history of KPNO was authored by Frank Kelley Edmondson, a historical actor who played a significant role in shaping the national observatory's history. Edmondson was an astronomer who served as program director for astronomy at the NSF in 1956-1957 and helped to establish AURA.¹²³ While continuing to remain actively involved in astronomy, Edmondson began to delve into the history of science with publications on KPNO and Daniel Kirkwood of the "Kirkwood Gaps" fame, eventually producing a monograph devoted to the founding of KPNO.¹²⁴ During an oral history interview in 1978, Edmondson recalled "no real difficulties" with the Tohono O'odham, explaining

Any hesitation the Indians had was completely taken care of when Ed Carpenter invited the whole tribal council to come into Tucson and look at the moon through the 36-inch telescope, of the Steward Observatory. They were so impressed with what they saw that they went right back out and held a meeting, and that's when they agreed to let the, (and this is a direct quote) "The Men With Long Eyes"—That goes back to the site testing. Yes. You see, there had to be permission to do the site testing. That goes back to that, which is before my time, with the National Science Foundation even. Then after the site was selected, then it was a simple matter to negotiate a lease with the Papago (Indians) and this lease required approval by Congress. Whatever the session of

¹²³ *American Institute of Physics History Newsletter: Center for History of Physics Newsletter* Volume XXXII No.2, Fall 2000. Available at www.aip.org/history/newsletter/fall2000/contents_fall2000.htm. Accessed 15 Oct 2011.

¹²⁴ See Edmondson, *AURA and KPNO: The Evolution of an Idea*, Edmondson, *AURA and its US National Observatories*.

Congress was at that time, it took a special act of Congress to make it legal for AURA to make this lease with the Papagos. And that was all done.¹²⁵

For Edmondson, an authoritative source who was interviewed twenty years after the lease was negotiated and approved by AURA and the O’odham Nation, moving from site selection to the lease approval was not problematic, but rather, “a simple matter.” Edmondson makes no reference to the sacredness of Kitt Peak to the O’odham in 1978. In his histories of KPNO published in the 1990s, Edmondson does make brief mention of the mountain as a sacred site for the tribe, but reaffirms his earlier assertion that any concerns the tribe may have harbored about the use of the mountain were laid to rest by the powerful display of the moon through the University of Arizona’s telescope.

In his personal memoir about KPNO authored fifty years after the lease was approved, Meinel explains that only one tribal elder harbored any concerns about safeguarding the spiritual integrity of the mountain. Meinel noted that the tribe’s main concerns about the proposed astronomical development of their mountain were aesthetic, not spiritual. Before obtaining permission to access Kitt Peak, Meinel assured tribal members that

they would scarcely see any sign of our telescopes or the public road from either Shuk [sic] Toak or Sells. I didn’t foresee the highly visible array of telescopes that would grow over the ensuing years. Neither did I anticipate the awful scar from the public access highway marring the western side facing Sells. If I had told them what can now be seen, the result might have been different.¹²⁶

Echoing Edmondson’s account, according to Meinel, any fears that the telescopes would detract from the view of the mountain from the valley below were laid to rest once the telescope

¹²⁵ Interview of Dr. Frank K. Edmondson by Dr. David DeVorkin on 2 February 1978, Niels Bohr Library & Archives, American Institute of Physics, College Park, MD USA. Available at www.aip.org/history/ohilist/4588_2.html#6. Accessed 10 Oct 2011.

¹²⁶ Meinel, Meinel, and Jacobs, p. 27.

demonstration had taken place.¹²⁷ In a 2012 interview, Abt, too, recalled the demonstration as the critical inflection point in the tribe's decision to support the observatory since tribal members left that night with a better understanding of how the mountain would be used.¹²⁸

Today, the National Optical Astronomy Observatory (NOAO) website that manages KPNO affirms Edmondson's, Meinel's, and Abt's recollections that the O'odham's support of the new observatory came after a persuasive telescope demonstration.¹²⁹ A webpage devoted to information about the observatory's relationship with the Tohono O'odham displays a photo of the 1958 meeting between AURA representatives and members of the Tohono O'odham Shuk Toak district council in which the lease was signed. The website points out that "Like many Native Americans, the Tohono O'odham have a significant relationship with the stars because they figure prominently in their religions and ancient stories."¹³⁰ According to the website, the tribe initially refused to agree to the plans for the observatory on their sacred mountain, but "a solution was achieved" after the tribal council was impressed by the views through the 36-inch telescope at the Steward Observatory.¹³¹ By noting that the lease was approved after the telescope demonstration and drawing attention to the O'odham's relationship with the stars, the website strongly hints that the O'odham welcomed the observatory after recognizing a shared appreciation for the night sky. This version of the narrative is echoed verbatim in the

¹²⁷ Meinel, Meinel, and Jacobs, p. 27-28.

¹²⁸ Interview with Helmut Abt. 04 June 2012.

¹²⁹ The NOAO was founded in 1982 when the AURA-managed observatories of KPNO, Cerro Tololo Inter-American Observatory, and National Solar Observatory were consolidated. See "National Optical Astronomy Observatory." www.noao.org. Accessed 10 Oct 2011.

¹³⁰ "The Kitt Peak Virtual Tour," Kitt Peak National Observatory: Tohono O'odham. www.noao.edu/outreach/kptour/kpno_tohono.html. Accessed 11 Oct 2011.

¹³¹ *Ibid.*

KPNO docent training manual.¹³² Because the KPNO website and docent training manual so closely corroborate with individual astronomers' recollections, it may be safely assumed that the 'official' KPNO narrative is one that paints the O'odham Nation as initially skeptical but ultimately enthusiastic about the scientific and economic virtues of the observatory.

In the majority of the narratives on the lease negotiation presented by astronomers through retrospective accounts of KPNO's founding, the tribal officials are represented as welcoming the proposed observatory after recognizing its scientific value. If the sacredness of the mountain is mentioned at all, it certainly does not emerge as an obstacle to the lease negotiations. For example, Abt pointed out that "we had to promise not to roll any boulders away from caves" in order to prevent the escape of four winds trapped there by l'ittoi.¹³³ Yet Abt emphasized that the lease negotiation "was fairly smooth, once they became convinced that astronomy's not going to be harmful to their sacred mountain."¹³⁴ Characteristically, when Leo Goldberg was asked to contribute a retrospective piece on the founding of KPNO for a 1983 issue of *Sky and Telescope* celebrating AURA and Kitt Peak's 25th anniversary, Goldberg only briefly acknowledged the sacredness of the site chosen for the national observatory, writing "a few individuals deserve special mention, even in an account as brief as this one...The Tribal Council of the Papago Indians, on whose reservation Kitt Peak is located, deserves respect and appreciation for recognizing the importance of allowing astronomical research to be done on their sacred mountain." In other words, despite the mountain's sacred status, tribal officials became convinced of the observatory's scientific merit and decided not to stand in the way of 'progress.'

¹³² Kitt Peak Docent Training Manuel 2008, p. 95. Available at www.lsstmail.org/outreach/kpvc/docent-news/training-2008.pdf. Accessed 04 April 2012.

¹³³ Interview with Helmut Abt. 04 June 2012.

¹³⁴ Ibid.

A sincere appreciation for astronomy may indeed have been a key factor influencing the Tribal Council's decision to agree to the terms of the lease, but what of the more pragmatic observation that the Nation stood to receive benefits from the new agreement that compensated for potential drawbacks? I will return to this question from the O'odham's perspective in the following chapter, but astronomers' narratives about the terms of the lease do underscore the economic advantages brought to the Tohono O'odham as a result of building telescopes on the mountain.

Describing the presence of O'odham staff and cultural artifacts at the Kitt Peak Visitor's Center, Edmondson pointed out, "There is a person on duty in there who sells Papago baskets, which our contract requires to sell. The lease from the Papagoes [sic] requires we display and sell Papago arts and crafts. So the person also sells brochures, postcards, and the Papago stuff, and can answer simple questions."¹³⁵ The NOAO website also emphasizes that the Nation has benefited from astronomy on Kitt Peak because the lease stipulated "a variety of concessions."¹³⁶ Near a photo of Tohono O'odham basketry on the website, a caption declares that due to the arrangement between the NSF and the O'odham Nation, KPNO serves the Tohono O'odham nation in a variety of ways: "The top 200 acres of the mountain are leased by the National Science Foundation and all electricity is purchased from the tribal utility authority. The observatory provides many jobs, and sales of arts and crafts in the Kitt Peak National Observatory Visitor Center, such as the baskets shown here, support O'odham traditional culture."¹³⁷ When asked to comment on the arrangement between the observatory and the

¹³⁵ Edmondson to DeVorkin, 2 February 1978.

¹³⁶ "The Kitt Peak Virtual Tour."

¹³⁷ Ibid.

O’odham Nation in a 2011 interview, Abt put it simply: “Kitt Peak observatory is very successful on the mountain, and they [Tohono O’odham] have gotten something in return.”¹³⁸

Two key themes emerge from the analysis of narratives drawn from the perspective of astronomers involved in the lease negotiation. First, despite an initial reluctance to permit observatory construction, the O’odham were remarkably cooperative when it came to surrendering the use of their sacred mountain because they appreciated its potential to serve modern science. In these accounts, sacredness does not appear to have been seen as a major issue obstructing the approval of the lease. Second, the primary commentary on the consequences of building telescopes on Kitt Peak for the O’odham focuses on the many economic advantages of the observatory’s partnership with the O’odham Nation, though economic concerns are not presented as the main motivation for signing the lease.

Regardless of whether the astronomers’ narratives should be interpreted at face value, certain omissions in these accounts are telling and warrant further exploration. Narratives, whether produced by institutions or individuals, are inherently selective, and it is instructive to explore details that have been highlighted and downplayed to gain insight into broader meanings. All of the astronomers’ dominant narratives—issued years after the lease was finalized—support the notion that the negotiation was “a simple matter” through the often-repeated claim that objections to the lease disappeared after Tohono O’odham leaders were inspired by the beauty of the magnified moon at the Steward Observatory. But how do these recollections compare to descriptions of the lease negotiation process produced by astronomers in the late 1950s? Examining the earlier narratives of some of the same astronomers generated

¹³⁸ Abt, quoted in Ramon-Sauberan, Jacelle, “Kitt Peak National Observatory and Native Americans Go Way Back,” *Indian Country Today*. 20 October 2011.

at the time the lease was originally signed reveals many points of convergence, but also some telling inconsistencies.

Deciphering Astronomers' Narratives: the Making of "a scientific adventure story"

The theme of the persuasive observatory demonstration as the key to securing the Kitt Peak site is clearly articulated in astronomers' narratives issued in the 1950s, but the lease negotiation is also consistently characterized as a serious *challenge* due to the mountain's sacredness. In January 1956, Meinel told a reporter that leasing the mountain was "a difficult process" due to the Papago Tribal Council's lengthy deliberations because a single opposing vote stood in the way of accessing the mountain for site testing.¹³⁹ Fifty years later, Meinel also framed the negotiation as hinging on the resistance of a solitary tribal elder, but he no longer recalled the process of securing the lease as "difficult" and placed little emphasis on its sacredness. In other 1956 newspaper articles, astronomers informed reporters that the observatory project was initially threatened when a tribal elder refused to grant permission for site testing in two separate Tribal Council votes because he was concerned that astronomers would disturb stones he had placed in front of caves on Kitt Peak.¹⁴⁰ All of the press releases and newspaper articles printed in January 1956, just after the Papago Tribal Council approved a resolution to negotiate a lease with the NSF, mentioned that Kitt Peak was sacred to the tribe.¹⁴¹ At that time, astronomers evidently wanted the public to know that entering into the lease negotiation process with the O'odham was *not* "a simple matter."

¹³⁹ "Observatory Site Sought: Lonely Peak near city one of six under test," *The Tucson Citizen*. 06 January 1956. University of Arizona Library Special Collections.

¹⁴⁰ "Search for observatory site," 14 February 1956. *The Bisbee Daily Review*. Astronomical Observatory--Kitt Peak, The Arizona Historical Society archives. For other contemporary reports, see Clifton Abbott, "'Men with long eyes' promise not to disturb the caves of Ee-ee-toy," *The Tucson Citizen*. 23 January 1956; "Scientists Prefer Kitt Peak for Observatory," *The Tucson Citizen*. 23 January 1956. The Arizona Historical Society archives.

¹⁴¹ See *Ibid.*

The emphasis on the difficulty of securing the land for KPNO is also unmistakable in a section of a promotional guide prepared by the NSF about the observatory titled “Obtaining Kitt Peak Observatory site was not easy.”¹⁴² In this pamphlet, the story of the founding of KPNO is told from the astronomers’ vantage point. According to the guide, which was intended to provide information for radio or television promotion of the new national observatory, it was only “after months of delay” that site testing studies were allowed by the tribe following their visit to the 36-inch telescope.¹⁴³ In a later section titled “The Papago Indians,” it is noted that

without the cooperation of the Papago Indians, as expressed by members of their tribal council, it would have been impossible to locate Kitt Peak National Observatory on the most advantageous site in the nation. Representatives of the National Science Foundation and of AURA are aware of this and grateful to the Papago people for their farseeing cooperation. These Arizona Indians, simple desert dwellers, have made a major contribution to the nation’s modern scientific progress.¹⁴⁴

The condescending tone of the pamphlet is unmistakable—the O’odham construction workers are described as “good workers when properly directed”—but the O’odham were also bestowed with some agency in this greatly simplified account, since it was “impossible” to secure the site without their agreement.¹⁴⁵

Similar to later narratives issued by the KPNO astronomy community, the O’odham’s motivation for signing the lease is presented as a function of their “farseeing” recognition of Kitt Peak’s role in contributing to scientific progress. But the NSF also took pains to communicate

¹⁴² Morgan Monroe, Consultant, Public Information, National Science Foundation to Aden Meinel. “Background material and Kitt Peak National Observatory.” c. 1959. The University of Arizona Special Collections. Though the pamphlet is undated, there are several chronological references that render its date less ambiguous. Meinel is listed as the current Director of KPNO, but he stepped down from that position in 1960 just before KPNO was dedicated, so the pamphlet was produced sometime before then. Based on descriptions of other events in the pamphlet, I have assigned it an approximate date of 1959.

¹⁴³ *Ibid.*

¹⁴⁴ *Ibid.*

¹⁴⁵ *Ibid.*

that the negotiations were “not easy,” and again, that building the observatory on Kitt Peak would have been “impossible” without the tribe’s cooperation. An op-ed in the *Arizona Daily Star* framed the balance of power more dramatically by proclaiming that “negotiations, conducted through interpreters, were at least as difficult and delicate as those at Teheran or Yalta.”¹⁴⁶ The tribal leaders were lauded as “skillful diplomats” for refusing to sell their mountain and agreeing to its lease only after “the council realized that this was a scientific and educational project proposed for their sacred mountain.”¹⁴⁷

It appears that there was a concerted effort among astronomers in the 1950s to show that working with the O’odham to obtain the rights to Kitt Peak was problematic due to the mountain’s sacred status, and this message was then filtered through the media. Why, then, did astronomers refer to the negotiation as “difficult” or “not easy” early on, but later recall the process as “smooth” or even “simple”?

One possibility is hinted at in the same informational pamphlet about KPNO produced by the NSF that chronicles the challenges of working with the O’odham to obtain the lease of Kitt Peak. In the opening section of the pamphlet, “The Kitt Peak Story” is described as

a scientific adventure story containing all the elements of drama. It’s a story of dreams come true, of a great exploratory search spread across a continent, of teamwork in the face of adversity, of an old Indian culture aiding the cause of modern scientific research. It is a story of growth, of careful investment of public funds, of science and scientists, of the sun, the stars, the mysteries of space. This is a big story, an encouraging story—the kind we enjoy because all men are adventurers at heart.¹⁴⁸

¹⁴⁶ Inez Robb, “Papagos Prove Skillful [sic] Diplomats,” *The Arizona Daily Star*. 28 April 1959. The University of Arizona Special Collections.

¹⁴⁷ Morgan Monroe, Consultant, Public Information, National Science Foundation to Aden Meinel.

¹⁴⁸ *Ibid.*

The “scientific adventure story” of KPNO’s founding apparently centered on a plotline involving triumph over adversity. Adventurous astronomers— the heroes of the story—were responsible for persevering against incredible odds to establish the observatory as part of a noble quest to lift “mankind from darkness and fear to the dawn of the space age.”¹⁴⁹ Not wishing to alienate the public because the “careful investment of public funds” was integral to the continued support of the new national observatory, the authors of the pamphlet made key rhetorical choices to position themselves within the prevailing political, social, and cultural attitudes about science in Cold War America.¹⁵⁰

During the post-WWII period of rapid economic expansion, the social prestige of science was at an unprecedented zenith and American scientists were valorized as heroic leaders of progress.¹⁵¹ Astronomers already enjoyed an exalted position within the public sphere, but as discussed earlier in this chapter, the American astronomy community was strained by funding and access issues. By turning the site selection and lease negotiation for KPNO into an inspiring adventure story connected to the space age, the authors of the pamphlet satisfied the public appetite for narratives about American scientific superiority while simultaneously legitimizing the necessity of building a national observatory.¹⁵² In later narratives written after KPNO was

¹⁴⁹ Morgan Monroe, Consultant, Public Information, National Science Foundation to Aden Meinel. A week before Meinel climbed the summit with the O’odham guides, journalist Clifton Abbott predicted that the expedition would signal “a burning new age” for American astronomy. See Clifton Abbott, “Observatory site hunt launches new age in U.S.,” *Tucson Daily Citizen*. 07 March 1956. Courtesy of John Glaspey.

¹⁵⁰ On the intersection of Cold War politics and American scientific ideals, see Paul N. Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America* (Cambridge, MA: MIT Press, 1996). Science fiction played an important role in shaping the American public’s attitudes toward science. See Audra J. Wolfe, “Germs in Space: Joshua Lederberg, Exobiology, and the Public Imagination, 1958–1964,” *Isis* 93 (2002): p. 183-205.

¹⁵¹ American scientists were named *Time Magazine*’s “Men of the Year” in 1960. See “Men of the Year,” *Time* 22 January 1960, p. 40.

well established and the American space program boasted numerous achievements, astronomers tended to gloss over the challenges of gaining tribal approval for the observatory, effectively dismissing the notion that the O'odham's concerns about their sacred mountain were of serious consequence. Conversely, in the more dramatized 1950s narratives of confrontation between scientists and the O'odham, the sacredness of the mountain was presented as a significant obstacle to obtaining the lease agreement. But astronomers' narratives have remained steadfast on one point: tribal resistance eroded immediately after the telescope demonstration at Steward Observatory.

Did the Tohono O'odham in fact offer little resistance to AURA officials seeking a perpetual lease of their sacred mountain, and if so, was it because they were truly eager to embrace astronomical enterprise? By filtering astronomers' narratives through the socio-political climate of the late 1950s, I seek answers to these questions in the next chapter. In the process, I show how the Schuk Toak District Council's and Papago Tribal Council's acceptance of the lease terms reflects on the political authority of Native Americans during this period.

¹⁵² Astronomers and AURA officials fielded questions about KPNO's connection to the space race during a visit to the summit in 1958. See Jim Hayes, "Kitt Peak plays part in Space Age: Scientists survey observatory site," *The Arizona Daily Star*. 28 March 1958.

Chapter Two

An Aging Observatory and a Sovereign Nation: the changing identities of Kitt Peak National Observatory and the Tohono O’odham

“Kitt Peak observatory never should have been built...The one thing that keeps bothering me, is that they want to keep building and building and building. They keep desecrating the mountain over and over again.”
--Mildred Antone, Tohono O’odham¹

“I felt it was a privilege to work at the Kitt Peak National Observatory.”
--Don Mendez, Tohono O’odham²

In a small conference room at the DoubleTree hotel in Tucson, Arizona, Bernard Siquieros is talking about collaboration. Introducing himself as a Tohono O’odham who was raised on the reservation and now serves as the Curator of Education at *Himdag Ki*,³ the Tohono O’odham Nation Cultural Center and Museum, Siquieros is fielding a question about how to form cross-cultural relationships. A quick scan of the room reveals that his response is considered valuable information to this audience of non-Native conference attendees: pens are dancing over yellow legal pads in a flurry of note-taking. This is not an anthropology conference or an educational forum; it is the 2012 meeting of the Astronomical Society of the Pacific, and Siquieros is one of several invited Native American speakers who have agreed to share their perspectives on the intersections of scientific and indigenous ways of knowing that form the basis of this year’s theme: “Communicating Science: a National Conference on Science Education and Public Outreach.”⁴ Siquieros informs the astronomers in the room that his museum receives many requests to collaborate with the O’odham on scientific projects, and he challenges prospective collaborators by asking, “How is this going to benefit us? We know it’s going to benefit you, by providing information for your dissertation or book, but how is it going to benefit *us*? Demonstrate how it’s going to benefit us as a people.” An astronomer in the crowd raises her hand somewhat sheepishly. “This may be a naïve question,” she begins, “but is inspiring wonder or a scientific career not enough of a benefit?” Siquieros responds, “Successful collaborations are those projects where we are able to work and develop a sense of mutual respect.” He explains that some projects “begin in a promising way, but once funding is

¹ Mildred Antone, quoted in *Arizona Daily Star*, 17 June 2005.

² Don Mendez, quoted in Jacelle Ramon-Sauberan, “Kitt Peak National Observatory and Native Americans Go Way Back,” *Indian Country Today*. 20 October 2011.

³ There are multiple meanings of the Tohono O’odham word *Himdag*. At an educational conference held at the Tohono O’odham Community College in 2005, the Himdag Committee defined Himdag as “everything in life that makes us unique as individuals and as a people. It is a life long journey (past, present, future, and spiritual life).” See 2nd Annual TOCC Student Learning Outcomes Institute, Redoubling Our Efforts: Transformation Through Assessment Institute Summary. Compiled by Katrina Jagodinsky. 08 July 2005. Available at www.tocc.cc.az.us/PDFS/inssummary.pdf. Accessed 19 January 2013. In this chapter, the first use of O’odham words is italicized.

⁴ These observations are drawn from my attendance at the 2012 Astronomical Society of the Pacific meeting in Tucson. For full program details, see *Astronomical Society of the Pacific, Communicating Science: a National Conference on Science Education and Public Outreach*. August 4-8, 2012. Tucson, AZ.

secured, things change. It's important to gain respect by *showing* respect for the people you work with."

Invited to discuss the challenges and rewards of forging meaningful collaborations with scientists at a 2012 conference for professional astronomers, Tohono O'odham Bernard Siquieros was careful to emphasize that his people would not blindly accept assurances of a project's mutual benefit. Securing a partnership with the O'odham necessitated proving that the tribe stood to gain more than the satisfaction of fostering scientific curiosity, and a clear demonstration of respect for the indigenous perspective was critical. Though Siquieros's comments were intended for astronomers seeking to develop a dialogue with Native communities in future collaborative ventures, his concerns must also be understood as part of a conversation between astronomers and the Tohono O'odham that was initiated more than fifty years earlier. Chapter one examined the origins of this dialogue between the astronomy and Tohono O'odham communities and situated astronomers' shifting narratives about the lease of Kitt Peak from the Tohono O'odham within the political and social context of the Cold War.

In this chapter, I discuss the lease negotiation for Kitt Peak National Observatory (KPNO) from a variety of Tohono O'odham perspectives, including the concerns of the executive branch represented by Chairman Manuel and the legislative branch of the Tribal Council. Gaining insight into the views of the O'odham who did *not* participate in tribal government is more of a speculative enterprise, however. When assessing the approval of the lease from the tribe's perspective, there are only a few archival sources that provide commentary on the opinions of O'odham directly involved in the decision-making, and virtually none that capture the attitudes of O'odham who were not part of the governing body at the time. Still, it is possible to gauge the extent to which the Tribal Council's approval of the lease represented the interests and opinions of the entire O'odham population by considering how information from Tribal Council

meetings was disseminated across the reservation. Taken as a whole, my examination of Manuel's correspondence and Tribal Council meeting minutes from this period suggests that the unanimous Tribal Council decision did not necessarily represent a consensus among the O'odham about the decision to lease their sacred mountain. Astronomers have explained the O'odham's approval of the lease as a sign of the tribe's enthusiasm for modern science. Alternatively, some scholars have regarded the signing of the lease as an instance of political repression by the federal government, as this chapter will discuss. I argue instead that tribal leaders exercised a nontrivial degree of political authority throughout the lease negotiations. Signing the lease was not necessarily a matter of embracing astronomy, but may have been largely motivated by the tribe's desperate need for economic improvements.

After detailing the early years of KPNO, I provide a brief history of the emergence of the indigenous rights movement in the United States. Pinpointing when this political and cultural movement began to gain momentum among the Tohono O'odham establishes the critical context for an analysis of why the O'odham initially accepted scientific enterprise on their sacred mountain but later denounced the terms of the lease. I argue that the debate over the contested landscape of Kitt Peak only became possible as Native Americans pursued political mobilization. Citizenship had been granted to all Native Americans under the Indian Citizenship Act of 1924, but the indigenous rights movement, like the modern environmental movement, was virtually nonexistent in the late 1950s.⁵ It was not until 1986, nearly thirty years after KPNO's founding, when the Tohono O'odham Nation rejected "Papago," a name originally given by Jesuit missionaries that means "bean-eater," and reclaimed its ancestral name Tohono

⁵ 43 U.S. Stats. At Large, Ch. 233, p. 253 (1924).

O’odham, literally “the People of the Desert.”⁶ That same year, the tribe adopted a new constitution to replace its original 1937 constitution and by-laws.

Due to the National Science Foundation’s (NSF) stewardship of KPNO, when the O’odham Nation exercised its political authority to challenge the terms of the lease in 2005 by filing a lawsuit against a proposed telescope array, many tribal members viewed the suit against the NSF as a long-overdue indictment of the federal government’s treatment of the tribe. Thus I suggest that the history of the Tohono O’odham Nation’s evolving relationship with KPNO is one that traces the social and political agency of Native Americans in the second half of the twentieth century. I also reprise my argument from chapter one that Kitt Peak was culturally constructed by the O’odham and astronomy communities as an ideal observing site, a sacred mountain, or merely as an economic opportunity.

Finally, this chapter argues that the necessity of overcoming significant barriers to the shared use of the mountain has resulted in attempts to establish “trading zones” among the scientific and nonscientific cultures invested in the use of Kitt Peak. The concept of a trading zone proposed by Peter Galison is a “social, material, and intellectual mortar” that unites disparate cultures with different forms of argumentation derived from different theoretical backgrounds. Drawing from anthropological studies of how different cultures overcome barriers to trade through the development of specialized contact languages, Galison argues that local coordination can exist between two distinct groups even when the two parties disagree about broader meanings.⁷ Efforts to integrate Tohono O’odham concerns and culture into the observatory have included a wide range of economic, social, and symbolic concessions to the

⁶ See David Rich Lewis, *Neither wolf nor dog: American Indians, environment, and agrarian change* (New York: Oxford University Press, 1994), p. 118.

⁷ See Peter Galison, *Image and Logic: A Material Culture of Microphysics* (Chicago: University of Chicago Press, 1997), chapter 9, p. 802.

tribe such as preferential consideration to tribal members for observatory jobs, displaying and selling O'odham baskets and pottery at the KPNO Visitor's Center, educational outreach in the Nation's schools, and hosting open observatory nights for the O'odham Nation. But have these different communities with widely varying cultural perspectives on the use of the mountain truly managed to develop regions of local coordination?

I conclude this chapter by analyzing the KPNO Visitor's Center as an important locus of social and material exchange between the KPNO and O'odham communities. In the early years of its operation, the Visitor Center successfully bridged the cultural gaps between these communities through the efforts of a dedicated KPNO staff member. Elizabeth Estrada worked at the Visitor Center and acted as a cultural ambassador between astronomers and the O'odham in order to facilitate the sale of O'odham crafts, for which she was made an honorary member of the Papago Tribe. What began as an economic arrangement stipulated by the lease ultimately revitalized the declining cultural tradition of O'odham basket-making, and the relationship between KPNO and the O'odham remained relatively amicable for many years as a result of this effective partnership. After Estrada's death in the late 1980s, direct social and economic exchange dwindled, and economic and political changes began to transform the cultural worlds of both communities. As a result, the cultural distance between KPNO and the O'odham steadily widened, and the Visitor Center was reduced to only a symbolic zone of mediation by the time of the 2005 lawsuit. By tracking the changing parameters of local exchange at the Visitor Center from the 1960s to the twenty-first century, I present an historically contingent explanation of the successes and failures of trading zones between scientific and nonscientific groups with a cultural investment in Kitt Peak.

The Myth of Consensus: O'odham Perspectives on the Lease Negotiations

The Papago Tribal Council formally accepted the terms of the lease with the astronomers they had dubbed *O'odham mo g cew wu pui* (the People with the Long Eyes) in March 1958 and signed the lease in October, just under two years from the date of the *Schuk Toak* District Council's approval.⁸ For astronomers, the Tribal Council's unanimous 15-0 vote approving the Resolution was an eagerly anticipated endorsement of the arrangement between the NSF and the O'odham, but what did this vote really signify for the O'odham? Although I have thus far referred to the O'odham and the American astronomy communities as discrete entities, it is unlikely that either the O'odham or the astronomers were truly unified in their acceptance of the observatory. Within both communities, the observatory signaled a fundamental shift in traditional community standards, and both stood to gain and lose from the deal.

In the years leading up to the lease agreement, the O'odham had already experienced internal tension between seeking new economic and social opportunities through modernization and the desire to cling to traditional ways (not unlike the American astronomy community's apprehension over the enduring ramifications of building a national observatory on existing standards of astronomical practice). Since the lease would ultimately become the cornerstone of the debate over the astronomical development of Kitt Peak in 2005, it is important to address whether the Tribal Council's unanimous vote corresponded to universal acceptance of the lease terms by the O'odham of the 1950s.

⁸ Papago Tribal Council Resolution No. 976. The lease was formalized through a law passed by the 85th Congress. See Public Law 85-816, 72 Stat. 981. See also "Papagos permit use of sacred site," *The Amerindian* 6 (May-June), p. 3. Chicago, *American Indian Review*.

Immediately after the Papago Tribal Council approved the first Resolution authorizing site testing and lease negotiation in January 1956, John H. Denton wrote to Chairman Manuel offering free legal counsel on the lease negotiation.⁹ Denton and his colleague Sidney Gerber were members of a local charitable organization of Tucson citizens called the Association of Papago Affairs, and both men worked to ensure that the tribe would receive a one-time bonus of \$25,000 for signing the lease of Kitt Peak.¹⁰ Though Manuel's response is missing from archival records, it is apparent from Gerber's follow-up letter that the Chairman was not pleased with the economic concessions outlined in the lease proposal. Gerber apologized

I am sorry that the observatory lease is not going to bring you as much money for the Tribe's use as a thought they should get. However, it is probably too late to do anything now, but in the future, if you will [get] good competent advice at the time the negotiations first start on anything, then the Tribe will get proper compensation for their rights. The Tribe could have received enough annual income on the observatory lease to pay for a full time administrative assistant.¹¹

Gerber informed Manuel that a meeting had been held in Tucson to find a way to raise funds to hire an administrative assistant for the tribe, and the meeting adjourned with enough start-up funding to bring Chester Higman from Seattle in early February. The first several months of Higman's salary would be paid with the hopes that the tribe and the people of Tucson would elect to pay his salary afterward. According to Gerber, Higman was a good choice because "all the people in Tucson think he is just the right man for the job."¹² Funding for Higman, a

⁹ Papago Tribal Council Resolution No. 860 was approved on 06 January 1956, and Denton wrote Manuel on 16 January 1956. See Frank Edmondson, "AURA—KPNO Chronology, 1950-60," p.3- 4. Files of Edward H. Spicer, Arizona State Museum. box 8, folder 47.

¹⁰ Chester Higman, "Economic Developments on the Papago Reservation, Talk to Tucson Civic Unity Committee. 15 September 1958, p. 4. University of Arizona Library Special Collections.

¹¹ Sidney Gerber to Mr. Mark Manuel. 19 January 1958. University of Arizona Library Special Collections.

¹² Ibid.

businessman from Seattle who had spent two years in charge of overseas relief for the Friends Service Committee, was arranged jointly through the Friends Service Committee and the Association of Papago Affairs.¹³

The addition of an administrative assistant for the tribe was evidently important to Manuel as a means of grappling with the tribe's business affairs. Writing back to Gerber at the end of January, Manuel was confident that with Higman's expenses paid for, "the Tribe will have the chance to look into every business on the reservation, I know the Tribe is not getting much revenue out of every business lease or rental."¹⁴

The correspondence between Gerber and Manuel in the weeks following the Tribal Council's approval of the Resolution reveals that the Chairman feared that his tribe was being shortchanged in the lease agreement. Manuel hopefully anticipated that hiring Higman, a tribal outsider who would occupy the newly-created administrative assistant position, would lead to a much-needed review of the tribe's business arrangements. By this time, however, the Schuk Toak District Council had already agreed to make Kitt Peak available to the NSF and the Papago Tribal Council had formally supported site testing and the lease negotiation. Well aware that the lease negotiations had gained momentum before the tribe had received proper legal guidance, Gerber believed it was already "too late" for the tribe to recover more revenue from the lease of Kitt Peak. As it turned out, Gerber's assessment was fairly accurate. Despite

¹³ John Riddick, "Papagos Hire Business Manager For Reservation," *The Tucson Daily Citizen*. January 1958. University of Arizona Library Special Collections. The American Friends Service Committee (AFSC) is a Quaker organization founded during World War I to address issues of promoting peace within communities globally. See "About AFSC," <https://afsc.org/about>. Accessed 15 March 2013.

¹⁴ Mark Manuel, Chairman Papago Tribal Council to Sidney Gerber. 30 January 1958. University of Arizona Library Special Collections.

Manuel's misgivings, both the District Council and Tribal Council approved the lease to the NSF in 1958 with its one-time bonus of \$25,000 and an annual \$2,500 rental payment thereafter.¹⁵

Manuel may have been dissatisfied with the financial terms of the lease in 1956, but he was optimistic about the overall impact of the observatory on his tribe after the lease was signed in 1958. Manuel predicted that tourism on the mountain would aid tribal members interested in starting small businesses, and he told a newspaper reporter that the tribe was now enthusiastic about KPNO. Though tribal elders had once opposed the observatory, younger tribal members had won them over, and Manuel stated, "I hope some of our young boys will become astronomers."¹⁶

As Chairman, Manuel did not have the authority to determine the outcome of the lease negotiations, regardless of his personal opinions on the fairness of the lease. But as a direct participant in the interactions with astronomers since he was first approached by Meinel in 1955, Manuel at least had the opportunity to develop a well-informed opinion about each stage of the lease negotiation. The same cannot be said for the O'odham outside of tribal government. Given the dearth of written sources on O'odham perspectives on the lease from the 1950s, it is difficult to make a definitive statement about how information about the proposed observatory was circulating throughout the reservation. However, a discussion from a Tribal Council meeting after the lease was finalized hints at the possibility that much of the tribe was uninformed about the impending astronomical development of its sacred mountain.

¹⁵ Roughly half of the \$25,000 bonus and the annual \$2,500 rental payment went to the Schuk Toak District, with the other half distributed to the Tribal Council. The 1961 budget for the Papago Tribal Office and Council showed that the tribal share of the observatory lease was \$1,275. See Resolution of the Papago Council No. 1116. 03 June 1960. University of Arizona Library Special Collections.

¹⁶ John Riddick, "Papagos Hire Business Manager For Reservation."

In a 1959 Tribal Council meeting, Council members raised the ongoing issue of interpreting the Tribal Council minutes correctly at the District Council meetings so that residents of the eleven Districts could remain informed about Tribal Council business. The old protocol was to read previous Tribal Council minutes at the next meeting, where they were approved by members of the Tribal Council.¹⁷ People in the Districts were entirely shut out of the conversation through this process, so the Tribal Council had recently adopted a new procedure of mailing its meeting minutes out to District Councilmen shortly after the meetings took place.

The communication between the Tribal Council and the Districts was more efficient under this new system, but the problem of ensuring that residents of the Districts were up-to-date on tribal business persisted due to the O'odham-English language barrier. The Tribal Council observed that proper interpretation of the meeting minutes would require representatives from each District to attend Tribal Council meetings. If the District representative could read English and interpret well, they would be able to return to their District and go over the Tribal Council meeting minutes with the people of that District. The Tribal Council meeting minutes concluded, "only in some way like this can the Districts be kept informed and be able to take on the right kind of action on things that come up for them to decide on."¹⁸ Because no such system was in place when the lease of Kitt Peak was discussed at Tribal Councils from 1955-1858, and since the lease concerned only one District, it is quite

¹⁷ Minutes of the Papago Council. 06 November 1959, p. 8. University of Arizona Library Special Collections.

¹⁸ Minutes of the Papago Council. 06 November 1959, p. 8. University of Arizona Library Special Collections.

possible that other members of the geographically vast reservation were completely unaware of the lease deliberations.¹⁹

Whether the majority of the O’odham were well-informed about the proposal to lease Kitt Peak or not, the Tribal Council’s ability to effectively represent the O’odham during this period has also been called into question by scholars and some members of the current Tohono O’odham Nation. Critics of the Tribal Council assert that decisions made by this governing body should not be interpreted as the consensus of the tribe as a whole because the O’odham lacked political and cultural unity in the late 1950s. In his case study on federal Indian policy and the management of the Tohono O’odham’s sacred mountains, University of Arizona political scientist Daniel McCool examined the impact of the federal agenda to solve the “Indian problem” through cultural assimilation.

As a result of being subjected to over a century of culturally damaging federal policy that frequently violated tribal sovereignty and ignored Indian religious beliefs while attempting to dissolve Indian cultures into the dominant ‘white’ culture, McCool concluded that the Tohono O’odham grew increasingly less committed to traditional spiritual practices and beliefs.²⁰ Prior to the 1960s, Tohono O’odham children were sent to boarding schools off the reservation, where O’odham language and cultural traditions were prohibited.²¹ Many O’odham sought

¹⁹ In 1958, Chairman Manuel estimated that there were around 6,000 people living on the Papago Reservation’s 3 million acres of land stretching from San Xavier to Gila Bend. See John Riddick, “Papagos Hire Business Manager For Reservation.” Higman’s estimate was higher, between 8,000-11,000 residents, but he noted the difficulties of determining the tribal population in the absence of an accurate census and given the migratory nature of tribal members during the agricultural season. C.J. Higman to Mr. Claude Medford, Jr. 21 April 1958. University of Arizona Library Special Collections.

²⁰ Daniel McCool, “Federal Indian Policy and the Sacred Mountain of the Papago Indians,” *Journal of Ethnic Studies* 9 (1981): p. 58-69; p. 67.

²¹ The Indian Oasis School District was established in the 1960s, with the first school on the reservation opening in 1963. By 1967, there were ten grades, and Baboquivari High School was opened on the

wage work off the reservation, which introduced new sources of cultural fragmentation into the tribe as people began to abandon traditional agricultural practices. Thus the Tohono O’odham of the 1950s must be understood as a heterogeneous community of individuals with different and often competing economic, political, and spiritual priorities. Particularly in light of the poor network of communication between the Tribal Council and the eleven Districts, the opinions and decisions of the Tribal Council that shaped the lease of Kitt Peak in 1958 may not have accurately represented the rest of the tribe.

Some members of the Tohono O’odham Nation have also pointed out that the Tribal Council had limited political authority in the 1950s because it answered to the Bureau of Indian Affairs (BIA). In 2005, Cultural Affairs Manager for the Tohono O’odham Peter L. Steere argued that the BIA’s oversight of tribal affairs meant that the Tribal Council had “far less autonomy” than its twenty-first century counterpart.²² The argument that the Tribal Council was beholden to the BIA rather than to the people of the tribe was also articulated by a Tohono O’odham activist and blogger who affirmed

TON [Tohono O’odham Nation] is the BIA recognized governing body of the Tohono O’odham people, that was established by the Indian Recognition Act of 1934 (IRA). Since its conception, the legitimacy of this body has been called into question by the traditional people of the community. Many Traditional O’odham and parts of the community feel that TON decisions do not speak for the community as a whole.²³

reservation in 1971. See Michael S. Adams, *Every Stick and Stone: A History of the Papago People* (Alpha Graphics, 1979), p. 257.

²² Peter L. Steere, quoted in Joan April Suwalsky, *Somewhere Touching Earth to Sky: The Lease of Kitt Peak and the Intersections of Citizenship, Science, and the Cultural Landscape*. Honors thesis. (Barnard College, 2005), p. 32. The Arizona State Museum archives.

²³ The O’odham Solidarity Across Borders Collective. www.oodhamsolidarity.blogspot.com/2010/04/movement-demands-autonomy-oodham.html. Accessed 12 December 2011.

The blogger anachronistically refers to the Papago Tribal Council as the Tohono O’odham Nation, but the intended message is that the O’odham, like most other peoples with a system of self-government, have not always agreed with the decisions made by their elected leaders.

The Tribal Council represented a politically and culturally fragmented population that was poorly informed about tribal business, but the lease of Kitt Peak *was* demonstrably endorsed by the fifteen Tribal Council members who made the deciding vote. Is it safe to assume, then, that this unanimous vote at least represented a consensus among Tribal Council members in 1958? Certainly, the Tribal Council members agreed to uphold the Schuk Toak District Council’s earlier vote of approval for the observatory according to established tribal customs, but some Tribal Councilmen were still reluctant to accede to the terms of the lease, as a close inspection of the Tribal Council minutes reveals.

The KPNO lease was presented for formal approval by the Papago Tribal Council at the October 1958 meeting. As Director of KPNO, Meinel was present, and other AURA officials were also in attendance to witness the deliberations. The Schuk Toak District Council had already approved the lease terms, and Schuk Toak Councilman Larry Miguel was satisfied that the final lease was in agreement with the proposed terms, but some tribal members still had questions for the observatory officials present. Tohono O’odham Johnny Blaine asked for clarification on the bonus and annual rental amount, and Tribal Council member Archie Hendricks of the *Chukut Kuk* District wanted to know what would happen to the lease agreement if the tribe was terminated. An AURA attorney present at the meeting assured tribal members that they would retain full control of the lease even if termination occurred.²⁴ Tribal Councilman Austin Garcia of the Chukut Kuk District inquired about whether the attorney’s promise that the tribe would

²⁴ Minutes of the Papago Council. 03 October 1958. University of Arizona Library Special Collections.

not lose lease rights upon termination was in fact written into the lease, and the attorney located the relevant clause and read it to the audience.²⁵ The discussion continued until the Tribal Council and other tribal members present were satisfied, and the Resolution approving the lease and authorizing the Chairman to sign on behalf of the Council was then approved by a unanimous vote of 15-0.²⁶

As soon as the vote was made, a Tohono O’odham asked when the bonus and rental would be paid to the tribe. AURA Business Manager Ralph Patey told the group that the payment was expected to be made by November once the Secretary of the Interior and the Director of the NSF had signed the lease.²⁷ Then, as AURA officials looked on, Manuel and his new administrative assistant Chester Higman gathered with other members of the Tribal Council to sign the document that would permit the construction of the national observatory on their sacred mountain. Meinel thanked the Council and told Council members that the lease could be good for both the tribe and AURA, and the meeting adjourned for lunch.²⁸

The Dream of “a million dollars”: An Economic Argument for Signing the Lease

Back in 1956, the Tribal Chairman had expressed concerns that revenues from the lease were insufficient, and Tribal Council members shared their own concerns about the economic terms of the lease just moments before the lease was signed in 1958. If the governing body of

²⁵ Minutes of the Papago Council. 03 October 1958. University of Arizona Library Special Collections.

²⁶ Ibid.

²⁷ Minutes of the Papago Council. 03 October 1958. President Eisenhower had signed a bill authorizing the NSF to lease Kitt Peak from the Papago Indian Tribe in August 1958. See “Kitt Peak Plans Expedited; Authorization Bill signed,” *The Arizona Daily Star*. 29 August 1958, p. 4. University of Arizona Library Special Collections. See also “Udall submits Kitt Peak bill: measure authorizes Papago tribe to lease site for planned observatory,” *The Arizona Daily Star*. 23 July 1958. The Arizona Historical Society archives, Astronomical Observatory-- Kitt Peak.

²⁸ Minutes of the Papago Council. 03 October 1958.

the tribe harbored lingering doubts about the economic advantages of the lease, why did they agree to sign it? In her thesis on the KPNO lease, Joan April Suwalsky argues that the lease “favors NSF significantly, and actually usurps political agency from the Tohono O’odham Nation.”²⁹ In Suwalsky’s view, the O’odham entered into the contract as a show of good citizenship in accordance with termination era political pressures.³⁰ Postwar federal Indian policy was animated by termination measures that were designed to discontinue federal Indian services and ultimately dissolve all federally recognized tribes. Under the banner of emancipation, the so-called ‘era of termination’ was ushered in by Eisenhower’s signing of the 1953 House Concurrent Resolution 108.³¹ This measure led to the development of individual tribal termination bills and resulted in the loss of over one hundred sovereign communities. Suwalsky’s argument conforms to the assessment of later Tohono O’odham commentators who see the BIA’s interference in tribal affairs as a significant obstacle to tribal autonomy, but this interpretation necessarily downplays the tribe’s growing political agency.

As chapter one has already shown, the opposing vote of tribal elders from the Schuk Toak District Council once jeopardized the entire national observatory project. The tribe could have maintained its original position that the observatory presented an unacceptable risk to the sanctity of Kitt Peak, and the observatory planners would likely have turned to their second choice, Hualapai Mountain in Kingman, Arizona. Instead, tribal officials elected to work with observatory officials. Certainly, the tribe was well aware of entering into an agreement with a federal agency against the threatening political pressures of the termination era—in fact, the subject of termination was raised at the Tribal Council just before the lease was signed. Further,

²⁹ Suwalsky, *Somewhere Touching Earth to Sky: The Lease of Kitt Peak and the Intersections of Citizenship, Science, and the Cultural Landscape*, p. 6.

³⁰ Ibid.

³¹ 1953 House Concurrent Resolution (HCR) 108 (67 St. B 132) and Public Law 280 (67 St. 588).

in an informational pamphlet prepared for public consumption, the NSF praised tribal members who “acquired a considerable measure of civilization” by embracing wage work and rejecting traditional customs.³² Signing the lease could have been seen by the NSF as a means for the tribe to demonstrate its acceptance of mainstream American values, as Suwalsky contends. However, the argument that the tribe was pressured to submit to the lease terms due to the fear of losing federal benefits through termination is complicated by the tribe’s recent success in suing the federal government. John Denton, the lawyer who assisted the tribe in the lease negotiations, was the same lawyer who had previously worked with the tribe to restore the tribe’s mineral rights in 1955, and there is no evidence to support the notion that the tribal government accepted the lease terms under duress.

As discussed in the previous chapter, several astronomers have explained the District Council’s and Tribal Council’s decision to sign the lease quite differently by viewing the act as a testament to the tribe’s embrace of science. This account holds that tribal members were so moved by the telescope demonstration at Steward Observatory that they agreed to the lease because they believed astronomy was the best use of their sacred mountain.

The motivations of the District Council and Tribal Council members who decided the fate of the mountain are open to speculation, but it is quite possible that the decision to sign the lease was largely pragmatic rather than the result of political pressure or scientific support. When a consideration of the harsh economic reality of life on the reservation is read against the statements made by the O’odham involved in the lease negotiations, it is apparent that even modest economic gains offered through the lease agreement would have been difficult for the tribal government to dismiss.

³² Morgan Monroe, Consultant, Public Information, National Science Foundation to Aden Meinel, c. 1959.

In 1955, Chairman Manuel testified before Congress that his recently submitted \$23 million Papago Rehabilitation Program bill was desperately needed to sustain the people living on the reservation. Farming was still the primary source of income for families living on the reservation, and according to Manuel, the O'odham lagged 25 years behind non-Indian farmers and ranchers in agricultural self-sufficiency. Congress rejected the relief bill.³³ Economic relief was still one of the tribe's most urgent priorities when Higman began to assess the needs of the O'odham in 1958.

In a talk to the Tucson Civic Unity Committee shortly after accepting the administrative assistant position, Higman recounted a meeting with off-reservation Tohono O'odham in Tucson in which a young man asked him, "Well, have you made a million dollars for the tribe yet?" Seven months later, Higman admitted, "the Papago income not only hasn't increased a million dollars since I've been here, but if the young man asked me the same question today I'd have to admit that the realization of even a fraction of such a goal doesn't appear to be any closer."³⁴ The tribe was one of the poorest in the state and Higman projected a deficit in the 1958-59 tribal budget of \$1,000, even with the bonus of \$12,500 for signing the KPNO lease.³⁵ In his talk, Higman explained that the one-time bonus from the observatory would have to be replaced through some other funding source in upcoming years to maintain the budget.³⁶ He emphasized, "I don't believe people generally realize how small Papago Tribal income is...Indeed, if it weren't for substantial federal support, the Tribal government could hardly operate at all, and certain

³³ Lewis, *Neither wolf nor dog: American Indians, environment, and agrarian change*, p. 164.

³⁴ Chester Higman, "Economic Developments on the Papago Reservation," p. 1.

³⁵ The total bonus was \$25,000 for signing the lease, but half that amount went to the district in which the land was located under the terms of the Papago Constitution. See Chester Higman, "Economic Developments on the Papago Reservation," p. 2.

³⁶ *Ibid*, p. 3.

services are still inadequate.”³⁷ Higman despaired, “But where is that million dollars going to come from? Is it just a dream or does it have any basis of fact?”³⁸

The tribe’s decision to approve the astronomical development of their sacred mountain, I argue, must be viewed largely as an attempt to improve economic conditions on the reservation. Though the early opposition to the exploration of Kitt Peak as an observatory site in the Schuk Toak District indeed centered on preserving the spiritual integrity of the mountain, the concerns later expressed by Manuel and members of the Tribal Council were pragmatically based on the financial terms of the lease. This is not to say that the tribe no longer considered astronomical development as a spiritual threat, since the lease contained several stipulations regarding the sacred attributes of the mountain. But tribal leaders could not easily ignore the promise of annual revenues generated by the lease agreement, no matter how small. Even if the lease ultimately fell short of expectations and did little to fix the tribe’s economic woes, the Tribal Council’s decision was binding, and it would be decades before members of the tribe achieved a level of political mobilization that permitted a formal challenge of the lease.

Building ‘Astronomy City’

1959 opened with a flurry of activity on the mountain. In early November 1958, the NSF had agreed to allocate \$4 million to AURA for a solar telescope to be constructed at KPNO.³⁹ The tribe had already approved the lease, so once it was signed by Alan T. Waterman, Director of the NSF, and the Secretary of the Interior, construction could finally begin. At the summit, the first telescope pier was quickly put in place. Just below, thirteen Tohono O’odham were

³⁷Chester Higman, “Economic Developments on the Papago Reservation,” p. 2-3.

³⁸ Ibid, p. 4-5.

³⁹ “National Science Foundation Announces Fund Allocation for National Astronomical Observatory.” For Press, Radio, and TV, NSF-58-169. 09. November 1958. University of Arizona Library Special Collections.

employed by the observatory to do road work leading up to the site.⁴⁰ Construction continued throughout 1959 with an eight-room dormitory, a maintenance workshop, a garage, and a laboratory office nearing completion in November. The foundations for three residences and a dining hall had been poured and were expected to be finished in January. "Astronomy City," as it was soon dubbed, was beginning to materialize, and the relationship between astronomers and the O'odham seemed to be flourishing.⁴¹

KPNO astronomers invited members of the Tribal Council to visit Kitt Peak in November 1959 to show them the progress that had been made on the observatory, and the Council decided to accept the invitation with a visit to the summit on 20 November.⁴² The *Tucson Citizen* reported that astronomers and the Tribal Council delegation led by the new Chairman, Enos Francisco, "got along fine, laughing at each other's jokes and trying to understand the other's world as the Indians explained the mysteries of their religion and the astronomers the mysteries of the stars."⁴³ During the tour of the construction site, Francisco asked Associate Director Keith Pierce to explain why Kitt Peak had been selected, and Pierce spoke of the site survey process and the clear air at Kitt Peak. Francisco translated this response for the tribal members who did not speak English and then told the astronomers and engineers about the sacred attributes of I'itoi. Francisco was clearly knowledgeable about the traditional ways the

⁴⁰ "First telescope pier in place at Kitt Peak," *The Tucson Citizen*. 28 January 1959. University of Arizona Library Special Collections.

⁴¹ "Astronomy City looming up," *The Arizona Daily Star*. 01 November 1959. University of Arizona Library Special Collections.

⁴² Minutes of the Papago Council. 06 November 1959, p. 7. University of Arizona Library Special Collections. The previous month, KPNO astronomers reached out to the tribe by displaying a model of the completed observatory at the October Papago Rodeo at Sells. See "Kitt Peak exhibit to be seen at Papago rodeo," *The Arizona Daily Star*. 09 October 1959. University of Arizona Library Special Collections.

⁴³ John Riddick, "Indians see progress made on Kitt Peak observatory," *The Tucson Citizen*. 23 November 1959. University of Arizona Library Special Collections.

mountain was valued by his people, but he was eager to see the potential benefits of the astronomers' use of the mountain come to fruition. Referring to the astronomers, Francisco declared, "I am glad they came because they bring a chance for education to my people and they bring a little revenue...but some people are resentful because they think people are coming to make money on our reservation. They do not understand."⁴⁴

Construction continued throughout 1959, and the 36-inch telescope was finally dedicated in the spring of 1960.⁴⁵ Leo Goldberg, who would become the third Director of KPNO, later heralded the formal establishment of the national observatory as "a great day for American astronomy."⁴⁶ Gathered among the astronomers, engineers, and Washington brass, Tohono O'odham tribal members were present to observe the dedication ceremony, including Chairman Francisco, who gave a celebratory speech at the luncheon following the ceremony.⁴⁷

⁴⁴ Riddick, "Indians see progress made on Kitt Peak observatory." According to Edmondson, when KPNO business manager Ralph Patey attended a meeting of the Schuk Toak District Council, Francisco initially "gave Patey a rough time" but at the dedication, "Enos Francisco was no longer hostile." See Edmondson, "AURA—KPNO Chronology, 1950-60," p. 6.

⁴⁵ In late 1959, the new highway leading to KPNO was set to begin construction, and observatory planners asked the tribe for a permit to use sand and gravel from sites near the proposed roadway and the use of water from a nearby well over the two-year period of construction. See C.J. Higman to Mr. John Cable. 12 November 1959. University of Arizona Library Special Collections. For a detailed description of the dedication ceremony, including a full list of speakers, see "Dedication of Kitt Peak National Observatory" Program, Tuesday 15 March 1960. University of Arizona Special Collections.

⁴⁶ Leo Goldberg to Dr. Robert R. McMath, 21 March 1960. Series: HUGFP 83.16 Association of Universities for Research in Astronomy, 1961-1977, Box 1 AURA Board correspondence, 1960s. Goldberg called the dedication of the Kitt Peak Observatory a "great day for American astronomy" because he believed it would enable the U.S. to maintain its dominance in astronomy. Goldberg became the new Director after Meinel resigned his position on the day of the dedication over a dispute with the Board of Directors and became Director of Steward Observatory. See Press Release No. NOAO 11-05. "Aden Meinel, First Director of Kitt Peak National Observatory, Passed Away." 05 October 2011. *NOAO News*. Available at www.noao.edu/news/2011. Accessed 05 January 2013.

⁴⁷ Edmondson, "AURA—KPNO Chronology, 1950-60," p. 6. Vice-Chairman Harry Marcus also attended the dedication ceremony. See Kitt Peak National Observatory (Tucson, Arizona: Association of Universities for Research in Astronomy, Inc.), March 1960. Reprinted from *Sky & Telescope* Vol. XIX No. 7 (May 1960), p. 3; "List of Invitees." University of Arizona Special Collections.

NSF Director Alan T. Waterman read a letter from President John F. Kennedy calling the telescope a “source of pride to the nation,”⁴⁸ and Francisco told the 120 assembled guests that his people were also “pleased and proud” to have the telescope built on their land.⁴⁹

Following the dedication of the observatory’s 36-inch (0.9-meter) telescope in 1960, an 84-inch telescope (2.1- meter) was completed in 1961, followed by a 4-meter telescope in 1973. By making some of the largest telescopes in the country available for use by the entire American astronomy community, KPNO soon began to realize its mission to democratize astronomy. The O’odham community also underwent dramatic changes during this period as it began to absorb and apply currents of thought from the emerging Native American rights movement in the United States. In the next section, I turn my attention to a brief exploration of the so-called ‘Red Power’ movement that proved so influential in altering the relationship between the O’odham and the astronomers.

The Rise of ‘Red Power’

The 1960s marked the dedication of KPNO and also the beginning of a new era of Native American self-determination that would later provide the impetus for the Tohono O’odham to reject the terms of the lease with the NSF. The fallout from federal termination policies played a major role in these developments. Somewhat ironically, the goal of assimilating tribes into the United States by dissolving the federal trust relationship with Indian nations through termination backfired because many tribes responded with renewed efforts to promote tribal sovereignty. Also counter to the federal agenda of cultural assimilation, the migration of Native Americans to cities fostered political mobilization among young leaders in urban community

⁴⁸ John F. Kennedy, quoted in John Riddick, “Messages from JFK, Pope Mark Kitt Peak Dedication,” *The Tucson Daily Citizen*. 16 March 1960.

⁴⁹ Francisco, quoted in *Ibid*.

centers in the late 1960s.⁵⁰ Complementing termination policy, the commissioner of the BIA, Glenn Emmons, encouraged Native Americans to relocate to urban areas where the pressures of acculturation and run-ins with the police engendered new resentments against federal and local authorities among Native American youths. Echoing the civil rights and student protest movements of the 1960s, Native Americans began to rebel against the termination era while promoting racial pride and solidarity with a series of 'Red Power' demonstrations staged by a variety of radical new activist groups.⁵¹

In 1968, Red Power activism assumed new heights when Dennis Banks and George Mitchell drew inspiration from the militant Black Panthers and founded the American Indian Movement (AIM), which began organizing protests to call attention to the issues of cultural preservation.⁵² Responding to the growing political unrest among Native American groups, Congress passed the Indian Civil Rights Act in 1968, but many radical Native American activists

⁵⁰ See Roberta Ulrich, *American Indian Nations from Termination to Restoration, 1953-2006* (Lincoln, NE: University of Nebraska Press, 2010); Michael C. Walch, "Terminating the Indian Termination Policy," *Stanford Law Review* 35 (1983): p. 1181-1215. Kenneth R. Philip examines the response to termination era policies by Native Americans in Philip, *Termination Revisited: American Indians on the Trail to Self-determination, 1933-1953* (Lincoln, NE: University of Nebraska Press, 1999).

⁵¹The label 'Red Power' is attributed to Native American activist Vine Deloria, Jr. In 1966, the National Congress of American Indians (NCAI) gathered to stage a unified response to federal termination policy, but the NCAI took a more conservative stance by refusing to endorse marches and other protests during this period. See Jake Page, *Sacred Lands of Indian America* (New York: H.N. Abrams, 2001), p. 382; Vine Deloria, Jr. and Clifford M. Lytle, *The nations within: the past and future of American Indian sovereignty* (Austin: University of Texas Press, 1998), p. 216.

⁵² Ward Churchill and Jim Vander Wall establish links between the Black Panther movement and the American Indian Movement in Churchill and Vander Wall, eds., *Agents of Repression: the FBI's Secret Wars on the Black Panther Party and the American Indian Movement* (Boston, MA: South End Press, 1988). See also Dennis Banks' personal account of co-founding AIM in Banks, *Ojibwa warrior: Dennis Banks and the rise of the American Indian Movement* (Norman: University of Oklahoma Press, 2004); Kenneth S. Stern, *Loud Hawk: the United States versus the American Indian Movement* (Norman: University of Oklahoma Press, 1994).

criticized the act for failing to seek input from Native American leaders.⁵³ In 1969, a group of Native Americans called Indians of All Tribes staged a protracted protest at the island of Alcatraz in San Francisco that lasted nineteen months, from 20 November 1969 to 11 June 1971.⁵⁴ Alcatraz was the site of a penitentiary that had been closed since 1963, and the Indians of All Tribes believed the island should be returned to Native Americans under the 1868 Treaty of Fort Laramie between the U.S. and the Sioux tribe, which provided for the return of abandoned federal lands to native peoples. During the occupation, the Indians of All Tribes issued a proclamation that sardonically proposed to reclaim Alcatraz for \$24 in glass beads and cloth, vowing to

give to the inhabitants of this land a portion of that land for their own, to be held in trust by the American Indian Government for as long as the sun shall rise and the rivers go down to the sea—to be administered by the Bureau of Caucasian Affairs (BCA). We will further guide the inhabitants in the proper way of living. We will offer them our religion, our education, our life-ways, in order to help them achieve our level of civilization and thus raise them and all their white brothers up from their savage and unhappy state.⁵⁵

The Indians of All Tribes claimed ownership of Alcatraz using arguments that reflected the historical pattern of land purchase agreements between white settlers and Native Americans, and the proclamation boldly mocked the cultural assimilation programs once administered by the federal government. The message was clear: the Indians of All Tribes were not only challenging the U.S. government to right the wrongs of the past by honoring broken treaties, they were challenging all Native Americans to reclaim their cultural identity. The occupation of

⁵³ Indian Civil Rights Act of 1968 (25 U.S.C. sections 1301-1303).

⁵⁴ For a Native American perspective on the Alcatraz occupation from a Mohawk poet, see Peter Blue Cloud, *Alcatraz Is Not an Island*, (Berkeley: Wingbow Press, 1972).

⁵⁵ The full text of the proclamation of the Indians of All Tribes who took Alcatraz is available online at “Foundsf: your place to discover and shape San Francisco history,” http://foundsf.org/index.php?title=ALCATRAZ_Proclamation. Accessed 17 January 2013.

Alcatraz was eventually disbanded by U.S. marshals in 1971, but the protest drew considerable national media attention, effectively raising awareness about the Red Power movement. The rapidly growing grassroots campaigns urging the federal government to uphold its treaties with Native American Nations and recognize tribal sovereignty finally gained firm support during the Nixon administration.

President Richard Nixon denounced the policy of termination in his 1970 message to Congress on Indian affairs.⁵⁶ Calling for “self-determination without termination,” Nixon was not the first President to embrace the rhetoric of Indian self-determination, but he was the first to actively employ federal policy changes that rendered the termination era obsolete.⁵⁷ Though he left office before its passage, Nixon’s message inspired the Indian Self-Determination and Education Assistance act passed by Congress in 1975.⁵⁸ Nixon was also instrumental in granting preferential hiring of Native Americans in the BIA, a transformative practice that continued into the Reagan administration.⁵⁹

Due to Nixon’s sympathetic federal Indian policy and the growing strength of AIM, the 1970s were truly a watershed in Native American political activity. In 1974, two influential books authored by Native American activists further fueled the movement. *The Fourth World: An Indian Reality* by George Manuel and Michael Posluns and *Behind the Trail of Broken*

⁵⁶ “Special Message to Congress on Indian Affairs,” July 8, 1970, Public Papers of the Presidents: Richard Nixon (1970) (Washington, D.C., 1971), p. 565- 567.

⁵⁷ See Harry A. Kersey, Jr., “Buffalo Tiger, Bobo Dean, and the ‘Young Turks’: A Miccosukee Prelude to the 1975 Indian Self-Determination Act,” *American Indian Culture and Research Journal* 29 (2005): p. 1-19; p. 2.

⁵⁸ The Indian Self-Determination and Education Assistance Act, Pub. L. No. 93-638, 88 Stat. 2203.

⁵⁹ By 1987, 82 % of the Bureau’s employees were Native American. See Samuel R. Cook, “Ronald Reagan’s Indian Policy in Retrospect: Economic Crisis and Political Irony,” *Policy Studies Journal* 24 (1996): p. 11-26; p. 19.

Treaties: An Indian Declaration of Independence by Vine Deloria, Jr. were seminal works because they each emphasized the importance of developing an international Native American rights movement.⁶⁰ In 1974, AIM founded the International Indian Treaty Council (IITC) with the goal of advancing the indigenous rights agenda on the global political scene by gaining access to the United Nations. Responding to the need to organize under a coherent political body in the international battle for tribal sovereignty, Manuel founded the World Council of Indigenous Peoples (WCIP) in 1975. The WCIP initiated a decades-long movement to create a proclamation of global indigenous rights at its second meeting in 1977, which paved the way for the drafting of the Universal Declaration on the Rights of Indigenous Peoples by the United Nations in 2007.⁶¹

The Ford and Carter administrations upheld Nixon's federal Indian policy, and Carter passed the American Indian Religious Freedom Concurrent Resolution in 1978, which was designed to recognize the religious practices of indigenous peoples by not restricting access to sacred sites.⁶² In practice, indigenous groups were unable to rely on the bill as a means of

⁶⁰ George Manuel and Michael Poslons, *The Fourth World: An Indian Reality* (Free Press, 1974); Vine Deloria, Jr., *Behind the Trail of Broken Treaties: An Indian Declaration of Independence* (University of Texas Press, 1974).

⁶¹ Universal Declaration on the Rights of Indigenous Peoples by the United Nations. 13 September 2007. available at http://www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf. Accessed 12 December 2011.

⁶² The American Indian Religious Freedom Act, Public Law No. 95-341, 92 Stat. 469 (Aug. 11, 1978). AIRFA was widely criticized by many Native American groups for failing to enforce its provisions. In *Lyng v. Northwest Indian Cemetery Protective Association* (1988), the Yurok, Tolowa, and Karok tribes sued under AIRFA to protect sacred lands that were threatened by a road proposed by the United States Forest Service. See *Lyng v. Northwest Indian Cemetery Protective Ass'n, et al.*, 485 U.S. 439 (1988). The Supreme Court ruled in favor of the Forest Service. In subsequent cases in the early 1990s, it became clear that the management of federal lands frequently undermined the protection of Native American religious rituals, leading the House of Representatives Committee on Natural Resources and Subcommittee on Native American Affairs to draft the American Indian Religious Freedom Act Amendments of 1994 H.R. 4155 and H.R. 4230 in 1994. See also *Havasupai Tribe v. United States*, 752 F. Supp. 1471 (D. Ariz. 1990); *Attakai v.*

protecting access to sacred sites since Arizona Representative Morris K. Udall, who co-sponsored the American Indian Religious Freedom Act, stated that the bill did not create any legal rights because it depended on “Federal administrative good will for its implementation.”⁶³

Under President Ronald Reagan, some of the modest gains of the 1970s eroded as federal budget cuts drastically reduced funding to Indian programs under the guise of stimulating economic independence for tribes, with education and employment sectors hit particularly hard.⁶⁴ Reagan fell further out of favor with Native American groups after he advocated making Indians “citizens along with the rest of us” instead of maintaining their “primitive lifestyles” when addressing the subject of Native Americans in a 1988 interview at a Soviet Union university.⁶⁵ Such remarks were viewed as another instance of the inconsistencies that characterized federal Indian policy under Reagan, especially in light of Reagan’s vows to uphold the anti-termination stance of the 1970s and strengthen government-to-government relationships between tribes and the United States in his Indian Policy Statement of 1983.⁶⁶

Although key Indian programs sustained devastating losses as a result of Reagan’s budget cuts, the Reagan era closed with an unprecedented leap forward in recognizing tribal sovereignty when the long history of federal paternalism in tribal affairs was thoroughly shaken

United States, 746 F. Supp. 1395 (D. Ariz. 1990); *Manybeads v. United States*, 730 F. Supp. 1515 (D. Ariz. 1989).

⁶³ Udall, quoted in Ann M. Hooker, “American Indian Sacred Sites on Federal Public Lands: Resolving Conflicts Between Religious Use and Multiple Use at El Malpais National Monument,” *American Indian Law Review* 19 (1994): p. 133-158; p. 137.

⁶⁴ Cook, “Ronald Reagan’s Indian Policy in Retrospect,” p. 15.

⁶⁵ “Remarks on Humoring Indians Bring Protest from Tribal Leaders,” *New York Times*, 01 June 1988, p. A13; “U.S. Erred, ‘Humored’ Indians, Reagan Says; Tribes Outraged,” *Arizona Republic*, 01 June 1988, p. A1.

⁶⁶ Statement of President Ronald W. Reagan On American Indian Policy (Jan. 24, 1983).

up by a new experiment in recognizing the political authority of individual tribes. After being submitted to Congressional investigation for his administration of the BIA, Secretary of the Interior for Indian Affairs Ross Swimmer introduced a groundbreaking new approach to overseeing federal funding of tribes. Instead of transferring funds to tribes through the BIA, Swimmer's plan enabled ten tribes to participate in a Self-Governance Project that channeled funds directly from the federal government. The Tribal Self-Governance Demonstration Project (TSGDP) pilot program of 1988 represented a major victory in tribal self-determination by recognizing the sovereign political status of the tribes involved.⁶⁷

By the late 1980s, the mission of Indian self-determination had gained national attention and pervaded the political climate of tribal governments as never before. Indigenous activist groups were working to narrow the gap between federal Indian policy and local action, and at the policy level, numerous laws had been passed by the federal government that were intended to secure greater control over religion, natural and cultural resources, and gaming for all Native American nations. Within this new political climate, the Tohono O'odham took the bold step of reclaiming its ancestral name and drafting a new constitution and by-laws in 1986.

A "new era" for the Tohono O'odham Nation

The development of the 1986 constitution was foreshadowed nearly two decades earlier in the inaugural address of the tribe's newly elected Chairman, Thomas A. Segundo. In 1968, a year that witnessed the dramatic growth of the Red Power movement and the passage of the Indian Civil Rights Act by Congress, Segundo called for "the beginning of a new era in the history of our Papago Tribal Government—an era which shall bring forth an unprecedented

⁶⁷ Cook, "Ronald Reagan's Indian Policy in Retrospect," p. 20. The TSGDP was made permanent in 1994 (PL 103-413).

surge of the greatest effort towards the development of our Papago people and their resources.”⁶⁸ The constitution and by-laws of the Papago Tribe was a relic of the Indian Reorganization Act of 1934.⁶⁹ Since 1934, the tribal population had nearly doubled, and Segundo wanted his people to be governed by a constitution that effectively addressed issues of tribal membership and jurisdictional problems related to regulating the reservation’s natural resources.⁷⁰ After an early draft of a revised constitution was circulated among the eleven districts, Segundo learned that a majority of his constituents believed the Tribal Council had too much authority and wanted to see a constitution that would formally redistribute power equally between the legislative branch embodied by the Tribal Council, the executive branch of the Chairman and Vice-Chairman, and a judicial branch of courts and judges.⁷¹ Fifteen public hearings were held by the Constitution Committee in nine of the eleven districts between 22 May 1981 and 23 March 1984 to solicit input from tribal members, and the Tribal Council then approved several resolutions affecting the language and form of the final constitution.⁷² The first resolution changed the tribe’s name from Papago to the aboriginal name Tohono O’odham, and a later resolution approved the three-branch form of government.⁷³

⁶⁸ Thomas Segundo, quoted in Vivian Juan-Saunders, *The Tohono O’odham constitution in transition*. M.A. thesis (The University of Arizona, 1992), p. 21. Arizona State University, Labriola National American Indian Data Center. Juan-Saunders would later become Tribal Chairwoman for the Tohono O’odham Nation.

⁶⁹ Under Chairman Mark Manuel, a revised constitution was defeated by a vote of 908 to 739 at the Papago Tribal Council meeting in 1958. See Minutes of the Papago Council. 06 June 1958. University of Arizona Library Special Collections.

⁷⁰ Juan-Saunders, *The Tohono O’odham constitution in transition*, p. 29-20.

⁷¹ Ibid, p. 29.

⁷² Ibid, p. 34.

⁷³ Papago Tribal Council Resolutions 46-80; 48-84. See also Juan-Saunders, p. 37-38.

On 06 January 1986, 2,180 eligible voters out of the total Tohono O’odham population of 15,844 turned out to approve the revised constitution and by-laws of the Tohono O’odham Nation, making it one of the first tribes to institute a three-branch form of self-government.⁷⁴ In her 1992 thesis on the development of the Tohono O’odham Nation’s 1986 constitution, future Tribal Chairwoman Vivian Juan-Saunders (who would spearhead the lawsuit against the NSF in 2005) argues that because the Constitution Committee was largely composed of Tribal Council members, the constitution did not truly reflect a more centralized system of self-government because the Tribal Council still retained significant authority.⁷⁵ Yet unlike its 1934 counterpart, the new constitution of the Tohono O’odham Nation had been forged in a climate of self-determination and reflected the tribe’s mission to

affirm our sovereign powers of self-government, to preserve, protect and build upon our unique and distinctive culture and traditions, to conserve our common resources, to establish a responsive form of government, to provide for the free expression of our people, to promote the rights, education and welfare of the present and future generations of our people and to show our gratitude to *I’itoi* our Maker.⁷⁶

The 1986 constitution brought the Nation squarely into the fold of indigenous rights movements that emphasized preserving the cultural traditions of the past while promoting new educational and economic opportunities. With the renewed institutionalization of this agenda, the Nation was in a better position to question the merits of its relationship with KPNO and the NSF, and the relatively amicable relationship that had endured since its signing would grow increasingly strained.

⁷⁴ Juan-Saunders, *The Tohono O’odham constitution in transition*, p. 40.

⁷⁵ *Ibid*, p. 41.

⁷⁶ Constitution of the Tohono O’odham Nation. 18 January 1986. The constitution was approved by the Department of the Interior on 06 March 1986.

'Rumblings' of Discontent

In the years leading up to the formation of the new constitution, there were a few scattered signs that some of the O'odham who worked at KPNO were unhappy with the management practices of the observatory, but most staff members were reportedly pleased with their employment opportunities. By 1962, twenty Tohono O'odham were employed in various service positions at KPNO.⁷⁷ A decade into the preferential employment agreement stipulated by the lease, many O'odham were convinced that the decision to lease Kitt Peak had benefited the tribe. In 1970, the reservation remained in a state of severe economic stagnation, and the annual income of individuals living on the reservation was only \$700.⁷⁸

Joseph Masco's ethnography of scientific, activist, and indigenous communities surrounding the Los Alamos National Laboratory in New Mexico powerfully illustrates this important link between regional socioeconomic differences and the engagement of different cultural groups.⁷⁹ In Masco's study, he establishes that the lab brings economic benefits to the region as a major employer, which means the neighboring Pueblo and Hispanic communities have a pragmatic attachment to the lab's continued operation even while some members of those communities take issue with the impact of the lab on the natural environment.⁸⁰ Pueblos oppose the lab because they regard the lab as harmful to the sacred landscape of the plateau above Santa Fe, which contains several religious sites. Hispanic communities oppose the lab out of concern for traditional subsistence agrarian uses of the land. Anti-nuclear activists who tend to harbor an intertwined agenda of promoting peace and environmentalism are the least

⁷⁷ Adams, *Every Stick and Stone*, p. 255.

Lewis, *Neither wolf nor dog: American Indians, environment, and agrarian change*, p. 166.

⁷⁹ Joseph Masco, *The Nuclear Borderlands: The Manhattan Project in Post-Cold War New Mexico* (Princeton: Princeton University Press, 2006).

⁸⁰ Ibid.

conflicted group in Masco's study, with no economic ties to the lab whatsoever.⁸¹ The Tohono O'odham community may be viewed as similarly torn between supporting the economic opportunities KPNO brings to the tribe and challenging the observatory's presence on their sacred mountain. But there is also another critical factor at play: by the 1970s, some O'odham simply did not identify with the cultural construction of Kitt Peak as a sacred mountain. Particularly for the younger generation of O'odham who grew up with the observatory, the mountain was recognized more as a much-needed employment opportunity than as a sacred site.

A 1971 *Arizona Daily Star* article on the relationship between KPNO and the Tohono O'odham featured an interview with a young O'odham man named Don Mendez who had been employed as a telescope operator for five years. When asked about the spiritual significance of Kitt Peak, Mendez remarked, "I doubt if my generation even knows or realizes that this is a sacred mountain to our tribe."⁸² As one of twenty O'odham then employed at Kitt Peak, Mendez believed the original opposition to the observatory had largely faded, leading the *Star* reporter to conclude that "science and religion have met at the summit of Kitt Peak. And both are accepted and respected today."⁸³ A 1977 *Star* article on the observatory further supported Mendez' assessment, painting an idyllic picture of life at the summit as an environment "in which everyone is equally important, from the titled observers to the support staff, from the Nobel laureate to the volleyball organizer."⁸⁴ Assistant manager for galactic and extragalactic

⁸¹ Masco, *The Nuclear Borderlands*.

⁸² Don Mendez, quoted in Elizabeth Maggio, "Kitt Peak: Sacred, Scientific: Indians who once fought to retain their holy mountain today work with astral probes of the universe," *The Arizona Daily Star*. 31 October 1971. The Arizona Historical Society archives, Astronomical Observatory-- Kitt Peak.

⁸³ Maggio, "Kitt Peak: Sacred, Scientific."

⁸⁴ John Peck, Editorial. *The Arizona Daily Star*. 27 February 1977.

telescope service at KPNO Gus Maxey affirmed, “We do have a close community here.” Maxey added, “the people who might cause friction don’t stay around very long. Oh, once in a while, there’s a problem, but it gets worked out.”⁸⁵

Just one year later, however, the *Star* reported that “there are rumblings atop Kitt Peak. Not the sort to jar the delicate telescopes, but those of deteriorating relations between the Indians and the national observatory that has been their friendly tenant.”⁸⁶ Several O’odham employed in operations jobs ranging from housekeeping to janitorial work had recently quit, complaining of poor treatment and discrimination by the observatory. At the time, twelve Tohono O’odham were employed in operations positions at KPNO, and two O’odham were employed in technical positions. The disgruntled former O’odham employees accused the observatory of preferentially giving work to non-O’odham employees and denying opportunities for advancement to O’odham workers.⁸⁷ In a follow-up letter to the editor, a former KPNO assistant manager of mountain operations countered that he had personally dealt with issues of absenteeism and poor work performance among O’odham employees, but that any employee who demonstrated interest in a different job was given the opportunity to advance, “be he Papago, Anglo, or of other minority groups.”⁸⁸ Other KPNO administrators also disputed the allegations, but a series of meetings was arranged for the O’odham to air their grievances.⁸⁹ Aside from these isolated accusations of unfair treatment in the 1970s, however, there is little

⁸⁵ Gus Maxey, quoted in Editorial. *The Arizona Daily Star*. 27 February 1977.

⁸⁶ Judy Donovan, “Kitt Peak mistreats Indians, Papagos say,” *The Arizona Daily Star*. 05 February 1978. The Arizona Historical Society archives, Astronomical Observatory-- Kitt Peak.

⁸⁷ Donovan, “Kitt Peak mistreats Indians, Papagos say.”

⁸⁸ Max Galey, “Kitt Peak fair,” *The Arizona Daily Star*. 14 February 1978. The Arizona Historical Society archives, Astronomical Observatory-- Kitt Peak.

⁸⁹ Donovan, “Kitt Peak mistreats Indians, Papagos say.”

evidence to suggest that there was widespread resentment among the O’odham about the lease arrangement with KPNO.⁹⁰ On the contrary, astronomers and the O’odham maintained a friendly relationship throughout this period, due in large part to the work of a KPNO Visitor Center employee named Elizabeth Estrada.

Weaving Cultural Connections: Basket-Making and the KPNO Visitor Center

Estrada, who was once married to a Tohono O’odham and remained close to her in-laws on the reservation, acted as a critical intermediary between the two communities for more than two decades by selling O’odham baskets. In the wake of the federal government’s cultural assimilation agenda, the O’odham had largely abandoned traditional basket-making. When tribal administrative assistant Chester Higman arrived on the reservation in 1958, he discovered that “most of the old customs are dying out although a few of the old people still practice them.”⁹¹ Chairman Mark Manuel told a *Tucson Citizen* reporter that year that he was hopeful that his people would begin to make baskets and start a museum displaying cultural artifacts.⁹² Years before the Red Power movements of the 1970s would provide the catalyst for a reclamation of cultural identity, Estrada encouraged tribal members to revive this declining tradition. The lease already provided for the sale of baskets and other O’odham handicrafts at the Visitor Center, and Estrada personally facilitated this arrangement by making regular trips to remote corners of the reservation to collect baskets to sell on the mountain. Estrada would then take the money back to individual artisans and retrieve the next load of baskets.⁹³ Helmut

⁹⁰ Astronomer John Glaspey came to KPNO in 1966 and characterized the relationship between astronomers and the tribe as “vibrant.” Interview with John Glaspey. 04 June 2012.

⁹¹ C.J. Higman to Mr. Claude Medford, Jr. 21 April 1958. University of Arizona Library Special Collections.

⁹² John Riddick, “Papagos Hire Business Manager For Reservation,” *The Tucson Citizen*. 1958. University of Arizona Library Special Collections.

Abt, the astronomer who had logged so many difficult hours scouting potential sites for the national observatory back in 1956, was impressed by Estrada's commitment to travel hundreds of miles on the reservation's bumpy dirt roads to ensure that the basket trade persisted.⁹⁴ Estrada learned basket-making techniques and conducted demonstrations alongside her O'odham peers during shifts at the Visitor Center. Although most of the baskets were sold at KPNO at "surprisingly low prices,"⁹⁵ basket-making became an important revenue stream for many O'odham. Selling baskets was not only a source of income; the O'odham tradition of basket-weaving was also an important step toward cultural revival that was directly connected to the observatory. Through basket-making and maintaining a friendship with Estrada, many O'odham received an economic, cultural, and social payoff that was tangibly related to the observatory. In turn, the partnership fulfilled the lease terms for the observatory and legitimized KPNO's stated goals to promote O'odham culture.

Indeed, members of both the astronomy and O'odham communities credited the goodwill between the two groups to Estrada's tireless efforts to promote basket-making. In 1962, the Papago Tribal Council voted to make Estrada an honorary member of the tribe, and according to an observatory press release in 1988, Estrada's volunteerism "played a major role in fostering and strengthening the friendship between Kitt Peak and the Tohono O'odham Nation."⁹⁶ Though selling O'odham baskets and other crafts at the Visitor Center had originated

⁹³ "Elizabeth Estrada Honored," National Optical Astronomy Observatories press release NOAO 88-05.05 May 1988. The Arizona State Museum, Spicer files, box 8, folder 15.

⁹⁴ Interview with Helmut Abt. 04 June 2012.

⁹⁵ Ibid.

⁹⁶ Estrada also served the O'odham community by editing the reservation's monthly newspaper the *Papago Indian News* and serving as Tribal Director of Arts and Crafts. See Papago Tribe of Arizona. Resolution No. 1279. 26 October 1962, on display at Kitt Peak Visitor Center Gift Shop; "Elizabeth Estrada Honored," National Optical Astronomy Observatories press release.

through the lease strictly as an economic concession for the tribe, the social network that developed around this practice eventually matured into a trading zone that intertwined the cultural worlds of the observatory and the O’odham in meaningful ways.

Estrada’s death in 1985 preceded the adoption of the new Tohono O’odham constitution by just one year.⁹⁷ The network of communication and partnership between astronomers and the O’odham personally forged by Estrada was effectively destabilized just as the Tohono O’odham Nation was transitioning into a new era of political and cultural authority. After Estrada passed away, KPNO staff initially followed her example and collected baskets from individual O’odham on the reservation, but budget and staffing shortfalls soon made this practice untenable. Rich Fedele, who became Manager of Public Outreach for the KPNO Visitor Center in 2001, believes the old method of interacting with the O’odham directly to collect and sell baskets had “a far greater social impact “for the O’odham than the current practice, which involves purchasing baskets in bulk from a middleman.⁹⁸

In recognition of Estrada’s contributions to the observatory and the O’odham, astronomers and tribal members gathered at the Kitt Peak Visitor Center Gift Shop in 1988 for a dedication ceremony that honored Estrada with a plaque on permanent display in the museum.⁹⁹ Speaking in Tohono O’odham at the ceremony, District Chairman Francisco Jose referred to Kitt Peak as a place for astronomers and his people.¹⁰⁰ His speech emphasized the common ties between two dissimilar communities that had recently lost their cultural

⁹⁷ “Elizabeth Estrada dies; longtime Papago friend,” *The Arizona Daily Star* 24 October 1985, p. 1B.

⁹⁸ Interview with Rich Fedele. 05 June 2012.

⁹⁹ “Elizabeth Estrada Honored,” National Optical Astronomy Observatories press release.

¹⁰⁰ *Ibid.*

ambassador, and it was clear that Estrada's absence was keenly felt by both groups.¹⁰¹ The sale of baskets at the Visitor Center continued, but without Estrada present to navigate the cultural gaps between astronomers and the O'odham, the gulf would only widen as each group faced significant new challenges in the years that followed.

"An Aging Observatory"

As the 1980s drew to a close, both the Tohono O'odham Nation and the national observatory located on one of its highest peaks were in a state of financial distress. In 1987, the unemployment rate on the reservation was estimated at 53 percent and showed no signs of improvement.¹⁰² The slow economic decline of the late 1980s would soon develop into a recession during the early 1990s, and the Tohono O'odham Nation was already suffering from federal cutbacks.¹⁰³ Cognizant of the pitfalls of depending on the federal government for aid in a time of economic instability, Tohono O'odham Tribal Council chairwoman Harriet Toro was eager to increase tribal self-sufficiency in the upcoming decade. The current state of economic affairs looked grim, but Toro hopefully predicted, "someday we will be taking care of all our own concerns and not having to depend on Washington for assistance."¹⁰⁴

KPNO, too, was dependent on the federal government to meet its financial demands, and the NSF budget for astronomy was rapidly shrinking. KPNO's 30th anniversary in 1988 was

¹⁰¹ "Elizabeth Estrada Honored"; Interview with Helmut Abt. 04 June 2012.

¹⁰² Some O'odham believed the unemployment rate was higher than 53 percent. See Gene Varn, "'New Vision' fades as tribe nears vote," *The Southern Arizona Bureau*. 20 May 1987. Indians of North America--Tohono O'odham, Tribal Government. The Arizona Historical Society.

¹⁰³ According to many leading economists, the recession took place from 1990-1991, but it was preceded and followed by longer periods of declining economic activity. For a concise explanation of the key factors influencing the recession of the 1990s, see Stephen K. McNees, "The 1990-91 Recession in Historical Perspective," *New England Economic Review* (January/February 1992): p. 3-22.

¹⁰⁴ Harriet Toro, quoted in Enric Volante, "Toro takes helm of Tohono O'odham," *The Arizona Daily Star*. 20 April 1986.

a modest occasion of cake and ice cream for the staff as the newly appointed Director of the National Optical Astronomy Observatories (NOAO) Sidney Wolff struggled to identify ways to cut spending under a newly reduced budget.¹⁰⁵ Four years earlier, the NOAO was founded to consolidate KPNO, the Cerro Tololo Inter-American Observatory (CTIO) in Chile, and the National Solar Observatory's telescopes at Kitt Peak and New Mexico's Sacramento Peak.¹⁰⁶ The recently-implemented changes made KPNO part of a more efficient and streamlined research organization, but the national observatories were still hemorrhaging vital resources.

Wolff was planning for a budget reduction of between \$2 million and \$3 million less than needed to fund ongoing operations over the upcoming fiscal year, and NOAO had already lost 140 jobs since 1980 and cancelled a scheduled pay raise for staff. Wolff predicted that the "the next three months are not going to be very easy" because she would need to determine whether to close facilities to accommodate the drastically restricted budget.¹⁰⁷ The central dilemma was not even the short-term squeeze on the budget, but the long-term relevance of the national observatories to the American astronomy community. Wolff pointed out, "if the national observatories [sic] doesn't build the next generation of large telescopes, then we're going to look pretty outdated with pretty small telescopes in about 10 years' time."¹⁰⁸ According to Wolff, the NOAO collectively accommodated nearly 1,000 astronomers annually, resulting in the production of hundreds of scientific papers.¹⁰⁹ But should the NSF continue to

¹⁰⁵ Jim Erickson, "Crunch time: modest party to mark Kitt Peak anniversary as astronomers try to deal with funding cut," *The Arizona Daily Star*. 04 April 1988.

¹⁰⁶ *Ibid.*

¹⁰⁷ *Ibid.*

¹⁰⁸ *Ibid.*

¹⁰⁹ *Ibid.*

make substantial investments in the national observatories for the sake of maintaining the ideal of ‘universal access’ to telescopes? The federal patronage structure supporting KPNO and the other observatories composing NOAO was still something of an anomaly in American astronomy, which was uniquely characterized by its reliance on private funding for the construction and operation of the majority of its ground-based optical telescopes. The budget cuts affecting KPNO presaged a new crossroads in American astronomy that was strikingly reminiscent of the debate about democratizing the field thirty years earlier.

The NSF budget for KPNO remained static throughout the 1990s, and without adjustments for inflation, Wolff was forced to make some tough decisions. Well aware that any decision about shutting down telescopes at Kitt Peak would affect the nation’s ‘have-nots’—astronomers who lacked privileged institutional access to telescopes—Wolff canvassed opinions on potential telescope closures by establishing an online ‘electronic forum’ in 1995.¹¹⁰ Concerned astronomers from around the country weighed in over a two-month period. While some were enthusiastic about downsizing the national observatories to prioritize funding for larger telescopes being built in Hawai’i and Chile, others pointed out that graduate students and astronomers who depended on smaller telescopes to carry out their research projects would be left in the cold if KPNO abandoned its smaller instruments.¹¹¹ Deidre A. Hunter of Lowell Observatory argued that “the science that is done on smaller telescopes is every bit as good and as important to the field as the science that is done on bigger telescopes,”¹¹² a view affirmed by

¹¹⁰ Comments were solicited from 31 October 1995 to 23 December 1995 and roughly 60 comments were posted during that time. Selected comments from the electronic forum were printed the following year in Jim Erickson, “Kitt Peak plan calls for building 2 more scopes, closing 4,” *The Arizona Daily Star*. 07 January 1996, p. 5A-5B.

¹¹¹ The 8-meter Gemini twin telescopes, Gemini North and Gemini South, were under construction in Hawai’i and Chile in 1995, and NOAO would administer access to the Gemini user community.

¹¹² Deidre A. Hunter, quoted in Erickson, “Kitt Peak plan calls for building 2 more scopes,” p. 5B.

Timothy C. Beers of Michigan State University, who stressed that the new focus on larger telescopes “cannot, CANNOT, be done at the expense of the closing down of existing smaller facilities.”¹¹³

Members of a joint CTIO/KPNO Users Committee convened in Tucson in December 1995 to discuss the opinions generated in the electronic forum and to make recommendations for the draft of the renewal proposal to the NSF. Committee members concluded that “Shutting down the smaller telescopes to reduce operating expenses is, by itself, **not** a cost-effective measure, and would cripple the ability of NOAO to carry out what its users perceive as its primary mission: providing access to telescopes.”¹¹⁴ The Committee further emphasized

This is a period of change for NOAO—restructuring is necessary and, in the eyes of many, even desirable. But as plans for the future take shape, the committee feels an obligation to remind NOAO (as well as AURA and the NSF) of the primary need of the core constituents of NOAO facilities: access to telescopes and state-of-the-art instrumentation. Therefore, we summarize our main point in one simple statement: **Do whatever it takes to keep the existing telescopes open for as long as they are scientifically viable and in demand.**¹¹⁵

Despite this recommendation, maintaining all of KPNO’s telescopes under the reduced NSF budget was simply unfeasible. In January 1996, Wolff announced that she was submitting a \$21 million “renewal plan” to the NSF that would close four of the smallest and oldest optical telescopes at Kitt Peak. The proposal sought funding for a 4-meter and a 2.4-meter telescope to be constructed at CTIO in Chile and called for upgrades to the larger KPNO telescopes. In her

¹¹³ Timothy C. Beers, quoted in Erickson, “Kitt Peak plan calls for building 2 more scopes.”

¹¹⁴ CTIO/KPNO Users Committee Report. NOAO Newsletter 45 (March 1996). Available at www.noao.edu/kpno/kpnouc_report.html. Accessed 05 January 2013.

¹¹⁵ *Ibid.*

press release, Wolff explained that the proposal to shut down older telescopes was “a lousy idea, but it’s an inevitable result of the decreased budgets.”¹¹⁶

The fate of KPNO was sealed in 1999, when a long-range plan called “Building the Future” was issued by NOAO.¹¹⁷ Operating on behalf of the NSF, NOAO would be responsible for allocating observing time for the Gemini telescopes in the same way that it oversaw operations for users of KPNO and CTIO.¹¹⁸ KPNO would now serve a support role for research conducted at the twin 8-meter Gemini telescopes in Hawai’i and Chile. By that time, KPNO’s eight telescopes had been reduced to five, and two more telescopes would soon be shut down, leaving behind only two larger telescopes.¹¹⁹

In a 2000 *Arizona Daily Star* article, KPNO—once lauded as a symbol of American competitiveness during the height of the Cold War—was described as “an aging observatory” that was no longer in a position to keep pace with the large telescopes then being built in Hawai’i and Chile.¹²⁰ Commenting on the structural changes forced by the NSF budget cuts, KPNO Director Richard Green admitted that the observatory had shifted from supporting smaller projects on older instruments to supporting research on large, state-of-the-art instruments. “We have always had those two complementary aspects of our mission,” Green explained, “but we’re changing the balance.”¹²¹

¹¹⁶ Sidney Wolff, quoted in Erickson, “Kitt Peak plan calls for building 2 more scopes,” p. 5A.

¹¹⁷ *Building the Future: NOAO Long Range Plan*. 07 May 1999. Available at www.noao.edu/dir/lrplan/1999. Accessed 05 January 2013.

¹¹⁸ *Ibid.*, p. 27.

¹¹⁹ Jim Erickson, “Kitt Peak’s new universe,” *The Arizona Daily Star*. 17 September 2000.

¹²⁰ *Ibid.*

¹²¹ Richard Green, quoted in Erickson, “Kitt Peak’s new universe.”

KPNO's changing priorities would irrevocably alter the landscape of American astronomy by reducing access to smaller telescopes, but it would also have a local ripple effect within the Arizona astronomy community. As I will discuss in greater detail in chapters five and six, the Mt. Graham International Observatory (MGIO) was intended to be Arizona's answer to competing with the new generation of telescopes being built in Hawai'i and Chile. In a 1984 project summary for MGIO directed at the general public, Steward Observatory explained that "Since Percival Lowell first built an observatory near Flagstaff in 1894, Arizona has been world famous for astronomy. Following the selection of Kitt Peak in 1958 as the home of the national observatory, the largest new U.S. telescopes have been built in Arizona."¹²² The report then declared, "Today we find astronomy's future in Arizona is not secure. Our present observatory sites are not high enough to be competitive in new spectral regions, and they are becoming subject to light pollution from nearby cities. They cannot attract the coming new generation of ground-based telescopes for optical, infrared and sub-millimeter astronomy."¹²³ Steward Observatory astronomer Nick Woolf painted a similarly dire portrait of Arizona's ability to compete with Mauna Kea and other observatory sites, calling Arizona observatories "an endangered species."¹²⁴ As Woolf saw it

The observatories of the last century, largely built in cities, have become extinct, partly because of light pollution, and partly because the study of new regions of the spectrum have required mountaintop sites that push the altitude limits where people can work efficiently. The first mountaintop observatories are also dying. Mount Wilson is being closed, Lick Observatory can no longer perform some kinds of work. Palomar has lost

¹²² "The Mt. Graham Astrophysical Proposal," The University of Arizona. Steward Observatory. 1984, p. 1.. Courtesy of Doug Officer.

¹²³ "The Mt. Graham Astrophysical Proposal," p. 3.

¹²⁴ Nick Woolf, "An Observatory for Mt. Graham," unpublished essay. July 1985. Courtesy of Doug Officer.

the edge it had from its 200 inch telescope. In a decade or two the existing Arizona observatories will be following them.¹²⁵

As it turned out, ongoing litigation with environmentalists and Native Americans placed significant constraints on the development possibilities for the MGIO. Arizona was rapidly losing its once-secure status as a leading center of astronomical research, and in addition to the loss of prestige, this meant that Arizona astronomers could not count on being able to do world-class research right in their backyard.¹²⁶

Sweeping budget cuts had transformed KPNO from a 'universal access' observatory to one that mainly played a support role for larger telescopes, and the Arizona astronomy community could no longer point to their home state as the nation's astronomical mecca. Thus when Kitt Peak came under consideration as the potential site of a major telescope array, KPNO astronomers were understandably eager to secure the project as a means of simultaneously revitalizing the aging national observatory and Arizona astronomy.

Rejecting VERITAS

Around the same time that the American astronomy community was debating the pros and cons of the renewal plan for the aging observatory in the late 1990s, some members of the Tohono O'odham Nation were calling for a complete reevaluation of the lease. Across the United States, gaining access to and preserving sacred sites was steadily becoming a cultural and

¹²⁵ Nick Woolf, "An Observatory for Mt. Graham."

¹²⁶ The decline of astronomy in Arizona also translated into a substantial loss of revenue for the state. By Steward Observatory's estimate in 1984, the astronomy industry in Arizona brought in \$36 million annually. See "The Mt. Graham Astrophysical Proposal," p. 3.

political movement among indigenous groups, who were finding unprecedented legislative support from the federal government.¹²⁷

AIRFA had been shown to be little more than a policy statement in 1988 with the Supreme Court ruling against Tolowa, Yurok, and Karok tribes who sued the United States Forest Service to stop a proposed road through a mountainous area considered sacred to tribal members.¹²⁸ This ruling and numerous other sacred sites struggles then playing out across the United States catalyzed the formation of the American Indian Religious Freedom Coalition, representing nearly one hundred tribes and major Native American organizations, in 1988.¹²⁹ The American Indian Religious Freedom Coalition embodied an emerging focus on establishing solidarity with other tribes. Asserting religious rights tied to land had become a mandate within

¹²⁷ For a legal overview of the sacred sites movement in the United States during the 1990s, see Dean B. Suagee, "Tribal Voices in Historic Preservation: Sacred Landscapes, Cross-Cultural Bridges, and Common Ground," *Vermont Law Review* 21 (1996): p. 145-224; p. 145; Fred Unmack, "Equality Under the First Amendment: Protecting Native American Religious Practices on Public Lands," *Public Land Law Review* 8 (1987); Anastasia P. Winslow, Sacred Standards: Honoring the Establishment Clause in Protecting Native American Sacred Sites, *Arizona Law Review* 38 (1996): 1291-1343; p. 1291; Celia Byler, "Free Access or Free Exercise?: A Choice Between Mineral Development and American Indian Sacred Site Preservation on Public Lands," *Connecticut Law Review* 22 (1990): p. 397-435; p. 327; Raymond Cross and Elizabeth Brenneman, "Devils Tower at the Crossroads: The National Park Service and the Preservation of Native American Cultural Resources in the 21st Century," *Public Land & Resources Law Review* 18 (1997).

¹²⁸ *Lyng v. Northwest Indian Cemetery Protective Association*, 484 U.S. 439 (1988). Prior to *Lyng v. Northwest Indian Cemetery Association*, other sacred sites struggles had faced similar legal setbacks. The Hopi Tribal Council and Navajo Nation were engaged in a longstanding fight against the Forest Service over the development of northern Arizona's San Francisco Peaks for winter sports. According to one activist website, the San Francisco Peaks have been sacred to the Navajo, Hopi, Zuni, Tewa, Hualapai, Havasupai, Yavapai-Apache, Yavapai-Prescott, Tonto Apache, White Mountain Apache, San Carlos Apache, San Juan Southern Paiute, Fort McDowell Mohave Apache, and Acoma "since time immemorial." The Hopi and Navajo tribes formally objected to recreational development of the mountains in the 1978 Draft Environmental Impact Statement for a ski area called Snow Bowl, but the Forest Service approved expansion of Snow Bowl the following year. The Navajo Medicinemen's Association and other litigants unsuccessfully sued Interior Secretary John Block in 1979, and subsequent lawsuits filed by the Hopi and Navajo tribes in the 1980s were also dismissed. See *Wilson v. Block*, 708 F. 2d 735 (1983); "Protect the Peaks," protectthepeaks.org. Accessed 12 March 2013.

¹²⁹ Organizations that formally endorsed the American Indian Religious Freedom Coalition included the National Congress of American Indians, the Association on American Indian Affairs, and the Native American Rights Fund. See Karen Coody Cooper, *Spirited Encounters: American Indians Protest Museum Policies and Practices* (Lanham, MD: AltaMira Press, 2008), p. 63.

the Native American rights movement, and this new impetus would expand substantially over the next decade.

In 1990, a Native American Sacred Mountains conference brought together 100 Native American tribal representatives from reservations across the United States.¹³⁰ That same year, the Native American Graves Protection and Repatriation Act (NAGPRA) was signed into law by President George Bush.¹³¹ NAGPRA mandated the repatriation of museum specimens to Native American communities, symbolizing cultural and political empowerment for Natives. Former National Museum of the American Indian curator Karen Coody Cooper's 2008 study of Native American protests of museum policies found that "the return of objects has instigated a resurgence of ceremonial activities and cultural vitality in many recipient tribes...the pride of ownership of materials relating to historical events and cultural activities serves to transmit pride to upcoming generations whose grandparents experienced great loss, deprivation, and injury to their own sense of pride."¹³² Protests by Native American groups had secured federal legislation recognizing the rights of Natives, and the repatriation of materials fostered interest in renewing traditional ceremonial practices. Reclaiming sacred sites had not yet fully coalesced into a coherent movement, but Native Americans were beginning to define clear political goals

¹³⁰ "Victor, Nosie, Davis attend sacred site conference," *The Moccasin*. 04 December 1990.

¹³¹ Native American Graves Protection and Repatriation Act, 25 U.S.C. 3001 et seq. Nov. 16, 1990. Available at nps.gov/nagpra. Accessed 25 March 2013. Cooper, p. 63. See also Chip Colwell-Chanthaphonh, "Opening America's skeleton closets," *The Denver Post*. 09 May 2010; William L. Merrill, Edmund J. Ladd, et al, "The return of the *Ahayu:da*: Lessons for repatriation from Zuni Pueblo and the Smithsonian Institution," *Current Anthropology* 34 (1993): p. 523-567. NAGPRA was born of a conflict between museum and Native American cultures on the ownership and use of materials collected for display and storage in museums. The remains of an estimated 600,000 indigenous individuals were located in American museums and other repositories since the display of Native American skeletons was standard practice in American museums for much of the twentieth century. Cooper has observed that museum community members who consider Native remains and artifacts as 'objects' participate in an offensive classificatory scheme that denies the Native perspective that these materials contain life. See Cooper, p. 65; 85.

¹³² Cooper, p. 84.

that encompassed religious protection, and the passage of NAGPRA demonstrated the potential of political mobilization by 1990.

Still, the conditions of the National Historic Preservation Act of 1966 (NHPA) and the National Environmental Policy Act (NEPA) of 1969 stood as the most powerful laws for the protection of Native American religious rights until a series of lawsuits by Native American individuals and tribes resulted in amendments to the 1978 American Indian Religious Freedom Act (AIRFA) in 1994.¹³³ Then in 1996, President Bill Clinton issued an Executive Order requiring federal agencies to preserve the physical integrity of sites considered sacred to Native Americans and to accommodate access to those sites.¹³⁴ Significantly for the Tohono O’odham Nation, the Executive Order also mandated consultation with indigenous peoples to prevent disturbing the physical integrity of sacred sites. Indigenous groups continued to form networks of solidarity that created new pathways for communication between tribes that had once remained relatively culturally isolated from one another. Amidst this growing atmosphere of political and cultural empowerment for Native Americans, Schuk Toak District Chairwoman Frances Francisco announced in 1998 that a tribal attorney was in the process of reviewing the terms of the lease.¹³⁵

According to Francisco, the tribe had been dissatisfied with the lease arrangement for some time but hadn’t initiated the process of reviewing the lease until recently. Francisco asserted that the tribe’s main issues with the lease were rent and opportunities because “we

¹³³ Public Law 95-341 95th Congress. SJ. Res. 102. Joint Resolution: American Indian Religious Freedom Act. 11 August 1978.

¹³⁴ *Executive Order 13007: Indian Sacred Sites*. Federal Register: 29 May 1996 (Volume 61, Number 104). From the Federal Register Online via GPO Access. wais.access.gpo.gov. Accessed 22 September 2010.

¹³⁵ Anne T. Denogean, “Fresh look at Kitt Peak lease proposed,” *The Tucson Citizen*. 16 November 1998.

haven't really benefited anything from the observatory."¹³⁶ Francisco's list of demands included a reappraisal of the land to determine if the rental payment was sufficient, greater KPNO participation in the reservation's schools, and more job opportunities for the O'odham.¹³⁷

The lease still provided for the sale of baskets and other O'odham handiwork at the KPNO Visitor Center and also created preferential employment opportunities for the Tohono O'odham. However, because this arrangement was made between KPNO and the entire Tohono O'odham Nation, job notices were filtered through the headquarters of the tribal government in Sells, Arizona. Some members of the Schuk Toak District where Kitt Peak is located were beginning to express anger that their District, one of the poorest in the O'odham Nation, received no special preference in employment opportunities.¹³⁸

Citing KPNO outreach efforts such as volunteer work in the reservation school system and a recent O'odham family night on the mountain, KPNO Director Richard Green responded, "We are making a good-faith effort to create opportunities for them and to enable them to create more opportunities for themselves."¹³⁹ Green dismissed Francisco's complaints as a

¹³⁶ Frances Francisco, quoted in Denogean, "Fresh look at Kitt Peak lease proposed."

¹³⁷ Ibid.

¹³⁸ Trudy Griffin-Pierce, *Native Peoples of the Southwest* (Albuquerque: University of New Mexico Press, 2000), p.163. Astronomers and others have taken issue with the tribe's claims of economic depression in recent years due to the institution of lucrative casinos. In 1993, the Tohono O'odham Nation signed its first Indian gaming compact with the state of Arizona, bringing millions of dollars of revenue to the tribe annually, but the Schuk Toak District did not benefit significantly from this economic development. For an overview of the political and economic effects on Native American tribes triggered by the adoption of gaming practices following the passage of the 1988 Indian Gaming Regulatory Act (Pub.L. 100-497), see Steven Andrew Light and Kathryn R.L. Rand, *Indian Gaming and Tribal Sovereignty: The Casino Compromise* (Lawrence, KS: University Press of Kansas, 2005); Naomi Mezey, "The Distribution of Wealth, Sovereignty, and Culture Through Indian Gaming," *Stanford Law Review* 48.3: p. 711-737; Wayne J. Stein, "Indian Gaming: the Apex of a Long Struggle," in *Visions of an Enduring People: a Reader in Native American Studies*, Walter C. Fleming and John G. Watts, eds. (Dubuque, IA: Kendall/Hunt Publishing Company, 2000).

¹³⁹ Richard Green, quoted in Denogean, "Fresh look at Kitt Peak lease proposed."

“non-story” because in his view, Francisco was the only O’odham who demonstrably had an issue with KPNO. Even if the entire Schuk Toak District supported Francisco’s position that the lease terms were unfair, Green pointed out that Francisco did not speak for the Nation as a whole.¹⁴⁰ Tribal Chairman Edward Manuel, who *did* speak for the entire Nation, was silent on the issue, but the next Tribal Chairperson would have much to say about the terms of the lease and the relationship between the O’odham and KPNO.

In September of 2004, a 25-acre site at Kitt Peak’s Horseshoe Canyon was graded, power lines were installed, and concrete foundations were poured in anticipation of a new \$13 million dollar telescope expansion project called the Very Energetic Radiation Imaging Telescope Array System (VERITAS). A year earlier, a consortium of ten research institutions led by the Smithsonian Astrophysical Observatory had identified Kitt Peak as a suitable site for the seven-telescope complex designed to detect gamma rays, and the land was subleased from the NSF. VERITAS was originally slated for a site near Montosa Canyon in southern Arizona’s Coronado National Forest, but a Native American group called To All Our Relations operated a sweat lodge close to the proposed site and challenged the United States Forest Service permit granted for the project. Though the site was not on the reservation, the Tohono O’odham Nation joined with To All Our Relations to file an appeal against the permit on the grounds that the array would disturb aesthetic and spiritual properties of Montosa Canyon, and the permit was revoked.¹⁴¹ VERITAS officials decided to move the project to Kitt Peak and began preparing the site, but the Tohono O’odham Nation had not given its prior approval.¹⁴² On the contrary, the

¹⁴⁰ Richard Green, quoted in Denogean, “Fresh look at Kitt Peak lease proposed.”

¹⁴¹ “U.S. won’t allow telescopes near sweat lodge,” 23 April 2003. *Indian Country Today*.

¹⁴² For more background on VERITAS from the perspective of two astronomers involved, see Buell T. Jannuzi and Jeremy Mould, “The Tohono O’odham Nation, the NSF, VERITAS, and Kitt Peak National Observatory,” *KPNO/Kitt Peak*. June 2006.

O’odham Nation insisted that construction had begun abruptly “despite the objections of Schuk Toak District and the Tohono O’odham Nation (the “Nation”) which were communicated to representatives of Kitt Peak National Observatory.”¹⁴³

The Tohono O’odham Nation responded to the site preparation forcefully in March of 2005 by filing a lawsuit in U.S. District Court against KPNO, the NSF, and the Smithsonian Institution Astrophysical Observatory to halt VERITAS. Charging that the new telescope construction would threaten the spiritual integrity of Kitt Peak, the lawsuit claimed that the NSF violated several U.S. cultural, historic, and environmental preservation laws, including Section 106 of the National Historic Preservation Act (NHPA), the National Environmental Policy Act (NEPA), the Endangered Species Act of 1973 (ESA), and the AIRFA. In addition to seeking an injunction that would halt further telescope construction, the O’odham Nation also asked the BIA to cancel the lease of Kitt Peak by the NSF.¹⁴⁴

The discussion about the lawsuit contains important clues to the narrative about the lease negotiation that has emerged in the Tohono O’odham Nation in recent years. Tohono O’odham Chairwoman Vivian Juan-Saunders said the lease “was written when the federal government’s attitude toward Native Americans was very different. The lease they have is nowhere near what would be acceptable today.”¹⁴⁵ According to Juan-Saunders, “the promise of revenues and employment” influenced tribal leaders in the 1950s to sign the lease during a time when the federal government was taking away land and rights from many tribes.¹⁴⁶ In

¹⁴³ Tohono O’odham Nation Resolution 6-808, p. 1.

¹⁴⁴ Brenda Norrell, “Lawsuit to Halt Kitt Peak Telescopes Filed,” 11 April 2005. *Indian Country Today*.

¹⁴⁵ Juan-Saunders, quoted in Paul L. Allen, “Tribe sues to stop telescope,” *The Tucson Citizen*. 24 March 2005.

2005, however, Juan-Saunders asserted, “we’re in an era of self-governance and self-determination, where the Tohono O’odham Nation is concerned that our rights are being violated.”¹⁴⁷ Juan-Saunders was not only suggesting that the lease was connected to her tribe’s history of subjugation by the federal government; she was boldly asserting that the rights of tribal members were threatened by the VERITAS project, which represented an important cultural and political transformation for the O’odham.

In her study of the battered women’s movement in the United States, Sally Engle Merry engaged with the broader question of determining when a “rights consciousness” is adopted within groups and individuals.¹⁴⁸ Merry found that individuals generally began to conceive of themselves as being entitled to certain rights after a series of encounters with the legal system that either reinforced or denied the availability of rights. According to Merry, developing a “rights consciousness” requires “a shift in subjectivity, one that depends on wider cultural understandings and individual experience.”¹⁴⁹ Juan-Saunders’ “rights consciousness” drew from an understanding of Native American rights derived in part from the Red Power movements of the 1970s as well as the more recent political and legislative developments of the 1990s.

When Juan-Saunders declared that the rights of the Tohono O’odham were being violated in 2005, she was well aware that San Carlos Apaches had been making similar rights-based claims against the Forest Service and the Mt. Graham International Observatory (MGIO)

¹⁴⁶ Juan-Saunders, quoted in Susan Carroll, “Tribe fights Kitt Peak project,” *The Arizona Republic*. 24 March 2005.

¹⁴⁷ *Ibid.*

¹⁴⁸ Merry, “Rights Talk and the Experience of Law: Implementing Women’s Human Rights to Protection from Violence,” *Human Rights Quarterly* 25 (2003): p. 343-381; p. 381.

¹⁴⁹ *Ibid.*

for the past fifteen years.¹⁵⁰ In fact, the Tohono O’odham Legislative Council had passed a resolution supporting the San Carlos Apache Tribal Council’s opposition to MGIO in 1992.¹⁵¹ As chapter six details, the San Carlos Apaches had lost their legal battles by the time of the VERITAS case in 2005, but Apache activists were still actively opposed to MGIO. The Apaches had already set an important precedent for framing telescope construction as a Native American rights violation, and the federal government continued to provide the legal and political support for this narrative by strengthening religious freedoms for Native Americans in the 1990s. Juan-Saunders’ narrative of the signing of the lease was thus produced within an unprecedented climate of legal, political, and cultural empowerment to reclaim control over sacred sites. The Tohono O’odham Legislative Council endorsed her opposition to VERITAS by passing Resolution 6-806 in December 2006, stating that the Schuk Toak District and the Papago Tribe were “persuaded” to lease a portion of Kitt Peak for scientific purposes.¹⁵²

In the discourse surrounding the VERITAS lawsuit, members of the Tohono O’odham governing body articulated a shared perception that the 1950s lease negotiation was critically shaped by termination era pressures. In this narrative, the federal government held all the cards and the Papago Tribal Council was at a major political disadvantage. This chapter has argued instead for the political agency of the Papago Tribal Council of the 1950s in the decision to sign the lease of their sacred mountain to the NSF. As astronomers’ narratives produced immediately after the lease negotiations make clear, the tribe retained a significant measure of control over where the national observatory would be built—securing the summit of Kitt Peak

¹⁵⁰ See, for example, the Apaches’ 1990 claim that any permanent modification of the mountain represented “a display of profound disrespect for a cherished feature of the Apache’s original homeland” in San Carlos Apache Tribal Council Resolution 90-68. 10 July 1990.

¹⁵¹ See “O’odham oppose Mt. Graham scopes,” *Arizona Daily Star*. 11 May 1992.

¹⁵² Tohono O’odham Nation Resolution 6-808.

was not, after all, “a simple matter.”¹⁵³ I have shown that the Tribal Council was probably not representative of its constituents across the reservation in the 1950s and some Council members expressed concerns about the terms of the lease. Chairman Manuel’s correspondence with lawyer John Denton also indicates that Manuel was deeply concerned about improving economic conditions on the impoverished reservation and worried that the lease arrangement was inadequate. Ultimately, however, the Tribal Council retained the authority to approve or deny the lease. Without tribal records or other firsthand accounts to provide insight into the Tribal Council’s decision-making process, it is only possible to speculate that the Council believed it was acting in the best economic and educational interest of the tribe. However modest, the O’odham stood to gain economic concessions from the lease arrangement, and even Manuel later expressed his belief that the observatory would bring positive changes to his people.

Chairwoman Juan-Saunders, too, located the Tribal Council’s decision to sign the lease in economic necessity, but her assessment of the Tribal Council’s motivations for accepting the terms of the lease also pointed to coercive political pressures. Juan-Saunders believed that the O’odham of the 1950s had not been given a true voice in the lease deliberations, and she argued that the O’odham Nation was once again being denied true self-determination.

According to the lawsuit, during the site preparation process for VERITAS, the NSF did not follow proper environmental assessment protocol under NEPA. Kitt Peak was not identified as a sacred site in a cultural resources report and the environmental assessment declared that there was “no significant impact,” a conclusion that was submitted in a report to the Tohono

¹⁵³ Interview of Dr. Frank K. Edmondson by Dr. David DeVorkin on 2 February 1978, Niels Bohr Library & Archives, American Institute of Physics, College Park, MD USA. Available at www.aip.org/history/ohilist/4588_2.html#6. Accessed 10 Oct 2011.

O’odham Tribal Council, the Schuk Toak District Council, the BIA, and the U.S. Fish and Wildlife Service without first seeking tribal input. The O’odham Nation lawsuit pointed out that the NHPA was disregarded because the VERITAS project’s Cultural Resource Report was never sent to the Arizona State Historic Preservation Office for review. Finally, the lawsuit alleged that the biological report for the VERITAS project should have been filed with the U.S. Fish and Wildlife Service, but this action was never taken.¹⁵⁴

Chairwoman Juan-Saunders defended the decision to take the Nation’s grievances with the observatory to the courts by declaring, “‘I’itoi’s Garden has cultural and religious significance to our people—we have no choice but to try to halt the construction of this project.’”¹⁵⁵ Stating that “The nation has always maintained that this mountain is of cultural significance to our people,” Juan-Saunders further specified, “We want a role in decision making, and we have a right to decision making. I’m appalled that certain federal laws are not being abided by a federal entity.”¹⁵⁶

Not surprisingly, the lawsuit did little to ease the brewing tensions between the O’odham and KPNO officials. Hoping to avoid a federal court battle, the NSF voluntarily halted construction of the VERITAS project the following month after the lawsuit was filed. After investing \$1 million in the initial site preparation, deputy general counsel for the NSF Amy Northcutt admitted, “We’ve gone back to square one.”¹⁵⁷ The NSF had voluntarily agreed to put

¹⁵⁴ Richard Green and Douglas Isbell. “Tohono O’odham Dispute Process of VERITAS Site Selection on Kitt Peak,” *NOAO-NSO Newsletter* 82 (June 2005), p. 28.

¹⁵⁵ Juan-Saunders, quoted in Norrell, “Lawsuit to Halt Kitt Peak Telescopes Filed.”

¹⁵⁶ Juan-Saunders, quoted in Susan Carroll, “Tribe fights Kitt Peak project,” *The Arizona Republic*. 24 March 2005.

¹⁵⁷ Northcutt, quoted in Lourdes Medrano, “Tohono O’odham Nation blocks telescope at sacred site,” *Arizona Daily Star*. 17 June 2005.

a temporary stop to construction activities, but for Juan-Saunders, the suspension of construction was a triumph that reflected “an era of new determination.”¹⁵⁸ VERITAS scientist Trevor Weekes had already witnessed his project’s relocation from another promising site in the Santa Rita mountains due to tribal and environmental objections, but he believed the abandonment of the Kitt Peak site was only a temporary setback. Once scientists consulted with the Nation and the Arizona State Historic Preservation Office under the NHPA, Weekes was confident that construction would resume.¹⁵⁹ The assistant general counsel for the NSF, Charisse Carney-Nunes, disagreed with the Nation’s claim that tribal members were not notified about construction plans, but stated that in the future, the NSF would be “very deferential to ensure that the tribe is on board every step of the way.”¹⁶⁰

With the cooperation of the NSF and the cessation of construction activities at Kitt Peak, the grounds for the lawsuit would seem to have been rendered moot, but the legal saga was just beginning. Later that summer, U.S. District Judge David Bury ruled in favor of the NSF, concluding that indeed, the NSF’s voluntary work stoppage removed the grounds for litigation.¹⁶¹ The ruling disposed of the O’odham’s lawsuit, but it did not change the fact that the NSF was still heavily invested in finding a way for VERITAS to come to fruition at Kitt Peak.

In October 2005, after the NSF agreed to participate in a Section 106 National Historic Preservation Act consultation, the resulting Cultural Resources Report found that the early construction on the VERITAS project had already had “an adverse effect” on Kitt Peak, which

¹⁵⁸ Juan-Saunders, quoted in Medrano, “Tohono O’odham Nation blocks telescope at sacred site.”

¹⁵⁹ Medrano, “Tohono O’odham Nation blocks telescope at sacred site.”

¹⁶⁰ Carney-Nunes, quoted in Ibid.

¹⁶¹ “Tohono O’odham Ruling settles little about Kitt Peak’s future,” *Arizona Daily Star* 01 August 2005.

was deemed eligible for the National Register of Historic Places.¹⁶² Discouraged but not defeated, the NSF sought a compromise with the Nation that would permit construction to continue while safeguarding the spiritual integrity of the mountain. At a meeting held at the Schuk Toak District headquarters in January 2006, the Nation and Schuk Toak District Council discussed opposition to the VERITAS project with representatives from the NSF, the U.S. Department of Energy, the Smithsonian Institution, the National Optical Astronomy Observatories, the Bureau of Indian Affairs, the Arizona State Historic Preservation Office, and the Advisory Council on Historic Preservation.¹⁶³ The meeting adjourned without any resolution to the conflict.

In May 2006, NSF and NOAO officials presented a compromise to the Tohono O’odham Legislative Council that was prepared as a written Memorandum in July upon the Nation’s request. In the July 2006 Memorandum of Agreement under Section 106 of the NHPA, the NSF proposed terminating the use of VERITAS in 20 years and removing VERITAS “or a comparable telescope or facility” from the mountain in consultation with the Nation, followed by the eventual termination of NSF funding for all observatories on Kitt Peak and the lease to the NSF in 75 years.¹⁶⁴ The O’odham Legislative Council rejected this proposal in December 2006, resolving that the VERITAS project should not be completed and calling for the restoration of the Horseshoe Canyon site to its previous state as well as the termination of the lease.¹⁶⁵

¹⁶² Resolution of the Tohono O’odham Legislative Council (The Tohono O’odham Nation’s Position Regarding Further Construction on Ioligam Doag (Kitt Peak), Resolution No. 06-806. 07 December 2006, p. 2

¹⁶³ Resolution of the Tohono O’odham Legislative Council No. 06-808. 07 December 2006, p. 2.

¹⁶⁴ *Ibid*, p. 3.

¹⁶⁵ *Ibid*.

In 2007, relations between the Nation and the NSF deteriorated even further. The Tohono O’odham Nation passed an Emergency Resolution in February requesting the assistance of the National Congress of American Indians (NCAI) alleging that the NSF and other federal agencies had unexpectedly terminated the NHPA consultation process “without seriously considering alternative sites.”¹⁶⁶ The issue of whether telescope construction could proceed on Kitt Peak had already been referred to the Advisory Council on Historic Preservation (ACHP) for further consideration, but the Nation feared that the VERITAS project was once again moving forward as originally planned. This time, the Tohono O’odham Nation sought not only to halt construction of the VERITAS project, but the Nation also demanded that the NSF relocate the telescope facility. Citing violations of the 1996 Executive Order 13007, which deals with sacred lands, and the 2000 Executive Order 13175, which requires tribal governments to be consulted in cultural and religious matters pertaining to their lands, the resolution called upon the NCAI to serve the Nation by asking Congress to repeal the lease of Kitt Peak, “an action that would support the rights of Indian peoples to self-government that includes the control of their traditional and cultural lands.”¹⁶⁷ When the ACHP reported its findings to the NSF three days after the Emergency Resolution was passed, the news was less than favorable for the VERITAS project, to put it mildly.

First, the ACHP observed that the Section 106 review for VERITAS was beset by “a number of flaws” in its early stages, since construction was initiated before the review had even

¹⁶⁶ Emergency Resolution for National Congress of American Indians Regarding the Continued Construction of the VERITAS Project on Kitt Peak/Iollgam Doag, Sacred Lands of the O’odham in Southern Arizona 20 February 2007, p. 2.

¹⁶⁷ *Ibid.*

taken place.¹⁶⁸ The report went on to condemn the NSF's overall management of Kitt Peak, stating "the ACHP has an even larger concern for underlying problems with how NSF, as a long-term leaseholder, has managed this historic property." Under President Bush's Executive Order 13287, known as 'Preserve America', federal agencies were directed to preserve heritage assets.¹⁶⁹ Referencing the Executive Order, the report continued, "it is troubling in light of the current dispute over Kitt Peak, that NSF previously notified the ACHP that the provisions of the Executive Order did not apply to it, presumably because it did not own or control real property. This is clearly inconsistent with the long-term lease NSF holds at Kitt Peak."¹⁷⁰ The ACHP recommended that the NSF should work with the Tohono O'odham Nation to nominate Kitt Peak for listing on the National Register of Historic Places, but it also urged NSF to "reconsider alternative locations for the VERITAS project in light of the Tohono O'odham Nation's resolution of December 13, 2006" and to "resolve the adverse effects caused by premature project construction."¹⁷¹ The final ACHP recommendation to the NSF was to work with the Nation on a plan to decommission existing facilities and restore the mountain landscape to its previous state. The report closed with the admonition that agency staff involved in future Section 106 reviews by the NSF must be properly trained on the consideration of "religious and cultural significance to the Nation, other Indian tribes, and Native Hawaiian organizations."¹⁷² By responding to each of the Nation's concerns voiced in the Emergency Resolution with overwhelming support and obliquely accusing the NSF of making false claims about its

¹⁶⁸ John L. Nau, III, Susan S. Barnes, and John M. Fowler to Honorable Arden L. Bement, Jr. Advisory Council on Historic Preservation. 23 February 2007, p. 2.

¹⁶⁹ Executive Order 13287: "Preserve America." 03 March 2003.

¹⁷⁰ Nau, John L. III et al to Honorable Arden L. Bement, Jr., p.2.

¹⁷¹ Ibid, p. 3.

¹⁷² Ibid.

stewardship of Kitt Peak, the ACHP report signaled the final blow to the VERITAS project. The VERITAS array was ultimately relocated in January 2007 to the Smithsonian's Fred Lawrence Whipple Observatory in southern Arizona.¹⁷³

The VERITAS conflict represented a major departure from the isolated "rumblings of discontent" among the O'odham related to complaints about job opportunities at KPNO. For the O'odham Nation, the VERITAS episode brought some of the latent hostilities toward KPNO and the NSF to the surface, and for the first time since the late 1950s, tribal objections were presented as both economic *and* spiritual. Politically empowered by the cultural renaissance of the Native American rights movements now firmly entrenched in the O'odham community, supported by federal legislation protecting the religious claims and practices of indigenous groups, and angered by the lack of initial consultation on the VERITAS project, the Nation took decisive action. Nearly fifty years after astronomers and their O'odham guides camped together at the summit, the two communities were divided by culturally divergent visions of the mountain's use and significance.

Astronomers invested in Kitt Peak had always culturally constructed the mountain as an ideal site for ground-based optical astronomy in their narratives about the mountain's significance, from the earliest press releases issued by the NSF to more recent justifications of astronomical development at KPNO. Though KPNO astronomers were respectful of Kitt Peak's sacred status to the O'odham, the mountain was held in high regard by astronomers for its scientific value rather than its religious meaning. As I have shown, the mountain's meaning was more dynamic for the O'odham over the years. Tied to generational differences and the shifting economic and political conditions of life on the reservation, Kitt Peak was culturally constructed

¹⁷³ A perusal of the VERITAS website timeline makes no reference to either Kitt Peak or the first site selected in the Santa Rita mountains. See www.veritas.sao.arizona.edu Accessed 11 December 2011.

by the O’odham as a sacred mountain, a job site, and a cultural battleground in the struggle to assert tribal sovereignty. Through the VERITAS project, Kitt Peak had become a contested landscape.

Some members of the astronomy community at KPNO who had worked closely with the O’odham over the years felt somewhat blindsided by the seemingly sudden rejection of the lease and the accusations of misconduct against the observatory. Others, however, recognized that relations between the O’odham and KPNO had been declining for years.¹⁷⁴ When astronomer John Glaspey returned to the observatory in 1998, he was surprised to discover that tribal members had very little contact with KPNO because he had personally witnessed a thriving relationship with the O’odham as a graduate student at KPNO in the late 1960s. At that time, the Schuk Toak District Council frequently held their meetings at the observatory and the tribe was frequently informed about new developments on the mountain. Thirty years later, Glaspey noted that the interaction between the tribe and the observatory was “practically zero.”¹⁷⁵

Formally, the VERITAS debacle was a legal dispute between the Nation, the NSF, and KPNO, but it was also symptomatic of the increasing social and cultural distance between the observatory and the tribe that developed in the years after Estrada’s death. Yet even as tensions escalated in the years leading up to the 2005 lawsuit, the observatory and the Nation were unable to avoid working together by virtue of the terms of the lease, which of course ensured that the O’odham would continue to be employed at the observatory.

¹⁷⁴ Interview with Katy Garmany. 05 June 2012; Interview with John Glaspey. 04 June 2012.

¹⁷⁵ Interview with John Glaspey. 04 June 2012. Glaspey clarified that the relationship wasn’t bad; it simply “didn’t exist” in any meaningful way during the late 1990s.

In practical terms, this meant astronomers found themselves in the awkward position of working on a reservation alongside tribal members who may have resented the use and development of the mountain for scientific purposes. Katy Garmany, a KPNO astronomer who was teaching astronomy at the Tohono O’odham community college while the VERITAS controversy unfolded, recalls that when it came to working with the younger generation anyway, “people didn’t talk about it.”¹⁷⁶ Regardless of whether astronomers and the O’odham openly discussed the challenge to the lease and the VERITAS project, it was an uncomfortable chapter in the history of the observatory’s relationship with the tribe. Some astronomers may have experienced an internal tug-of-war over the desire to be culturally sensitive and the necessity of earning a living and advancing in their chosen career. At the same time, many O’odham members who worked at the observatory would have found themselves in a similarly uncomfortable position, torn between tribal solidarity and the reality of earning a paycheck.

Tohono O’odham artist Ron Miguel, whose grandfather Jose Miguel witnessed the signing of the lease, attested to this sense of personal conflict after working at Kitt Peak for over five years. Although KPNO offered a steady paycheck, Miguel lamented the threat to the spiritual integrity of his people caused by observatory development on their sacred mountain. Miguel expressed his sadness about the spiritually damaging impact of the observatory in a cracked marble plaque of l’ittoi intended to depict cultural loss.¹⁷⁷ How, then, have astronomers and members of the O’odham Nation managed to navigate this juxtaposition of interests and identity in recent years?

¹⁷⁶ Interview with Katy Garmany. 05 June 2012.

¹⁷⁷ Griffin-Pierce, *Native Peoples of the Southwest*, p. 164.

From the Man in the Maze to the Man in the Moon: the KPNO Visitor Center as a Network of Exchange

As Peter Galison has shown, distinct communities possessing seemingly incommensurable belief systems frequently develop ‘contact languages,’ or regions of local coordination, that permit communication within ‘trading zones.’¹⁷⁸ In recognition of the observatory’s unique relationship with the Tohono O’odham, KPNO astronomers and administrators have made many attempts to integrate O’odham culture into the astronomical culture on the mountain. In turn, the O’odham have exhibited a desire to marshal the astronomical culture on the mountain for the benefit of the Nation. In both cases, these attempts at accommodation can be regarded as ‘trading zones,’ or instances of integration between these otherwise disparate cultural domains. But how have true contact languages manifested within these trading zones, if at all?

The KPNO Visitor Center and Museum offers the most promise as a trading zone since it remains an important site of interaction between scientists and nonscientists. Here, any existing tensions between the O’odham and the observatory are deeply submerged in a visual discourse of mutual respect.¹⁷⁹ At the Visitor Center, scientific and indigenous cultures are seamlessly blended into tourist commodities as woven Tohono O’odham baskets and pottery are sold alongside stargazing books, T-shirts, and magnets emblazoned with both the observatory’s logo and the Tohono O’odham ‘man in the maze’ symbol (see Figure 1). The dual representation of astronomical and indigenous cultures is further marketed to the public on the KPNO Visitor Center and Museum website. Photos on the website draw attention to the wide variety of astronomical and O’odham wares available for purchase and the site welcomes its

¹⁷⁸ Galison, *Image and Logic*, 783-4.

¹⁷⁹ These observations are drawn from my visit to the KPNO Visitor Center and museum in June 2012.

patrons to “...make sure you stop by and check out some of our unique items from Tohono O’odham crafts (which we are known for) to astronomy education items.”¹⁸⁰ Leaving the gift shop with a telescope and a hand-woven basket featuring the O’odham’s creator I’itoi after chatting with a member of the O’odham Nation, a visitor to KPNO is made to feel that both astronomers and the O’odham are equally represented on the mountain.



Figure 1. KPNO magnet showing ‘man in the maze’ and major observatories at Kitt Peak. Photo: Leandra Swanner

Indeed, exhibits on astronomy and telescopes in the museum space adjoining the gift shop find a seemingly natural home next to displays about O’odham traditions at the Visitor Center (see Figure 2), a deliberate juxtaposition promoted by Manager of Public Outreach Rich Fedele, who has taken great pains to accommodate O’odham perspectives throughout the public spaces at the summit. Shortly after assuming his post in 2001, Fedele worked with tribal members to gain approval for a new KPNO sign that displayed the Tohono O’odham Nation flag. The sign now greets visitors as a visual reminder that the mountain has both scientific and indigenous stakeholders, and it is also something of a testament to the kinds of partnerships

¹⁸⁰ Kitt Peak National Observatory Visitor Center and Museum website. www.noao.edu/outreach/kpvc/kpvc-gs.php. Accessed 12 December 2011.

that can form around joint astronomy-and-O’odham related ventures.¹⁸¹ Just outside the Visitor Center, there are other telling signs of attempts by Fedele and his predecessors to incorporate the O’odham into the visual landscape of the observatory.



Figure 2. “O’odham Baskets.” Photo courtesy of NOAO/KPNO Fedele. Glass cases at KPNO Visitor Center Museum and Gift Shop displaying Tohono O’odham baskets. Astronomy books and stargazing kits are visible on top of the cases and along the wall.

¹⁸¹ Interview with Rich Fedele. 05 June 2012. Fedele believes it is important for visitors to have visual cues that they are on a reservation because there are corresponding rules that must be observed, such as a no-alcohol policy and a prohibition on removing artifacts from the mountain. Some of Fedele’s other attempts to connect with the O’odham community through Kitt Peak resources have been less successful. Fedele once attempted to expand the Tohono O’odham exhibit in the museum, meeting with interested members of the Tohono O’odham Cultural Center, but the collaboration was ultimately shelved due to the Cultural Center’s budget and staffing constraints. Fedele also encouraged Tohono O’odham vendors to bring food trucks to the Visitor Center during the busy winter months as a means of providing additional income for tribal members. Several O’odham were enthusiastic about the proposed business venture, but vendors failed to show up on a regular basis, which Fedele attributes to the logistical difficulties of reaching Kitt Peak from the reservation. Despite several setbacks in promoting O’odham culture and job opportunities through Visitor Center activities, Fedele is still seeking new ways to integrate the tribal and astronomical communities. In a 2012 interview, Fedele outlined ambitious plans to hold a yearly craft fair fundraiser to show off O’odham crafts as a public service to the tribe, with funding for advertising provided by KPNO. He also plans to expand the Visitor Center with classrooms and a small planetarium that would be available for tribal use, but a tribal law passed under Juan-Saunders during the VERITAS controversy prohibiting any new building on the mountain makes such expansion a sensitive issue.

A plaque is mounted on a large boulder with the O’odham’s “man in the maze” symbol, which is both a metaphor the O’odham use to urge seeking meaning in life as well as a depiction of I’itoi’s path from Baboquivari Peak to the Tohono O’odham.¹⁸² Another tribute to the O’odham is found in the visitor parking lot, where Fedele commissioned a Tohono O’odham artist to paint a large circular mural on an old telescope mirror blank. Showing scenes of O’odham harvesting the fruit of the saguaro cactus for the Nawait i’i (Rain Ceremony) and making basket and pottery under a starry sky dotted with planets (see Figure 3), the mural’s symbolism is unmistakable: in this place, traditional O’odham ceremonies and practices are intimately wedded to astronomical culture.



Figure 3. KPNO Visitor Center mural. Photo: Leandra Swanner

¹⁸² This is the general form of the man in the maze legend, but the story is passed from one generation to the next and can assume different meanings from one family to another. See Adams, *Every Stick and Stone*, p. 263.

The promotion of an image of a mutually beneficial partnership between the O’odham and KPNO is not only perpetuated through the material culture of gift shop and museum, but also through the unique forms of social exchange fostered by the Visitor Center. From the KPNO docent training manual produced by the Visitor Center, it is clear that the staff who represent the observatory are encouraged to reference the O’odham Nation in their interactions with the public.¹⁸³ The manual prompts docents to engage their audience on guided tours by asking “focus questions” not only based on astronomy-related subjects, but also by asking questions rooted in O’odham culture such as “What are Tohono O’odham baskets made out of?”¹⁸⁴ Tohono O’odham history apparently provides a useful vehicle for furthering the Visitor Center’s stated goal of promoting the understanding and appreciation of science for nonscientists. According to a section in the docent training manual explaining how to “link science to human history,”¹⁸⁵ “Research shows that nonscientists are more interested in science if it can be related to people from a different time. Telling about any aspect of a natural or physical science through the eyes of those who explored it, discovered it, overcame it, succumbed to it, worried about it, were empowered by it, or who otherwise affected or were affected by the thing in question, will generally make it more interesting to nonscientists.”¹⁸⁶

While much of the Visitor Center’s efforts to merge the scientific and nonscientific cultures tied to the mountain are geared toward the broader public, the Visitor Center is also the site of educational outreach activities that explicitly focus on the O’odham Nation and that

¹⁸³ Docents undergo a 12-week training program that includes a section on Tohono O’odham culture taught by a tribal member. Interview with Rich Fedele. 05 June 2012.

¹⁸⁴ Kitt Peak Docent Training Manual 2008, p. 107. Available at www.lsstmail.org/outreach/kpvc/docent-news/training-2008.pdf. Accessed 04 April 2012.

¹⁸⁵ *Ibid*, p. 105.

¹⁸⁶ Kitt Peak Docent Training Manual 2008, p. 105.

seek to unify these cultures less metaphorically. KPNO hosts astronomy nights for the tribe approximately every other year in which astronomers volunteer both their personal time and observing time.¹⁸⁷ During the open houses, Tohono O’odham visitors are invited to look through eyepieces placed on two of the largest research telescopes, the 3.5-meter WIYN and 2.1-meter telescopes.¹⁸⁸ This privileged viewing time is reserved exclusively for the Tohono O’odham Nation and occurs before scheduled observers carry out their nightly run, representing a significant commitment of the observatory’s resources.¹⁸⁹ Perhaps concerned about the virtually nonexistent relationship with the Nation noted by Glaspey in the late 1990s, KPNO began to expand its educational outreach programs even as it weathered significant NSF budget cuts that generated downsizing in other departments of the observatory. The KPNO education office submitted a grant proposal to the NSF in 1999 to fund a program that would draw upon Native storytelling by O’odham participants in tribal schools to “use astronomy as a catalyst for learning native culture, language, and science.”¹⁹⁰ Although the grant proposal does not refer to any tensions between the O’odham and the observatory, it may safely be assumed that linking astronomy education to the O’odham oratory tradition was a deliberate strategy to increase scientific literacy while enhancing the O’odham’s image of the observatory.

¹⁸⁷ Interview with Katy Garmany; Correspondence with Katy Garmany. 24 March 2013; Interview with Rich Fedele. Garmany noted that while searching through back issues of the KPNO newsletter in preparation for its 50th anniversary, KPNO staff were able to trace the observatory’s tradition of holding open houses for the tribe to the 1980s.

¹⁸⁸ Correspondence with John Glaspey. 20 March 2013; Correspondence with Katy Garmany. 24 March 2013. The WIYN Consortium includes the University of Wisconsin, Indiana University, Yale University, and the NOAO. See “WIYN 3.5 meter Observatory,” <http://www.wiyn.org/About/wiyn.html#whatis>. Accessed 25 March 2013.

¹⁸⁹ Amateur astronomers also set up telescopes in the parking lot. Correspondence with John Glaspey. 20 March 2013.

¹⁹⁰ Griffin-Pierce, *Native Peoples of the Southwest*, p. 164.

Bridging the cultural gap between astronomers and the Tohono O’odham through education has persisted as an important goal for the KPNO scientific community. In a January 2008 report to the American Astronomical Society made by the Committee on the Status of Minorities in Astronomy, Garmany acknowledged

In recent years, the scientists and staff at NOAO have recognized that the observatory could be offering a lot more assistance across the educational spectrum on the nation. While every NOAO job ad carries the line ‘NOAO and NSO are affirmative action and equal employment opportunity employers. Preference granted to qualified Native Americans living on or near the Tohono O’odham reservation,’ the majority of O’odham who work at Kitt Peak are in service-related jobs. With this in mind, the observatory has begun supporting a number of projects, primarily through the division of Public Affairs and Educational Outreach (PAEO), but involving a number of NOAO scientists and staff.¹⁹¹

Reflecting on the ongoing focus on educational outreach to ease tensions while simultaneously serving the Nation and the mission of the observatory, KPNO Director Buell Jannuzi explained in 2009, “we’re making sure there’s good communication, that we plan in advance, and find things we have in common—especially education.”¹⁹²

Garmany, who began teaching astronomy courses at the Tohono O’odham Community College in 2004, has pointed out that the college’s fundraising campaign used photographs of students and tribal elders taken at KPNO, so the O’odham have in turn drawn upon their privileged connection with the observatory to promote the tribe’s interests.¹⁹³ The Nation also asked observatory staff to lend their support to a K-12 educational initiative called “Reach for the Stars” that would enable students to participate in evening observing programs in exchange

¹⁹¹ Katy Garmany, “New Partnerships Between the Tohono O’odham Nation and Kitt Peak National Observatory,” *Spectrum* January 2008. American Astronomical Society, Committee on the Status of Minorities in Astronomy, p. 3-16; p. 3.

¹⁹² Jannuzi, quoted in Sarah Jacoby, “Tales from the Outskirts: Kitt Peak. The daughter of astronomers returns to ‘The Mountain’ to see what others see.” *Tucson Weekly* 16 July 2009.

¹⁹³ Garmany, p. 16.

for good attendance. These partnerships, whether ultimately successful or not, reveal that the O’odham Nation is eager to capitalize upon its unique relationship with KPNO, just as the astronomy community on the mountain has demonstrated a willingness to become involved in the O’odham community.

I suggest that the Visitor Center should be regarded as a still-developing “social, material, and intellectual mortar”¹⁹⁴ bridging the world of scientists and nonscientists, particularly KPNO astronomers and the Tohono O’odham. Taken as a whole, the docent-led observatory tours, gift shop purchases, and educational astronomy outreach programs centered at the Visitor Center are critical ‘trading zones’ that can provide for a means of communication across otherwise unnavigable cultural gaps. Despite the atmosphere of mistrust sparked by legal drama, such trading zones have the potential to facilitate a sustained dialogue between the scientific and nonscientific communities at Kitt Peak, though it cannot be assumed that the two cultures are speaking the same language as a result.

Lurking behind the façade of mutual accommodation is an embittered relationship that cannot so easily be reconciled with gift shop sales or educational outreach programs, one that has been defined by radically different cultural and legal visions of the mountain’s purpose over the years. Members of the Tohono O’odham Nation have deployed the discourse of culture to claim the mountain as a sacred site, and astronomers have certainly made significant efforts to acknowledge its sacredness, but whether these promising exchanges will eventually materialize into a true contact language based on mutually-understood concepts is not yet clear.

¹⁹⁴ Galison, p. 803.

Conclusion

In recent years, the relationship between the astronomy and Tohono O’odham communities invested in Kitt Peak has been profoundly shaped by the dueling forces of observatory expansion and the campaign to reclaim the mountain initiated by some tribal members. Chapter one traced the early encounters between astronomers and the O’odham and provided an analysis of astronomers’ narratives about the circumstances of the lease and the purpose of the national observatory. Understanding how and why the resistance to KPNO emerged nearly fifty years after the signing of the lease has been the principal task of this chapter, which first necessitated an examination of the motivations behind signing the lease in the 1950s. As I have shown, the O’odham did not necessarily place spiritual priorities aside to make way for modern science, nor were they bullied into signing the lease by federal agents working for the BIA. Rather, the Tribal Council’s initial agreement to lease Kitt Peak to the NSF was most likely based on practical considerations such as creating economic opportunities for the impoverished tribe.

I have argued that the development of tensions between KPNO and some members of the O’odham Nation was historically anchored to the growth of Native American rights movements in the United States as well as generational shifts in the O’odham cultural construction of the mountain as a sacred peak or an economic opportunity. Two decades after the ‘new era’ of self-determination was ushered in by the 1986 constitution, tensions between KPNO, the NSF, and the O’odham Nation reached their zenith with the VERITAS project. By that time, the slow ripple effect from the indigenous rights movement inaugurated in the 1970s had provided the foundation for Tohono O’odham activism in the early twenty-first century. It was only then that the Tohono O’odham Nation was finally positioned to exercise its political authority to oppose the perpetual lease of their sacred mountain. New narratives about the

circumstances of the signing of the lease in 1958 began to emerge among the O’odham, and those narratives ultimately found their way into legal documents that brought the \$13 million VERITAS project to a complete stop at Kitt Peak, demonstrating the rhetorical power of narratives to influence scientific development.

Analyzing the history of interactions between the O’odham and KPNO astronomers has also shed light on how trading zones of cross-cultural cooperation may coalesce and disintegrate according to shifting social, economic, and political circumstances. The mutually beneficial relationship between the O’odham and astronomy communities withered after Estrada’s passing in 1985 when KPNO switched to a more impersonal system of collecting and selling O’odham baskets. At roughly the same time, both the tribe and observatory experienced significant changes in identity. The Papago Tribe became the Tohono O’odham Nation in 1986, and federal budget cuts forced KPNO officials to restructure the observatory by trading its leadership position for a more supportive role.

In many ways, the two communities were culturally alienated from one another at the time of the VERITAS lawsuit, but this history has also shown that there is great potential for trading zones to develop between scientists and nonscientists in spite of bitter circumstances. Kitt Peak was not on federal or state-owned land, so the founding of the observatory marked the beginning of a formal relationship with the Tohono O’odham. Because of this unique arrangement, astronomers had to confront the O’odham’s concerns legally *and* socially. Notably, throughout the VERITAS conflict, O’odham continued to work at KPNO and astronomers continued to perform educational outreach activities.

Only one year after the VERITAS dispute was resolved through the 2007 ACHP report, Director of the Tohono O’odham Cultural Center Bernard Siquieros opened the KPNO 50th

anniversary celebration by emphasizing that the Nation was fortunate to have forged a positive relationship with the observatory.¹⁹⁵ Just as the unanimous approval of the lease by Tribal Council officials in the 1950s could not be interpreted as a consensus by the entire O’odham population, Siquieros’s endorsement of KPNO should not be misread as fully representative of the Nation today. But that night, at that moment, the social and cultural worlds of astronomers and the Tohono O’odham were merged in a common desire to look to the future.

These two chapters have charted the history of KPNO by examining the changing relationship between two principal stakeholders in the mountain’s use: astronomers and the Tohono O’odham Nation. In the next two chapters, I turn my attention to an analysis of the history of Mauna Kea International Observatory on the Big Island of Hawai’i, where an extinct volcano was transformed into a contested landscape through the competing claims of *three* distinct communities: astronomers, Native Hawaiians, and environmentalists.

¹⁹⁵ Bernard Siquieros, “The History of Iolkam Du’ag.” Steward Observatory Public Lecture series. 22 March 2010. Podcast available at: www.as.arizona.edu/colloquia/Colloquium/Podcasts/Entries/2010/3/22_Why_Kitt_Peak__Part_1.html. Accessed 15 January 2013.

Chapter Three

From a Temple of the Gods to a Temple for the Stars: Colonialism, Environmentalism, and the Making of Mauna Kea International Observatory

“The Institute for Astronomy’s focus on telescope construction on Mauna Kea’s summit propelled the site into a premier location for astronomical research. However, this emphasis was at the expense of neglecting the site’s natural resources.”—The Auditor, State of Hawai’i¹

“Astronomers don’t seek to exploit the land. We respect the fragility of the mountain.”—Peter Kapack, student, Institute for Astronomy.”²

On the summit of a dormant volcano, the shrine waits to be greeted by the sun. Above, the soft glow of the Milky Way spills across a glittering backdrop of stars in the inky darkness of a cloudless night. It is easy to understand why astronomers covet this mountain. Dawn is fast approaching, and a small band of Native Hawaiian cultural practitioners and invited observers begin their trek up the highest rise on the summit of Mauna Kea. At 14,000 feet above sea level, the oxygen is thin, and labored breathing comes in shallow gasps frequently muffled by the howling of bitterly unforgiving winds. The oldest member of the group is well over sixty years old and uses a cane to find secure footing up the narrow path leading to the summit. Just before reaching the summit plateau, the shrine swims into view, at first barely visible in the greyish cloak of pre-dawn light. It is a humble structure consisting of a wooden platform wrapped in Ti leaves and adorned with withered plumeria blossoms. After descendants of Hawai’i’s venerated King Kamehameha I carefully arrange bundles of leaf-wrapped stones and sacred ferns on the shrine, the participants move to the eastward edge of the precipice to complete the ceremony. In anticipation of the sunrise, they begin to chant:

Awaken/Arise
The sun in the east
From the ocean
The ocean deep
Climbing (to) the heaven
The heaven highest
In the east
There is the sun
Awaken!³

¹*Audit of the Management of Mauna Kea and the Mauna Kea Science Reserve. A Report to the Governor and the Legislature of the State of Hawaii.* Report No. 98-6 February 1998, p. 21. Available at www.state.hi.us. Accessed 30 November 2012.

² Peter Kapack, quoted in *Voices and Visions of Mauna Kea: Mauna Kea Science Reserve Master Plan and Implementation Process Summary*. Prepared by the University of Hawai’i. March 2000, p. 1. Available at www.hawaii.edu/maunakea. Accessed 30 December 2012.

As the chanting continues, the sun appears to break free of the clouds far below, infusing the sky with brilliant shades of orange, magenta, and finally the wan blue of early morning. The chanting grows louder, and the sun bathes the plateau of volcanic red soil in a flash of gold that soon encompasses the downward slopes. Sunlight blesses the summit of Mauna Kea before visiting the land below, a phenomenon known as “first light” to the Hawaiians. It is the same term used by astronomers to denote the moment a telescope achieves its first operational use. Concluding the ceremony, a Hawaiian elder offers a final prayer. In a voice choked with emotion, he points to the gleaming white observatory domes dotting the horizon in all directions. Inside, weary telescope operators and their instruments are preparing to slumber through the day, and some observatory staff can already be seen filing into vans for the trip down the mountain. “They do not understand what they are doing, what they have done,” laments the elder, soliciting nods of affirmation from others in the group. “This mountain is still sacred.”

“This mountain is still sacred.” Asserted by a participant in a religious ceremony, this claim has increasingly become a central rallying point of anti-telescope discourse in the nearly forty-year-old debate over the use and control of Mauna Kea (“White Mountain”) on the Big Island of Hawai‘i.⁴ Permeating legal testimony, activist literature, and later echoed in online debates, the argument that the mountain is “still sacred” is intended to dispel the notion that Hawaiians are no longer culturally tied to the mountain. Astronomers have never disputed Mauna Kea’s sacredness to the ancient Polynesians. In 1974, the University of Hawai‘i’s Institute for Astronomy issued a report on the mountain noting “Artifacts indicate that the summit area played a significant part in early Hawaiian culture; correspondingly, the potential of

³ This chant was performed for the equinox ceremony I observed on Mauna Kea on 22 September 2012. In Hawaiian, the chant reads: E ala e, Ka la i kahikina, I ka moana, Ka moana hohonu, Pi‘i ka lewa, Ka lewa nu‘u, I kahikina, Aia ka la. E ala e!

⁴ The name “White Mountain” is derived in part from its mantle of white snow during the winter months, but the name also has other meanings connected to its spiritual significance, which I discuss later in this chapter. A few orthographical explanations are in order. Respecting the current revival in Hawaiian language that has resulted in changing standards of publication, this chapter uses current spelling trends for Hawaiian words unless quoting text written in an earlier style. Though Native Hawaiian scholars have argued against italicizing Hawaiian words because Hawaiian should not be considered a foreign language in Hawaii, I have chosen to italicize the first use of less common Hawaiian words. I use diacritical marks where appropriate, such as “Hawai‘i” instead of “Hawaii” or *Wēkiu*. Unless otherwise noted, I conform to the standards of the University of Hawai‘i Style Guide, available online at www.hawaii.edu/offices/eur/styleguide.html. Accessed 03 January 2013.

the area holds great interest to the archaeologist of today.”⁵ Acknowledging the mountain’s cultural past is less problematic for astronomers than accepting it as a site of *current* religious practice, however. Probing the temporal dimensions of the mountain’s spiritual geography unearths a larger controversy over access and control of the summit. If the mountain is still sacred, how can astronomical practice accommodate cultural practice, and vice versa?

While charting the shifting uses and meanings of the mountain landscape, this chapter seeks to pinpoint the emergence of competing claims to Mauna Kea. Drawing from published oral histories and well-established studies of Hawaiian history, I first examine the historical and ideological relationship of Native Hawaiians to Mauna Kea from earliest settlement to the twenty-first century.⁶ Both Native Hawaiians and astronomers have rhetorically embraced conceptions of the ancient Polynesians to support contradictory arguments about the proper use of the mountain, so I begin with a brief discussion of Polynesian navigation and the early settlement of the Hawaiian Islands.

Because the Mauna Kea Science Reserve was established on ceded land and sovereignty claims are at the heart of all land disputes in Hawai’i, I explore the shifting control of the land tied to the legacy of colonization in the nineteenth and twentieth centuries to provide critical

⁵ Mauna Kea - an overview. University of Hawaii Institute for Astronomy (Honolulu) July 1974, p. 6. UH Manoa Hamilton Hawaiian Library.

⁶A note on terminology: my use of the term “Native Hawaiian” refers to residents of the Hawaiian Islands who self-identify as native and may also belong to other racial backgrounds. Native Hawaiians also refer to themselves as *Kanaka Maoli*. To denote residents of the state who do not claim Native Hawaiian status, I use the category ‘Hawai’i resident’. As Stefan Helmreich has observed in his study of biologists’ classification of plant species, defining ‘native’ is “a taxing taxonomic question, especially in Hawaii, where the word native resonates with descriptors used by and for the indigenous people of Hawaii...” See Helmreich, “How Scientists Think; About ‘Natives,’ for Example: A Problem of Taxonomy among Biologists of Alien Species in Hawaii,” *The Journal of the Royal Anthropological Institute, Incorporating MAN* 11 (2005): p. 107-128; p. 108. In Hawai’i, the category “local” generally indicates non-Caucasians born in the islands with several generations of family ties to Hawai’i, and it is frequently used in opposition to “*haole*,” a word that once denoted a foreigner but now refers to Caucasians.

context for the debate over the mountain.⁷ As in my previous chapters, I pay particular attention to the making and use of narratives about the mountain as a sacred site because analyzing the historical production of narratives provides insight into the dynamics of power and knowledge production about Mauna Kea. Much like Native American oratories, Native Hawaiian narrative traditions, called *mo'olelo*, are centered on place. With the understanding that the *mo'olelo* carry historical understandings of the relationship of Hawaiians to their land, I approach these Hawaiian narratives as continuously negotiated and re-negotiated cultural constructions of the mountain.⁸

Refining the postwar portrait of the moral and political economy of American astronomy sketched in chapter one, I then outline the motivations for building a new observatory in the 1960s, a full decade after the Kitt Peak National Observatory was founded. Following an evaluation of the decision-making process that led to the construction of the first telescope on Mauna Kea in 1969, I explore the first environmental and cultural objections to the observatory.

Well before Native Hawaiian groups accused astronomers of cultural insensitivity for building telescopes on a sacred mountain, environmental groups feared the observatory would threaten the delicate *mamane* tree ecosystem at lower elevations on Mauna Kea. Later

⁷ Ceded lands, also known as 'Crown lands,' are regions of the Hawaiian Islands held in trust by the federal government for Native Hawaiians.

⁸ For this chapter, I draw extensively from Hawaiian *mo'olelo* contained in a 2005 oral history project commissioned by the Office of Mauna Kea Management at the University of Hawai'i at Hilo. This project consists of narratives about the relationship of Hawaiian land to the people of the islands, with most accounts written between 1794 and 1940 and translated by researchers Kapa Maly and Onaona Maly. See "Mauna Kea-- the Famous Summit of the Land: A Collection of Native Traditions, Historical Accounts, and Oral History Interviews for: Mauna Kea, the Lands of Ka'ohe, Humu'ula and the 'Āina Mauna on the Island of Hawai'i." Kumu Pono Associates LLC Study HiMK67-OMKM (033005b). Prepared by Kapa Maly and Onaona Maly. I also make use of the rich repository of texts on the religion and mythology of the Pacific Islander Regions available through the *Internet Sacred Text Archive*. See <http://www.sacred-texts.com/pac/>. Accessed 23 November 2012.

environmental debates centered on the destruction of critical habitat for the summit's endangered *Wēkiu* bug following telescope construction. For this reason, narratives about Mauna Kea's environmental and cultural significance are contextualized within two key movements unfolding during the 1960s and 1970s: the American environmental movement and the reclamation of cultural identity known as the Native Hawaiian Renaissance. By focusing in this chapter on how the policies and values of the American environmental movement intersected with the astronomical development of the mountain, I argue that the advent of modern environmentalism fundamentally transformed astronomical practice.

Concerned citizens increasingly objected to what they characterized as 'piecemeal' telescope development on the mountain in the mid-1970s. Bolstered by new Congressional reforms that led to the National Environmental Policy Act (NEPA) of 1969, the Environmental Protection Agency (EPA) in 1970, and the Endangered Species Act (ESA) of 1973, environmentalists began to insist that observatories prepare detailed Environmental Impact Statements before initiating construction. The growing public opposition to new telescope projects on Mauna Kea required astronomers and observatory planners to enter into a new conversation with nonscientists in the local community by holding town hall meetings and soliciting public input on the development process. This heightened public engagement remained a persistent trend in building large observatories on the mountain as citizens asserted their authority to regulate telescope development by participating in the drafting of a series of master plans to manage the Science Reserve on Mauna Kea. Opposition to the telescopes sparked a critical review of telescope development by the State of Hawai'i that in turn triggered a new master plan calling for an unprecedented level of community input. As discussed in the chapter that follows, the master plan process would also provide a forum for Native Hawaiians

to voice their objections to the observatory by directly confronting the astronomy community for the first time.

The Polynesian mystique

Across the Hawaiian Islands, the celebration of Polynesian culture is ubiquitous and far-reaching. Textbooks used in the private Kamehameha Schools for Native Hawaiian children instruct students to learn about their “creative, industrious, observant, skillful, and wise”⁹ Polynesian ancestors, and the ‘living history’ Polynesian Cultural Center on O’ahu attracts thousands of tourists and locals annually.¹⁰ Popular descriptions of Polynesian navigation commonly make references to Polynesians as ‘ancient astronomers’ who employed impressive and mysterious scientific methodology.¹¹ In the twentieth and twenty-first-century debates about the development of Mauna Kea, both astronomers and telescope opponents have leveraged the powerful cultural authority of Polynesian mythology to justify their respective positions.

⁹ Julie Stehart Williams. *From the mountains to the sea: early Hawaiian life* (Honolulu: Kamehameha Schools Press, 1997), p. 1.

¹⁰ The Polynesian Cultural Center was opened in 1963 on O’ahu’s North Shore by members of The Church of Jesus Christ of Latter-day Saints who sought to create a tourist attraction that would highlight traditional Pacific island cultures. Its stated goal is “to help preserve and perpetuate the more ideal aspects of Polynesian culture.” See www.polynesia.com. Accessed 22 November 2012. For a historical treatment on Mormons in Hawaii, see Hokulani K. Aikau, *A chosen people, a promised land: Mormonism and race in Hawai’i* (Minneapolis: University of Minnesota Press, 2012), especially chapter four, “In the Service of the Lord: Religion, Race, and the Polynesian Cultural Center,” p. 123-156.

¹¹ See, for example, Liesl Clark, “Polynesia’s Genius Navigators,” *NOVA: Secrets of Easter Island*. 15 February 2000. Available at <http://www.pbs.org/wgbh/nova/ancient/polynesia-genius-navigators.html>. Accessed 12 October 2012. Also see James Barr, “Of Metaphysics and Polynesian Navigation,” in Barry McDonald, ed., *Seeing God Everywhere: Essays on Nature and the Sacred* (Bloomington, Ind.: World Wisdom, 2003), p. 161-170; see also selected works by nautical anthropologist Ben Finney, especially *Hokule’a: the way to Tahiti* (New York: Dodd, Mead, and Company, 1979); Finney, *Voyage of Rediscovery: A Cultural Odyssey through Polynesia* (Berkeley: University of California Press, 1994); Finney, *Sailing in the Wake of the Ancestors: Reviving Polynesian Voyaging* (Honolulu: Bishop Museum Press, 2003). The Polynesian Voyaging Society maintains a repository of online sources emphasizing “the art and science of traditional Polynesian voyaging.” See www.hokulea.org. Accessed 20 December 2012.

Archaeologists and historians continue to debate the geographical migration patterns of the ancient Polynesians, and the exact dates of their arrival in the Hawaiian Islands are similarly contested. Most scholars agree that Polynesians relied on precise knowledge of the stars to navigate thousands of miles across the Pacific Ocean in small canoes, though their motives for undertaking such arduous journeys remain open to speculation. Polynesians settled the eight Hawaiian Islands between 300-500 CE, and their descendants gradually established chiefdoms across the islands governed by *ali'i Nui*, members of ruling families whose rank made them equivalent to gods on earth.¹²

The 'Post-contact' Era

The first contact with European outsiders came in 1778, when Captain James Cook's search for the fabled Northwest Passage led him to the island of Kawai'i. Cook later returned to the Hawaiian Islands in 1779, where he was killed in a scuffle with Hawaiians on the Kona coast of the Big Island.¹³ Cook's two visits took place during the reign of Hawai'i's most celebrated monarch, King Kamehameha I. Born on the Big Island of Hawai'i in 1758 as Kamehameha Nui, King Kamehameha I conquered and unified the eight Hawaiian Islands as the Kingdom of Hawai'i in 1795 when his warriors won the Battle of *Nu'uano* on O'ahu.¹⁴ His son, Kamehameha II,

¹² The origin of the Polynesian settlers is also a matter of scholarly dispute. Archaeological evidence suggests that the Polynesians departed from the Marquesas, Raiatea, Tahiti, the Society Islands, and Bora Bora. For an overview, see Patrick Vinton Kirch, *The Evolution of the Polynesian Chiefdoms* (Cambridge: Cambridge University Press, 1989).

¹³ How Cook was perceived by the Hawaiians he interacted with on his last voyage is a subject of enduring scholarly debate. In his 1992 *The Apotheosis of Captain Cook: European Mythmaking in the Pacific* (Princeton University Press, 1992) Gananath Obeyesekere deconstructs the colonial myth presented by Marshall Sahlins and others that Hawaiians welcomed Captain Cook as a manifestation of their god Lono. Sahlins takes issue with Obeyesekere's interpretation in his 1995 response, *How "natives" think: about Captain Cook, for example* (Chicago: University of Chicago Press, 1995). Obeyesekere's rebuttal is contained in the Afterword to the 1997 edition of *The Apotheosis of Captain Cook*, p. 193-245.

¹⁴ Samuel Kamakau, *Ruling chiefs of Hawaii* (Honolulu: Kamehameha Schools Press, 2001. revised ed.), p. 67-68.

became successor to the monarchy after his father's death in 1819. The following year, American missionaries arrived in Hawai'i, bringing new diseases, plants, animals, and goods to the Hawaiian people.

In the 'post-contact' nineteenth century, Hawai'i underwent dramatic political, social, cultural, and economic shifts. Native Hawaiian historian Jonathan Kay Kamakawiwo'ole Osorio's *Dismembering Lāhui: a history of the Hawaiian nation to 1887* describes colonialism in Hawai'i as a "slow, insinuating invasion of people, ideas, and institutions" that effectively "dismembered the lāhui (the people) from their traditions, their lands, and ultimately their government."¹⁵

The islands were soon ravaged by epidemics that reduced the Native Hawaiian population by over 90 percent.¹⁶ Kamehameha II succumbed to measles in 1824 on a trip to Great Britain, leaving the monarchy to his 7-year-old brother, Kauikeaoli, who then became known as Kamehameha III.¹⁷ During Kamehameha III's 30-year reign, the American missionary presence exposed the monarch to new views of land ownership and the rights of his people to participate in government. With European and American powers angling for control of the Hawaiian Kingdom in the mid-nineteenth century, King Kamehameha III and his chiefs began to draw from the Anglo-American legal and political system to refashion the existing legal and political structures of the Hawaiian Kingdom. Aided by American judge William Little Lee,

¹⁵ Jonathan Kay Kamakawiwo'ole Osorio. *Dismembering Lāhui: a history of the Hawaiian nation to 1887* (Honolulu: University of Hawai'i Press, 2002), p. 3.

¹⁶ Diseases such as Asiatic cholera, measles, the bubonic plague, and the common cold devastated the Hawaiian population. The estimate of a pre-contact Hawaiian population of 800,000 is found in David Stannard's study of epidemics introduced by Captain Cook and others. See David E. Stannard, *Before the Horror: the population of Hawai'i on the eve of Western contact* (Honolulu: University of Hawai'i Press, 1989).

¹⁷ Julie Williams Stewart and Suelyn Ching Tune, *Kamehameha II: Liholiho and the Impact of Change* (Honolulu: Kamehameha Schools Press, 2001).

Kamehameha III sought to create the kind of “civilized” state that would be recognized as sovereign by foreign powers.¹⁸ Relying on the counsel of missionaries, Kamehameha’s favorite wife, Kame’eleihiwa, led her chiefs to impose prohibitory laws based on Christian principles that criminalized hula dance, Hawaiian language, and other Hawaiian traditions.¹⁹

Prior to foreign contact, the ali’i nui had complete dominion over lands and ruling decisions, but Kamehameha III was receptive to American egalitarian ideals, adopting a Declaration of Rights in 1839 and a Constitution in 1840. In 1848, Kamehameha III made another radical departure from long-established tradition by transforming concepts of land ownership in the islands. As part of a new division of land called the Great *Mahele*, Kamehameha allocated one third of the land to ali’i with ‘Crown lands’ reserved for the king, one third reserved as government lands, and the remaining third was to be reserved for the *maka’ainana* (ordinary people who lived on the land, or ‘commoners’).²⁰ As Sally Engle Merry has pointed out, the ali’i were torn between gesturing toward “civilization” and undermining traditional Hawaiian systems of governance, and the Hawaiian public widely protested the transformation of Hawaiian politics and land regulation under chiefly control to private land ownership that was open to foreigners.²¹ In Native American scholar and activist Haunani-Kay Trask’s view, “Gunboat diplomacy by Western powers and missionary duplicity against the Hawaiian chiefs forced the transformation of Hawaiian land tenure from communal use to

¹⁸ Sally Engle Merry, *Colonizing Hawai’i: The Cultural Power of Law* (Princeton N.J.: Princeton University Press, 2000), p. 3-4.

¹⁹ Osorio, p. 11.

²⁰ Jean IwataCachola, *Kamehameha III: Kauikeaouli* (Honolulu: Kamehameha Schools Press, 1955).

²¹ Merry, *Colonizing Hawai’i*, p. 4.

private property by the middle of the nineteenth century.”²² The relationship between chiefs and the Hawaiian people dissolved under the transition to a representational political system because the ali’i, long known as chiefly descendants of gods, were now elected by humans.²³ The displacement of the Hawaiian legal system in turn fueled the sugar plantation economy, which ultimately led to the displacement of many Native Hawaiians from their own lands.²⁴ Under this new system, David Kalākaua became the Kingdom’s first popularly elected monarch in 1873. In July 1887, King Kalākaua was forced to sign the ‘Bayonet Constitution’, a document that placed executive authority within a group of *haole* men.²⁵ Following his death, Kalākaua’s sister, Lili’uokalani, became queen in 1891, but her tenure as monarch lasted a short two years.

The Overthrow

In 1893, the Hawaiian monarchy was abruptly terminated when Queen Lili’uokalani was displaced by an interim republic of European and American businessmen.²⁶ Until recently, the historiography on the overthrow of the Hawaiian monarchy and the subsequent annexation was dominated by scholars relying on English-language sources, and Native Hawaiian resistance was largely overlooked. In a groundbreaking departure from previous scholarship, Hawaiian political scientist Noenoe Silva’s 2004 study analyzes accounts of the takeover derived from Hawaiian-

²² Haunani-Kay Trask, *From a Native Daughter: Colonialism and Sovereignty in Hawai’i* (Monroe, Me.: Common Courage Press, 1999), p. 6.

²³ Osorio, p. 13.

²⁴ Merry, *Colonizing Hawai’i*, p. 4.

²⁵ Osorio, p. 1.

²⁶ “Recognition of the Provisional Government by the diplomatic and consular representatives resident at Honolulu.” HI - Prov. Gov., 1893. Available at www.llmcdigital.org. Accessed 20 November 2012.

language sources to reveal that 95% of Native Hawaiians resisted the annexation.²⁷ Shortly after President Benjamin Harrison's treaty to annex the Hawaiian Islands was submitted to the United States Senate, a newly-established organization of Native Hawaiians called the Hawaiian Patriotic League lobbied Congress to oppose the treaty. As a result of the League's efforts, the treaty failed to pass the Senate with the required 2/3 majority vote, marking a significant victory for the grassroots opposition to annexation.²⁸

However, the indigenous people of Hawai'i were rendered politically impotent when American expansionism found further expression in Hawai'i's annexation as a new territory of the United States in 1898.²⁹ Annexation meant the loss of self-government for the Hawaiian people as well as the loss of all lands previously belonging to the Hawaiian government and crown, which were automatically ceded to the United States government as public lands. In the newly formed "Territory of Hawaii," pineapple and sugar cane plantations dominated the local economy and wealthy plantation owners dominated local politics by campaigning against statehood. Lacking state prohibitions on immigration, Hawai'i's territorial status was a boon to

²⁷See Noenoe Silva, *Aloha Betrayed: Native Hawaiian Resistance to American Colonialism* (Durham: Duke University Press, 2004), especially chapter four, "The Antiannexation Struggle," 123-163. See also Schamel and Charles E. Schamel, "The 1897 Petition Against the Annexation of Hawaii," *Social Education* 63 (1999): p. 402-408.

²⁸ Native Hawaiian resistance took the form of a widely circulated petition protesting the annexation in 1897, and opposition to annexation was also articulated in speeches and Hawaiian language newspapers. See Silva, p. 123-163.

²⁹ The decision to annex the Hawaiian Islands became an issue of strategic importance soon after the start of the Spanish-American War. Hawai'i was ideally located for a Pacific naval base, and Congress quickly passed a Joint Resolution in July 1898. See Annexation of Hawaii. United States Congress. Senate Committee on Foreign Relations. Washington, D.C.: G.P.O. 1898. As Matthew Frye Jacobson has shown, nineteenth-century American expansionist policy was driven by principles of 'Anglo-Saxon' supremacy. For proponents of expansionism, 'Anglo-Saxon' was an ideological label used to identify and separate racially "pure" Americans from non-Anglo-Saxon "Others." In the racialized discourse of expansionism, the peoples of Mexico and the Pacific were destined to become 'Anglo-Saxonized'. See Matthew Frye Jacobson. *Whiteness of a Different Color: European Immigrants and the Alchemy of Race* (Cambridge: Harvard University Press, 1998), p. 205-213.

plantations because it enabled immigration from Japan, Puerto Rico, and Korea to provide labor for these growing industries. It was not until the 1950s that the Democratic Party of Hawaii ousted the plantation-supported Hawaii Republican Party, creating a favorable political climate for statehood. When President Dwight D. Eisenhower signed the Hawaii Admission Act into law in 1959, all ceded lands—including Mauna Kea—were transferred to the new state of Hawai'i.³⁰ Mauna Kea became part of the “ceded lands trust,” lands ceded by the federal government back to the State of Hawai'i and held in trust for Native Hawaiians and the public.³¹

The Commodification of the Mauna

During this extended period of colonialism and cultural change in the nineteenth and twentieth centuries, the ownership and control of Mauna Kea was inextricably linked to the shifting political landscape of Hawai'i. Below the summit, the majority of the mountain is an alpine desert with sparse vegetation, including mamane and ohī'a forests. Native Hawaiian ethnographies and oral testimony reveal that Native Hawaiians visited the lower elevations to hunt and harvest wood for canoes.³² Archaeological evidence indicates that the upper elevations and summit of Mauna Kea were used for burials and to collect materials for canoes and tools in the pre-contact period. Oral histories suggest that visiting the summit was restricted to ali'i, however, because the summit was considered the realm of the gods.

³⁰An Act to Provide for the Admission of the State of Hawaii into the Union (Pub.L. 86-3, enacted March 18, 1959).

³¹ As stated in the Admission Act, the ceded lands were to be used to support public education, to improve the conditions of Native Hawaiians, to develop farm and home ownership, to make public improvements, and for other public uses. See An Act to Provide for the Admission of the State of Hawaii into the Union, Sec. 4.(f).

³² Maly and Maly, 2005, p. 32-40; 278-279.

In sacred creation chants, the Hawaiian Islands are understood genealogically as descendants of *Wakea* (the “Sky Father”) and *Papahānaumoku*, or *Papa*, (the “Earth Mother”).³³ According to the Hawaiian origin chant the *Kumulipo* (“Beginning-in-deep-darkness”), Wakea joins with Papa, who gives birth to the Hawaiian Islands. The island of Hawai’i is the eldest and most sacred child of Papa and Wakea, and Mauna Kea is the child’s *piko*, or navel. Mauna Kea is often referred to as “ka piko o ka moku,” which means “the navel of the island,” and the word *piko* has three traditional Hawaiian meanings that refer to different anatomical features.³⁴ The soft spot on an infant’s head called a fontanel is the *piko* through which the spirit enters the body, the navel is the *piko* that serves as a physical marker of one’s genealogy, and the third *piko* is the genitalia, which permits procreation. All three *piko* must be safeguarded to maintain physical health and spiritual balance. Because Mauna Kea is understood as the *piko* of the island in these three ways, protecting the mountain also ensures spiritual, genealogical, and regenerative balance for the Native Hawaiian people.³⁵

In the post-contact period initiated by Cook’s 1778 voyage, the use and symbolic meaning of the mountain was redefined to conform to Western interests. By 1823, Europeans were regularly visiting the summit for sightseeing or scientific expeditions, often accompanied by Native Hawaiian guides.³⁶ Ascending to the summit was now permissible for all Native

³³ The literal translation of *Papahānaumoku* is “the firmament or wide place who gives birth to the islands.” See *Mauna Kea Comprehensive Management Plan. Prepared for the University of Hawai’i by Ho’akea, LLC dba Ku’iwalu*. April 2009, p. i. Available at <http://www.malamamaunakea.org>. Accessed 30 December 2012.

³⁴ *Mauna Kea Comprehensive Management Plan*, p. i.

³⁵ *Ibid*, p. ii.

³⁶ The earliest documented visit to Mauna Kea by European outsiders is found in the journal of American missionary Rev. Joseph Goodrich, who reached the summit on 26 August 1823. For detailed descriptions of the first trips to Mauna Kea derived from excerpts of journal entries made by Goodrich and other European visitors, see Maly and Maly 2005, p. 18-19; 98-130. For a full list of American missionaries who

Hawaiians because the collapse of the ali'i-maka'ainana hierarchy had irrevocably altered the relationship of Hawaiians to their lands. Under the traditional system, Mauna Kea's summit was understood as a *Wao akua*, or a remote location harboring spirits. Native Hawaiians typically avoided the Wao akua out of fear or respect, and humans could only enter these realms after asking permission.³⁷ As Hawaiians gradually became more Westernized, these spiritual and cultural restrictions on land use were no longer formally observed.

The transition to land ownership introduced by Kamehameha III's Great Mahele also played a major role in redefining the forested slopes of Mauna Kea as a valuable commodity in post-contact Hawai'i. Mauna Kea was leased by the Francis Spencer Waimea Grazing and Agricultural Company for sheep and cattle grazing in the 1850s.³⁸ Parker Ranch acquired the lease of mountain lands that included Mauna Kea in 1870, and Hawai'i Territorial Governor Walter F. Frear's Executive Order established the Mauna Kea Forest Reserve in 1905.³⁹ Mauna Kea was now owned by the Territory of Hawai'i and would later fall under the jurisdiction of the State Department of Land and Natural Resources after Hawai'i was admitted as a state in 1959.

Since the mid-nineteenth century, the lower elevations of Mauna Kea first served local business interests as a convenient rangeland resource, and later became a recreational haven for hunters, skiers, and hikers as a state-owned Forest Reserve. To better accommodate these uses of the mountain, the Civilian Conservation Corps built a stone cabin at the mid-level elevation in the 1930s to function as a ranger station, and this region of the mountain

visited Hawai'i in the nineteenth and twentieth centuries, see *Portraits of American Protestant Missionaries to Hawaii* (Honolulu: Hawaiian Mission Children's Society, 1901). Available at <http://archive.org/details/portraitsofameri00hwarich>. Accessed 03 January 2013.

³⁷ *Mauna Kea Comprehensive Management Plan*, p. 5-17.

³⁸ Maly and Maly, 2005, p. 15.

³⁹ *Ibid.*

subsequently became known as *Hale Pōhaku* (house of stone).⁴⁰ But the stark cinder cone landscape of the summit remained in a state of relative quiescence until the early 1960s, when astronomers discovered this lofty perch was an ideal observing site.

Making a Mauna for astronomy

After a 1960 tsunami devastated the local economy of Hilo on the Big Island, the Hawai'i Island Chamber of Commerce wrote to universities in the United States and Japan suggesting that Mauna Kea and the neighboring Mauna Loa could be developed as astronomical observatories.⁴¹

The timing could not have been better for Gerard Kuiper of the University of Arizona, a noted planetary astronomer who had already set his sights on Maui's mountain *Haleakala* as a potential site for a new observatory.⁴² Haleakala was an obvious candidate because it boasted dark skies, clear nights, a good access road, and a recent history of scientific development.⁴³ During the International Geophysical Year, a satellite tracking facility was established on

⁴⁰ *Mauna Kea Comprehensive Management Plan*. p. 5-14.

⁴¹ See "Education and Research," p. VI-1 in *Mauna Kea Science Reserve Master Plan*. Adopted by the University of Hawaii Board of Regents on June 16, 2000. Available online at www.hawaii.edu/maunakea. Accessed 29 November 2012. Mauna Loa was already home to the Mauna Loa Observatory, part of the National Oceanic and Atmospheric Administration, which was founded in 1956 to monitor and collect climate change, atmospheric composition, and air quality data. See www.esrl.noaa.gov. Accessed 06 December 2012.

⁴² Kuiper established the Lunar and Planetary Laboratory at the University of Arizona in 1960 after a distinguished tenure at Yerkes Observatory. See *Dale Cruikshank, Gerard Peter Kuiper, 1905-1973: a Biographical Memoir* (Washington, D.C.: National Academy of Sciences, 1993), p. 17.

⁴³ Haleakala is another mountain with great spiritual significance for Native Hawaiians. Haleakala Crater is known to Native Hawaiians as the "House of the Sun," and the summit region was visited by ancient priests. A controversy over the solar telescopes on Haleakala has erupted in recent years, with many important parallels to the Mauna Kea controversy. Because the indigenous groups examined in this dissertation hold more than one mountain to be sacred, I have decided to focus on the mountains that figure most prominently in their creation stories. For this reason, the Haleakala controversy is beyond the scope of this study.

Haleakala through the American satellite effort Project Moonwatch launched in 1956.⁴⁴ Walter Steiger, a University of Hawai'i at Manoa Astronomy Professor who helped to build the satellite station, later marveled, "The informality of the project would be unheard of today—no environmental impact statements and no building permits."⁴⁵ The tracking station helped the University of Hawai'i (UH) acquire land and infrastructure on the mountain that paved the way for a solar observatory, which was completed in 1962.⁴⁶ Dedicated as the C.E. Kenneth Mees Solar Laboratory, the new observatory was integral to building an astronomy community in Hawai'i. In Steiger's view, "An observatory without astronomers is but a pile of brick and cement. But before there was an observatory no astronomer was willing to come to Hawaii."⁴⁷ With the institutionalization of a solar astronomy program through the C.E. Kenneth Mees Solar Laboratory, the UH was able to attract several top astronomers to Hawai'i.⁴⁸ When Kuiper visited Maui in 1963, he saw Haleakala's potential to host the next world-class telescope. Kuiper believed Haleakala was superior to the far less accessible Mauna Kea, but he solicited funding from Hawai'i Governor John Burns to build a trail to the summit of Mauna Kea so the mountain

⁴⁴ The IGY was a global collaborative scientific research project encompassing geophysics, the atmospheric sciences, and oceanography. Taking place between July 1957-December 1958, the IGY involved thousands of professional scientists in 67 nations as well as amateur scientists who participated in programs such as Project Moonwatch (also known as Operation Moonwatch). For an authoritative history of the network of amateur satellite spotters who assisted professional astronomers during Project Moonwatch, see W. Patrick McCray, *Keep Watching the Skies! the story of Operation Moonwatch and the Dawn of the Space Age* (Princeton: Princeton University Press, 2008). For a personal account of the University of Hawai'i's involvement in establishing the satellite station on Haleakala, see Walter Steiger, Professor Emeritus, University of Hawai'i, "Origins of Astronomy in Hawai'i: the Haleakala Period." Available at www.ifa.hawaii.edu. Accessed 06 December 2012.

⁴⁵ Steiger, "Origins of Astronomy in Hawai'i: the Haleakala Period." Available at www.ifa.hawaii.edu. Accessed 06 December 2012.

⁴⁶ Ibid.

⁴⁷ Ibid.

⁴⁸ John Jefferies, Frank Orrall, and Jack Zirker were among the first astronomers to arrive at the UH after the solar observatory was founded. See Ibid.

could undergo proper testing. After the trail was completed in 1964, Kuiper initiated site testing from the cinder cone known as *Pu'u Poliahu*.⁴⁹

Under Kuiper's direction, University of Hawai'i at Hilo (UHH) staff performed nightly seeing tests on Mauna Kea's summit in 1965 and 1966.⁵⁰ The results were remarkable owing to Mauna Kea's isolation in the Pacific, minimal cloud cover, and atmospheric dryness. According to a 1974 report, Mauna Kea was selected over Haleakala because "no real or potentially incompatible activities (such as TV transmitters) existed there," and its 13,796-foot elevation made for excellent observing. Towering 4,000 feet higher than Haleakala, Mauna Kea was also a much better site for infrared observing.⁵¹ Kuiper immediately approached NASA to fund the construction of a telescope on Mauna Kea, but NASA solicited proposals from the University of Hawai'i, Harvard, and other universities. John Jefferies, head of the UH's solar program, seized upon what he termed a "glittering opportunity" and drafted a plan for an 84-inch telescope, which would provide the UH with privileged access to one of the world's largest telescopes.⁵² As Jefferies would later recall, his proposal was "inconceivably modest by today's standards, totaling 25 pages including the cover, signature, and budget pages as well as line drawings for

⁴⁹ Steiger, "Origins of Astronomy in Hawai'i: the Haleakala Period."

⁵⁰ The University of Hawai'i system includes multiple community colleges and universities across the Hawaiian Islands. In the 1960s, the two main university campuses were the University of Hawai'i at Manoa (UHM) on O'ahu and the University of Hawai'i at Hilo (UHH) on the Big Island. Though Mauna Kea is on the Big Island, the UH astronomy community initially developed at UHM. To avoid confusion, when referring to the University of Hawai'i as an administrative entity, I use UH, and when referring to individual campuses, I use UHH or UHM.

⁵¹ *Mauna Kea - an overview*, p. 7. Infrared radiation has longer wavelengths and lower energy than the visible part of the electromagnetic spectrum.

⁵² John T. Jefferies, "Astronomy in Hawaii, 1964-70," Available at www.ifa.hawaii.edu. Accessed 07 December 2012. As noted in chapter one, this dissertation employs the historical terminology when describing the diameter of the telescope's main mirror. Astronomers referred to telescope size in English units initially (e.g., the 88-inch telescope), but most telescopes built after 1970 were measured in metric units.

the proposed telescope!”⁵³ Ultimately, Kuiper lost his chance to oversee the new observatory at Mauna Kea when NASA selected UH’s proposal over Harvard’s and the University of Arizona’s. The UH contracted with NASA in 1965 to design, build, and install the 84-inch telescope, which was eventually built with an 88-inch mirror instead. Kuiper was outraged by NASA’s decision, and remained bitter about the loss of the Mauna Kea site for years.⁵⁴

With an established solar astronomy program on Haleakala and a major telescope soon to be constructed, the burgeoning astronomy community at UH was in desperate need of a separate research and administrative institute. Soon after submitting the 84-inch proposal to NASA, Jefferies turned his attention to soliciting approval from the UH Board of Regents for the Institute for Astronomy (IfA), which was founded in 1967 on the UHM campus in Honolulu.⁵⁵ In November 1967, the State of Hawai’i’s Board of Land and Natural Resources approved a 65-year lease of all lands above the 12,000-foot elevation on Mauna Kea to the IfA for \$1 per year. The lease of these lands, called the Mauna Kea Science Reserve, began in January 1968.⁵⁶

The IfA encouraged other institutions to build their own telescopes on Mauna Kea by sub-leasing land in the Mauna Kea Science Reserve, with the arrangement that the UH would receive 15% of their observing time as payment in kind.⁵⁷ In the summer of 1970, the 88-inch

⁵³ Jefferies, “Astronomy in Hawaii, 1964-70.”

⁵⁴ Barry Parker, *Stairway to the Stars: The Story of the World’s Largest Observatory* (Cambridge, MA: Perseus Publishing, 1994), p. 35.

⁵⁵ Jefferies, “Astronomy in Hawaii, 1964-70.”

⁵⁶ Under the terms of the lease, the lands above the 12,000-foot elevation of Mauna Kea forming the Mauna Kea Science Reserve constituted “a scientific complex, including without limitation thereof an observatory, and as a scientific reserve being more specifically a buffer zone to prevent the intrusion of activities inimical to said scientific complex.” See General Lease #S-4191. 21 June 1968.

⁵⁷ Parker, p. 8.

telescope was dedicated. Remarkably, just five years after winning the NASA contract, the UH was operating an 88-inch telescope and two 24-inch telescopes on the mountain for faculty and students. The era of modern astronomy on Mauna Kea had begun.

‘Piecemeal’ telescopes

In 1974, an Environmental Impact Statement listed several distinct development projects independently under review on Mauna Kea, including a 9,200-foot mid-level base camp for astronomers called Hale Pōhaku, an access road from Hale Pōhaku to the summit, and overhead power lines connecting the lower elevations of the access road leading to the summit. The most ambitious project listed was the newly proposed Canada-France-Hawaii telescope. The Centre National de la Recherche Scientifique (CNRS) of France, the National Research Council (NRC) of Canada, and the University of Hawai‘i had decided to form a partnership called the Canada-France-Hawaii Telescope Corporation with the goal of constructing a 3.6-meter optical telescope on the summit of Mauna Kea. Under the Canada-France-Hawaii telescope (CFHT) agreement, the CNRS and the NRC would equally share the cost of the \$21 million observatory. France was to provide the telescope and Canada would fund the infrastructure to support the instrument in exchange for 85 percent of observing time, with the University of Hawai‘i’s Institute for Astronomy controlling the remaining 15 percent of observing time.⁵⁸

As the first major international telescope proposed for the summit, the Canada-France-Hawaii telescope proposal sparked criticism by concerned members of the Big Island community of the University of Hawai‘i’s ‘piecemeal’ planning of projects on the mountain. District Forester

⁵⁸ See *Preliminary Tripartite Agreement Among the National Research Council of Canada, the Centre National de la Recherche Scientifique of France, and the University of Hawaii Concerning the Construction and Operation of a Large Optical Telescope on Mauna Kea in An Assessment of Environmental Impact Resulting from the Development of A Telescope and Observatory Facilities. Mauna Kea (Summit), Hawaii. Canada-France-Hawaii Telescope Corporation.* Prepared by Neighbor Island Consultants, December 1973, Appendix A, p. A-1-A-6. UH Manoa Hamilton Hawaiian Library.

Libert K. Landgraf questioned the wisdom of forsaking controlled planning for rapid development, cautioning the State Forester for the Hawaii Department of Land and Natural Resources not to be enticed by the multimillion dollar international proposal because “it would cost millions more to undo a mistake.”⁵⁹ Equally alarmed by what its members perceived as “haphazard development,” the Hawaii Audubon Society urged the state’s Department of Land and Natural Resources to develop a ‘Mauna Kea Master Plan’ for long-term land use. At a public hearing on the commercial use of conservation district lands, Audubon Society spokeswoman Mae E. Mull described the protection of the mountain’s ecosystems, its natural beauty, and public recreational uses as the primary goals of a master plan.⁶⁰

For the Audubon Society, advancing astronomical knowledge simply did not justify further development of Mauna Kea. As Mull emphasized, “to destroy the unique natural values of the mountain for the sake of astronomical observation of outer space is not ‘progress’ by any measure.”⁶¹ Earlier in the year, District Forester Landgraf had similarly concluded, “Education and scientific research is a noble cause but it should not be made at a loss to the people.”⁶² The Audubon Society’s campaign for a master plan soon found other advocates in the Hawaii Island Fish and Game Association, the Animal Species Advisory Commission, and the Hamakua District

⁵⁹ Libert K. Landgraf to Mr. Tom K. Tagawa, State Forester, “Comments on ‘An Assessment of Environmental Impact Resulting from the Development of a Telescope and Observatory Facilities,’” 21 February 1974. Courtesy of Deborah Ward.

⁶⁰ In Mull’s testimony and other correspondence advocating for the adoption of a Master Plan, the Society’s objections to development made no mention of sacredness. See Mae E. Mull, Testimony at public hearing on Commercial Use of Conservation District Lands. 11 April 1974. *The Elepaio. Journal of the Hawaii Audubon Society*. September 1974. Courtesy of Deborah Ward.

⁶¹ Mae E. Mull to Dr. Richard E. Marland, Interim Director, Office of Environmental Quality Control, “Re: Mauna Kea Master Plan.” 23 April 1974. Courtesy of Deborah Ward.

⁶² Landgraf to Mr. Tom K. Tagawa.

Development Council.⁶³ This widespread desire for a master plan among Big Island residents was affirmed by a County Council resolution in June 1974, and Acting Governor George R. Ariyoshi endorsed the resolution, expressing his personal interest in a master plan to guide observatory development.⁶⁴

The subject of delaying further development of the mountain until a master plan was adopted had already been considered and rejected by the CFHT Corporation as too expensive. In its 1973 Environmental Assessment, forgoing construction activities until a master plan was developed for Mauna Kea was estimated to cost the Canadian and French governments \$2.1 million and the State of Hawaii \$400,000 for each year of delay.⁶⁵ Thus in spite of local opposition, development of the mountain proceeded as planned in 1974, with the completion of roadwork leading to the summit in May and groundbreaking for the Canada-France-Hawaii telescope in late June.⁶⁶

⁶³ Though the conservation-oriented Hawaii Audubon Society and the Hawaii Island Fish and Game Association representing hunting interests had previously been at odds on many environmental issues, these organizations presented a unified front when it came to developing Mauna Kea for astronomical purposes. In letters to Richard Marland, Director of the Office of Environmental Quality Control, both groups called for programs to regulate present and future hunting of feral sheep, goats, and pigs to reduce populations straining the carrying capacity of the mountain. Other concerns listed included implementing conservation efforts for endemic Hawaiian birds and trees, designating Mauna Kea's Lake Waiau as a Hawaii Natural Area Reserves System, and preventing artifact collectors from pilfering at the mountain's Keanakakoi Adz Quarry.

⁶⁴ Hawai'i County Council Resolution No. 233. June 1974. See also Harry Whitten, "A Precious State Resource," *Honolulu Star-Bulletin*. 20 July 1974, p. A12.

⁶⁵ *An Assessment of Environmental Impact Resulting from the Development of A Telescope and Observatory Facilities*, p. VI-1.

⁶⁶ "Groundbreaking for Mauna Kea Project Set Despite Protests," *Hawaii Tribune-Herald*. 26 June 1974. The proposed development program had a four-year timeline, with construction scheduled to be completed in 1977. See *An Assessment of Environmental Impact Resulting from the Development of A Telescope and Observatory Facilities*, p. III-3.

Astronomers Meet the Public

Though construction activities continued in the same ‘piecemeal’ fashion that had infuriated observatory critics, the master plan idea had caught on in the Big Island community and would gain significant momentum as it played out over the next decade. Initiating the master plan process, Director of the IfA John Jefferies began to host a series of informational public meetings in 1974 to present an overview of current and projected observatory development. These meetings were well attended by conservationists, recreationists, and other concerned members of the community. Engaging directly with the public in this way, IfA astronomers came face-to-face with strong criticism of plans to build two new infrared telescopes funded by NASA and Great Britain.⁶⁷

In these early discussions with the public, the two main objections to observatory development that would eventually dominate anti-telescope discourse—the dual threat to traditional religious practices and the endangered Wēkiu bug—are strikingly absent.⁶⁸ Instead, the most commonly voiced concerns found in records of public meetings and written comments received by the IfA stemmed from fears that astronomers’ use of the mountain would infringe upon recreational use or damage the summit ecosystem. The reports issued by the CFHT during this period focus almost exclusively on assuaging these worries over access and habitat preservation, suggesting that the mountain’s sacred status was not represented to astronomers as a cultural issue requiring further study. In the preliminary assessment of Environmental

⁶⁷ “Mauna Kea Development Halt Asked by Dave Shapiro, Big Island Bureau Chief,” *Honolulu Star-Bulletin*. 15 August 1974, p. D2.

⁶⁸ For summaries of oral comments at public hearings about the CFHT in Hawaii and unabridged written comments, see *An Assessment of Environmental Impact Resulting from the Development of A Telescope and Observatory Facilities*, 1973; *Final Environmental Impact Statement: Proposed Telescope and Observatory Facilities, Mauna Kea (Summit), Hawaii. Canada-France-Hawaii Telescope Corporation*. Honolulu, Hawaii. Neighbor Island Consultants. May 1974. UH Manoa: Hamilton Hawaiian Library.

Impact from the CFHT in 1973, for example, the 'Cultural Characteristics' section made no mention of sacredness, and the 'Biological Characteristics' section focused solely on vegetation, mammals, and birds.⁶⁹ No Native Hawaiian groups or individuals were consulted during the preparation of either the preliminary assessment of Environmental Impact or the Final Environmental Impact Statement (FEIS), issued one year later.⁷⁰

Even in a later IfA report on the impact of astronomy on Mauna Kea, the 'Cultural Aspects' section made no mention of Native Hawaiian cultural resources, but rather, stressed the prestige bestowed on each Hawaiian citizen from the use of Mauna Kea as an observatory. In Director Jefferies' estimation, "it adds, surely, to the dignity of each citizen of the State to recognize that his Government and University have combined to focus such attention and to add such a uniquely new dimension to the international image of the State."⁷¹ To be sure, astronomy was quickly becoming a major asset to Hawai'i's economy and Mauna Kea was on track to becoming a leader in international astronomy, but some Big Island residents questioned the State's oversight of astronomy on Mauna Kea.⁷²

After listening to a particularly heated public debate about the observatory at a Conservation District Use Application hearing held by the Board of Land and Natural Resources (BLNR) in April 1974, Office of Environmental Quality Control Interim Director Richard Marland

⁶⁹ See *An Assessment of Environmental Impact Resulting from the Development of A Telescope and Observatory Facilities*, 1973.

⁷⁰ *Final Environmental Impact Statement: Proposed Telescope and Observatory Facilities, Mauna Kea (Summit), Hawaii. Canada-France-Hawaii Telescope Corporation*. Honolulu, Hawaii.

⁷¹ *Astronomy on Mauna Kea: its future and its impact in Hawaii*. John T. Jefferies, Director, Institute for Astronomy, University of Hawaii. August 1975, p. 21. UH Manoa: Hamilton Hawaiian Library.

⁷² Some of the public criticism of the management practices on Mauna Kea are distilled into the responses from government agencies consulted in the FEIS for the CFHT. See *Final Environmental Impact Statement: Proposed Telescope and Observatory Facilities, Mauna Kea (Summit), Hawaii. Canada-France-Hawaii Telescope Corporation*.

wrote a letter to the Department of Land and Natural Resources (DLNR) asking for clarification on the Natural History and Historic Landmark designation. Based on its unique status as the highest volcano in the world harboring the highest lake in the United States, Lake *Waiau*, Mauna Kea had been officially designated a National Natural History Landmark by the United States Department of the Interior in 1972.⁷³ Just below the summit, the *Keanakakoi* Adz Quarry was listed on the National Register of Historic Places as a National Historical Landmark in 1962.⁷⁴ According to the terms of this designation, all structures except those related to recreational pursuits were expressly prohibited, and Marland wondered, “if this statement is true, can the telescope be built?”⁷⁵ The response to Marland’s query was that the telescope was not “subject to procedural requirements under the Federal legislation establishing National Natural History and Historic Landmark designations.”⁷⁶ As the FEIS pointed out, the County of Hawaii had no jurisdiction over whether or not a structure could be built on State conservation lands. The telescopes were subject to review only by the BLNR, which had never agreed to the designation of Mauna Kea as a National Natural Landmark in the first place.⁷⁷

⁷³ *An Assessment of Environmental Impact Resulting from the Development of A Telescope and Observatory Facilities. Mauna Kea (Summit), Hawaii. Canada-France-Hawaii Telescope Corporation*, p. III-10.

⁷⁴ Mauna Kea Adz Quarry. National Register Number: 66000285. 29 December 1962.

⁷⁵ Richard E. Marland, Interim Director, Office of Environmental Quality Control to The Honorable Sunao Kido, Department of Land and Natural Resources. 17 April 1974, p. 4, in *Final Environmental Impact Statement: Proposed Telescope and Observatory Facilities, Mauna Kea (Summit), Hawaii. Canada-France-Hawaii Telescope Corporation*, Appendix C: Comments From Government Agencies.

⁷⁶ *Final Environmental Impact Statement: Proposed Telescope and Observatory Facilities, Mauna Kea (Summit), Hawaii. Canada-France-Hawaii Telescope Corporation*, p. D-16.

⁷⁷ Effectively, this meant Mauna Kea was designated as a National Natural Landmark and listed in the National Registry of Natural Landmarks, but it was not a *registered* landmark because the BLNR did not agree to the designation. See *Mauna Kea Science Reserve Complex Development Plan Final Environmental Impact Statement*. Prepared by Group 70 for Research Corporation of the University of Hawaii. January 1983, p. 89. Available at oeqc.doh.hawaii.gov. Accessed 12 November 2012.

Since the BLNR was effectively the legislating body most responsible for directing development on Mauna Kea, IfA astronomers drew from what they termed “extensive citizen participation” in the drafting of a DLNR Mauna Kea Plan, which was adopted by the BLNR in February 1977.⁷⁸ The 1977 DLNR Mauna Kea Plan provided a basic policy framework for the management of the Science Reserve and four other areas, but it was no substitute for a physical development plan with supporting environmental analysis data, and it had no real regulatory power over activities on the mountain.⁷⁹

Due to the hierarchy of control governing the use of ceded lands in Hawai‘i, federal laws were not yet brought to bear on observatory planning. Still, the broad public participation in an ongoing dialogue about land use and fragile ecosystems represented a markedly different political, social, and cultural epoch in American science, one that would have been utterly foreign to the astronomers who sought to build a national observatory on Kitt Peak only a decade earlier.

Astronomy and the rise of American environmentalism

Kitt Peak National Observatory planners benefited from the post-WWII period of rapid economic expansion when the social prestige of science was at an unprecedented zenith and American scientists were valorized as heroic leaders of progress.⁸⁰ Increasing national prestige by building a new observatory neatly aligned with this celebratory impulse in public discourse

⁷⁸ DLNR Mauna Kea Plan. 1977, p. 5.

⁷⁹ In addition to the Science Reserve management area, the 1977 DLNR Mauna Kea Plan established four other management areas, including the Mamane Ecosystem, the Historic/Archaeological area, the Silversword area, and the military area. See DLNR Mauna Kea Plan. 1977.

⁸⁰ Shortly after the bombing of Hiroshima and Nagasaki in 1945, *Time* magazine published letters to the editor likening the bomb to terrorism and barbaric mass murder, but American scientists were named *Time Magazine’s* “Men of the Year” in 1960. See “Opinion: Doubts and Fears,” *Time*. 20 August 1945, p. 36; “Letters to the editor,” 27 August 1945, p. 2; “Men of the Year,” *Time* 22 January 1960, p. 40.

about science, and nonscientists generally deferred to the professional expertise of revered scientific figures. This elite and venerated view of science could not withstand the assaults of the socially and politically turbulent 1960s, however.

The opposition to the United States involvement in the Vietnam War was imbued with public outrage at the scientific establishment over the military applications of science.⁸¹ At the same time, the grassroots environmental activism inspired by Rachel Carson's influential 1962 book *Silent Spring* was simultaneously a critique of science and a cultural marker of a shift in public attitudes toward scientific exceptionalism. As David K. Hecht has shown, Carson's devotees blurred the boundary between nonscientific and scientific domains by assuming an active role in the assessment of scientific knowledge.⁸² In the 'post-heroic era', science was no longer the exclusive province of a handful of experts.⁸³

The growing public wariness of the claims of scientific research and the burgeoning environmental movement would prove to be equally challenging obstacles to observatory development for the IFA. Even as his administration struggled to resolve the failures of the Vietnam War, Lyndon B. Johnson maintained an unwavering commitment to addressing environmental issues such as pollution and natural resources conservation, sowing the seeds of several major environmental acts passed by the Nixon Administration.⁸⁴ The National

⁸¹ See chapter one for more on this transition.

⁸² Hecht argues that Carson was representative of a new type of scientific icon in late twentieth-century America who was celebrated while retaining broad nonscientific appeal. See David K. Hecht, "Constructing a Scientist: Expert Authority and the Public Images of Rachel Carson," *Historical Studies in the Natural Sciences* 41 (2011): p. 277-302; p. 294-300.

⁸³ Barry Schwartz describes the "post-heroic era" as the rejection of ideals of American heroism and greatness in the twentieth century. See Barry Schwartz, *Abraham Lincoln in the Post-Heroic Era* (Chicago: University of Chicago Press, 2008).

Environmental Policy Act (NEPA) of 1969 and the Endangered Species Act (ESA) of 1973 helped to codify the agenda of environmental groups and ecologists, and the rising environmental concerns of the late 1960s were formally institutionalized through the Environmental Protection Agency (EPA) in 1970.⁸⁵

By the early 1970s, then, proposing a large development project such as an observatory meant opening up a dialogue with an informed public. Discussions about funding, site selection, and the technical specifications of instruments – once relegated to boardroom meetings between scientists, engineers, and investors—were presented to interested members of the general public. Astronomers were required to prepare Environmental Impact Statements that incorporated the comments made by nonscientists, though as the CFHT case illustrates, this level of regulation did not necessarily mean telescope construction would be delayed.

Small bugs, Big Problems

As the 1970s drew to a close, the three University of Hawai'i telescopes dotting the summit of Mauna Kea were joined by three new large telescopes: the CFHT, the United Kingdom Infrared Telescope (UKIRT), and the NASA Infrared Telescope Facility (IRTF). Despite the IfA's ongoing effort to solicit public feedback in drafting a comprehensive Master Plan, the 'piecemeal' style of construction that had characterized all building projects on Mauna Kea in

⁸⁴ On Johnson's embrace of environmental issues, see Samuel P. Hays, *Beauty, Health, and Permanence: Environmental Politics in the United States, 1955-1985* (Cambridge: Cambridge University Press, 1985). See also Ronald E. Doel and Kristine C. Harper, "Prometheus Unleashed: Science as a Diplomatic Weapon in the Lyndon B. Johnson Administration," *Osiris 21, Global Power Knowledge: Science and Technology in International Affairs* (2006): p. 66-85; Adam Rome, *The Bulldozer in the Countryside: Suburban Sprawl and the Rise of American Environmentalism* (Cambridge: Cambridge University Press, 2001). On Lady Bird Johnson's political agenda emphasizing America as a garden, see Lewis L. Gould, *Lady Bird Johnson and the Environment* (Lawrence, Kansas: University Press of Kansas, 1988).

⁸⁵ National Environmental Policy Act of 1969; EPA Order 1110.2; The Endangered Species Act of 1973, P.L. 93–205.

the 1960s and 1970s might well have persisted if not for a startling scientific discovery at the summit that had nothing to do with telescopes.

At the March 1980 meeting of the Hawaiian Entomological Society, entomologist Francis G. Howarth announced the exciting discovery of an unusual new bug found at the summit of Mauna Kea.⁸⁶ Earlier in the year, Howarth, S.L. Montgomery, and W.P. Mull had been conducting a search for insects under rocks at Mauna Kea's tallest cinder cone, *Pu'u Wēkiu* (wēkiu means 'top' or 'summit' in Hawaiian). Frequently subjected to hurricane-force winds and subzero temperatures, the cinder cones on the summit were an extremely inhospitable environment for plant or animal life. The startling discovery of a hardy and previously unknown insect immediately shattered the widespread assumption in the scientific community that Mauna Kea's summit was "a lifeless, red-black jumble of lava blocks."⁸⁷ Named the Wēkiu bug in recognition of its cinder cone habitat, biologists would later learn through a series of studies that the quarter-inch Wēkiu bug is uniquely adapted to the extreme conditions at the summit, surviving on dead insects deposited at the summit by winds blowing up the mountain slopes. By 1983, the Wēkiu bug was identified as a unique species endemic to Hawai'i (*Nysius wekiuicola*) with a population thought to exist only on Mauna Kea.⁸⁸ This news represented a new challenge for IfA astronomers who wished to continue building on the summit, now labeled as the only habitat of an extremely rare species of arthropod.

⁸⁶ F.G. Howarth and S.L. Montgomery, "Notes on the ecology of the high altitude aeolian zone on Mauna Kea," *'Elepaio, Journal of the Hawaii Audubon Society* 41(1980): p. 21-22.

⁸⁷ Waldrop, M.M., "Research news. Mauna Kea: halfway to space," *Science* 214 (1981): p. 1010-1013, quoted in Peter D. Ashlock and Wayne C. Gagne, "A Remarkable New Micropterous nysius species from the Aeolian Zone of Mauna Kea, Hawai'i Island," *International Journal of Entomology* 25 (1983): 47-55, p. 47.

⁸⁸ Ashlock and Gagne.

Plans based on Plans: the 1983 Complex Development Plan

The Wēkiu bug discovery only underscored the need to establish a more comprehensive plan to supplant the ineffectual 1977 DLNR Mauna Kea Plan. Under the new, rather cumbersome title the “Mauna Kea Science Reserve Complex Development Plan (SRCDP)” of 1983, the University of Hawaii sought to develop a true master plan that would govern future development of the summit and related facilities to the year 2000. The BLNR had turned over management and monitoring of activities related to the Mauna Kea Science Reserve to the UH, but the final plan would still be subject to approval by both the UH Board of Regents and the BLNR. Including the six existing telescopes on the summit, the SRCDP projected a total of thirteen telescopes to be sited on the mountain by the end of the century.⁸⁹ New power transmission lines would be installed to support the energy demands of the new telescopes and the mid-level facilities at Hale Pōhaku would be expanded to accommodate additional dormitories as well as a Visitor Information Station.⁹⁰ By articulating the SRCDP in an Environmental Impact Statement, the IfA’s stated goal was to meet the environmental assessment requirements for obtaining a Conservation District Use permit while informing the public about the management plan through the comment process.⁹¹

As in previous reports on the cultural significance of Mauna Kea, the 1983 SRCDP made scant mention of the mountain as a site of spiritual and cultural value to Native Hawaiians. Though the SRCDP readily disclosed that “ancient religious activity” took place at the summit of Mauna Kea, it made no reference to contemporaneous use of the mountain for religious purposes. The SRCDP also noted that the cinder cone known as Pu’u Poliahu and Lake Waiau

⁸⁹ *Mauna Kea Science Reserve Complex Development Plan Final Environmental Impact Statement*, p. x.

⁹⁰ *Ibid*, p. xi- xii.

⁹¹ *Ibid*, p. xiv.

were considered candidates for ranking as historic sites, but rejected the cultural value of Pu'u Poliahu, citing evidence from a 1982 archaeological survey of the Science Reserve conducted by Patrick McCoy of the Bishop Museum.⁹² The same archaeological survey classified 21 sites at the summit as shrines, and the SRCDP called for consultation with the State Historic Preservation Office prior to undertaking new telescope construction in these sites.⁹³

In the preparation of the plan to date, however, the Bishop Museum was the only consultant listed under the 'cultural and biological' category.⁹⁴ Comments were solicited from various members of the Big Island community, but no comments were received by individuals belonging to Native Hawaiian groups or self-identifying as Native Hawaiian.⁹⁵ Native Hawaiians were similarly underrepresented in the single public informational meeting about the plan held in September 1982 at UH Hilo, with mostly scientists and local business leaders in attendance.⁹⁶ Given the lack of cultural resources recognized by astronomers in 1983, it is understandable that when asked to assess the impact of astronomical development on historic and cultural properties protected under the National Historic Preservation Act of 1966, the SRCDP confidently concluded that there would be "no effect."⁹⁷

⁹² According to the archaeological reconnaissance of Dr. Patrick McCoy of the Bishop Museum in Honolulu, Native Hawaiian testimony made reference to Poli'ahu as a cave, so the name "Poli'ahu" has historic significance, but the physical site of the cinder cone by the same name should not be regarded as a historic site. See *Mauna Kea Science Reserve Complex Development Plan Final Environmental Impact Statement*, p. 15.

⁹³ *Ibid*, p. 90; 174.

⁹⁴ *Ibid*, p. 180.

⁹⁵ *Ibid*, p. 182.

⁹⁶ For a complete list of all attendees, see *Mauna Kea Science Reserve Complex Development Plan Final Environmental Impact Statement*, p. 184.

⁹⁷ *Ibid*, p. 16.

Reviewers of the plan also set aside concerns about the consequences of astronomical development on Mauna Kea's cultural resources, instead questioning the color of the telescope domes, the status of water supply facilities on the mountain, pollution, and access for recreational purposes. The most substantive objection to the SRCDP came from United States Department of the Interior Superintendent David B. Ames, who worried that the land use planning outlined in the SRCDP "only compounds an existing problem of blurred jurisdictions, overlapping and conflicting land use patterns, and piece-meal development of the larger summit area."⁹⁸ Another reviewer affirmed that the SRCDP did not adequately spell out the distinct roles of the UH, the IfA, the BLNR, and the County of Hawaii, noting that after reading the SRCDP, "...one gets the feeling that the Institute of Astronomy owns the summit and controls all its uses."⁹⁹

Several critics of the plan were also unwilling to accept the IfA's downplaying of visual impact of new telescopes. As Ames reasoned, "We have trouble reconciling your commitment to maintaining 'scenic attributes' of Mauna Kea, Objective #2, page 5, with plans mentioned some pages later for 13 huge telescopes and an eight-foot diameter microwave transmitter on a line-of-sight horizon between Waimea and Hilo."¹⁰⁰ UH Vice President for Administration Harold S. Masumoto succinctly responded, "Some people believe the sight of telescopes on the mountain is beautiful and some do not."¹⁰¹ Perhaps the biggest strike against the SRCDP was

⁹⁸ David B. Ames, Superintendent, United States Department of the Interior, National Park Service, Hawaii Volcanoes National Park to Mr. Louis Lopez, University of Hawaii Vice President for Administration. 12 August 1982 in *Mauna Kea Science Reserve Complex Development Plan Final Environmental Impact Statement*. 1983, p. 198.

⁹⁹ Rick Scudder to Mr. Harold Matsumoto. 10 August 1982 in *Mauna Kea Science Reserve Complex Development Plan Final Environmental Impact Statement*. 1983, p. 260.

¹⁰⁰ David B. Ames to Mr. Louis Lopez. 12 August 1982 in *Mauna Kea Science Reserve Complex Development Plan Final Environmental Impact Statement*, p. 199.

that it attempted to evaluate “envisioned” facilities that had not yet been planned or proposed.¹⁰² The IfA saw the SRCDP as a physical plan reflecting anticipated development of the summit, but critics had a tough time accepting a plan based on...future plans.

As the debate over the management plan continued, two more telescopes—the James Clerk Maxwell Telescope and the Caltech Submillimeter Observatory—were erected on Mauna Kea in 1987. The following year, the IfA issued an Amendment to the SRCDP that afforded some new protections to archaeologically significant sites on the summit.¹⁰³ Since three probable shrines had been identified in the proposed project area for a new radio antenna that would form part of the Very Long Baseline Array (VLBA), the Amendment suggested fencing around all archeological sites to mitigate “indirect impacts.”¹⁰⁴ The Amendment did not rule out the possibility of uncovering human remains during construction, but stated, “if remains are uncovered during construction an archaeologist should be immediately called.”¹⁰⁵

Placing fencing around archaeologically significant sites represented one of the first attempts by the Mauna Kea astronomy community to reconcile the cultural resources of the summit with its scientific uses. The Amendment also stands out as the first management plan or

¹⁰¹ Harold S. Matsumoto to Mr. David B. Ames. 23 September 1982 in *Mauna Kea Science Reserve Complex Development Plan Final Environmental Impact Statement*, p. 201.

¹⁰² The difficulty of assessing future projects on Mauna Kea was pointed out by DLNR Chairman Susumu Ono in his response to the EIS. See Honorable Fujio Matsuda. 12 October 1982 in *Mauna Kea Science Reserve Complex Development Plan Final Environmental Impact Statement*. 1983, p. 205. The word “envisioned” was replaced with “planned” in later drafts of the EIS.

¹⁰³ *Amendment to the Mauna Kea Science Reserve Complex Development Plan. Final Supplemental Environmental Impact Statement, Very Long Baseline Array Antenna Facility*. University of Hawaii Institute for Astronomy. September 1988.

¹⁰⁴ *Amendment to the Mauna Kea Science Reserve Complex Development Plan*, p. S-5; IV-12. The VLBA is a vast array of ten radio antennas operated by the National Radio Astronomy Observatory with stations across the United States and the U.S. Virgin Islands. See www.vlba.nrao.edu. Accessed 30 December 2012.

¹⁰⁵ *Ibid*, p. 24.

observatory-related report to make more than a passing reference to the mountain as a site of cultural significance to Hawaiians by acknowledging that the shrines “form a portion of a larger context of Hawaiian religious and economic use of Hawai’i’s only glaciated landscape.”¹⁰⁶ The 1988 Amendment may thus be interpreted as the advent of a new culturally informed sensibility in observatory planning on Mauna Kea, which begs the question: how was this nascent perceptual shift incorporated into the construction of subsequent telescopes?

Auditing the Astronomers

The next decade would provide no less than six opportunities for the IfA to showcase its approach to accommodating natural, cultural, and scientific activities as five major telescopes and a radio antenna were built in rapid succession on Mauna Kea during the 1990s.¹⁰⁷ As it turned out, however, building observatories on Mauna Kea in the 1990s bore a remarkable resemblance to the so-called ‘piecemeal’ style of building observatories on the mountain in the 1970s. Because each project required its own set of permits and Environmental Impact Statements according to the procedures outlined in the SRCDP, the cumulative impact of adding so many new instruments to the summit area was never fully examined. Critics charged the IfA with forsaking long-term cultural and environmental studies for speedy development, accusations that drew the scrutiny of the State Auditor in 1997.¹⁰⁸ Between May and November

¹⁰⁶ *Amendment to the Mauna Kea Science Reserve Complex Development Plan*, p. 23.

¹⁰⁷ New telescopes constructed in the 1990s included the California Association for Research in Astronomy’s W.M. Keck Observatory (Keck I) in 1992, the Mauna Kea radio antenna of the National Radio Astronomy Observatory’s Very Long Baseline Array in 1992, Keck II in 1996, the National Astronomical Observatory of Japan’s Japan National Large Telescope (now known as the Subaru telescope) in 1999, the Association of Universities for Astronomy’s Gemini North telescope in 1999, and the Smithsonian Institution’s Submillimeter Array in 1999. For a table that lists all telescopes constructed up to 1999 and their associated funding sources and project costs, see Exhibit 1.1, “Instruments on the Summit of Mauna Kea,” in *Audit of the Management of Mauna Kea and the Mauna Kea Science Reserve. A Report to the Governor and the Legislature of the State of Hawaii*. Report No. 98-6 February 1998, p. 3.

1997, the Hawaii Office of the Auditor investigated the policies and procedures of the IfA and the DLNR, conducting interviews with staff and astronomers and reviewing all records related to land use on Mauna Kea.¹⁰⁹ In February 1998, the Auditor issued a scathing report to the Governor and the Legislature of the State of Hawaii that indicted the University for mismanaging the natural and cultural resources of the Mauna Kea Science Reserve over a thirty-year period.¹¹⁰ According to the Auditor,

The university's control over public access was weak and its efforts to protect natural resources was piecemeal. The university neglected historic preservation, and the cultural value of Mauna Kea was largely unrecognized. Efforts to gather information on the Wēkiu bug came after damage had already been done. Trash from construction was cleaned up only after concerns were raised by the public."¹¹¹

The Auditor's recommendation was for yet another master plan to remedy these deficiencies in management, with special provisions for community input and compliance with the Historic Preservation Act.¹¹²

A Master Plan for Mauna Kea

The UH responded to the Auditor's demands immediately, establishing a 24-member Mauna Kea Advisory Committee to begin drafting the next master plan.¹¹³ To distinguish it from

¹⁰⁸ The Sierra Club complained about trash generated by telescope construction projects on the summit area in 1995. See *Audit of the Management of Mauna Kea and the Mauna Kea Science Reserve*, p. 35.

¹⁰⁹ *Ibid*, p. 13.

¹¹⁰ *Ibid*, p. 16.

¹¹¹ *Ibid*, "Summary."

¹¹² *Audit of the Management of Mauna Kea and the Mauna Kea Science Reserve*, p. 35.

¹¹³ Nine members of the Committee were described as "part Hawaiian." Other members were astronomers, environmentalists, and County Council members. See "Community Input: Process, Comments, and Responses," p. XII-1 in *Mauna Kea Science Reserve Master Plan*. Adopted by the University of Hawaii Board of Regents on June 16, 2000. Available online at www.hawaii.edu/maunakea. Accessed 29 November 2012.

its 1983 predecessor, the Mauna Kea Science Reserve Complex Development Plan, the new plan was called the Mauna Kea Science Reserve Master Plan (hereafter called the Master Plan). This time, as dictated by the State Audit, community involvement in the plan would have to extend beyond soliciting feedback from local business leaders, recreational groups, and scientists.¹¹⁴ To that end, the Advisory Committee listened to testimony from cultural experts, commissioned an extensive ethnographic study, prepared an EIS with public comments, and scheduled a series of public meetings in Hilo, Waimea, and Kona on the Big Island. These meetings exposed the growing tension between the competing needs and values of different stakeholders on the mountain.

In the taped recordings of Master Plan public meetings, astronomers appeared visibly uncomfortable when confronted by community members. Put on the defensive, many astronomers pointed out that they, too, were members of the Big Island community. After explaining why Mauna Kea was an unparalleled site for astronomy at a May 1999 meeting in Hilo, Gemini North astronomer Tom Geballe added, “More personally, I think the people who work on Mauna Kea are good citizens, they participate in the cultures of this island...”¹¹⁵

Geballe’s views on the integration of Mauna Kea astronomers within the Big Island community did not find a particularly receptive audience at the Hilo meeting. Native Hawaiian Kealoha Pisciotta identified herself as an employee of the James Clerk Maxwell Telescope who held an undergraduate degree in physics. As a cultural practitioner who maintained an *ahu* (family shrine) at the summit, Pisciotta was devastated when the shrine was removed from the

¹¹⁴ Instead, the UH promised to address cultural issues through direct consultation with Native Hawaiian groups through the new Advisory Committee. See “Response by the University of Hawai’i, January 26, 1998” in *Audit of the Management of Mauna Kea and the Mauna Kea Science Reserve*, p. 47.

¹¹⁵ Mauna Kea Science Reserve master plan [videorecording]: public meetings. Hilo, 27 May 1999. (Nā’ālehu, Hawai’i : Nā Maka o ka ‘Āina, 1999). UH Manoa: Sinclair AV Center.

summit on three occasions. Tearfully addressing the standing-room only crowd gathered in a science classroom on the UHH campus, Pisciotta bluntly stated, “the IfA, which is a department of the University, ordered the removal of shrine on Mauna Kea. And in my case, they consider it isolated. It is not isolated. It’s isolated because that was the only one that got caught. The University ordered this sacrilegious thing.”¹¹⁶ Turning to address her colleagues in the crowd, Pisciotta continued, “What were you doing, IfA? Attempting to change what we have? Hide our worship? So it’s inconceivable for me to imagine that this Committee could even approach asking for anything more, other than the forgiveness of the people.”¹¹⁷ Like the majority of Big Island residents who testified at the Hilo meeting, Pisciotta clearly took issue with Geballe’s characterization of the Mauna Kea astronomy community, instead referencing the IfA as distinct from the broader local community. In the Master Plan FEIS, Pisciotta’s passionate story of cultural insensitivity and betrayal by her IfA colleagues was presented as “an unfortunate incident that occurred because of misdirected policy on the part of a member of the University of Hawai’i maintenance staff.”¹¹⁸ Noting that apologies were made and workers were instructed not to disturb such features in the future, the FEIS distilled Pisciotta’s profound mistrust of the IfA into the observation that “suspicion and hurt feelings remain.”¹¹⁹

Indeed, the magnitude of Native Hawaiian resentment toward astronomical development on Mauna Kea had reached a new zenith, and astronomers found themselves struggling to come to terms with the relatively recent articulation of Mauna Kea as ‘still sacred’

¹¹⁶ Mauna Kea Science Reserve master plan [videorecording]: public meetings. Hilo, 27 May 1999.

¹¹⁷ Ibid.

¹¹⁸ *Mauna Kea Science Reserve Final Environmental Impact Statement*. Prepared for the University of Hawai’i by Group 70, International, Inc. December 1999, Appendix J. Available at www.oeqc.doh.hawaii.gov. Accessed 12 November 2012.

¹¹⁹ Ibid.

to Native Hawaiians. For many years, astronomers had contended with management issues related to preserving rare species and ancient shrines. Through the Master Plan development process, astronomers suddenly came face-to-face with vocal opposition from Native Hawaiian cultural practitioners who declared that Mauna Kea was the sacred site of religious rituals. But why did Native Hawaiians wait until the late 1990s to make this claim on the mountain?

Many astronomers felt blindsided by the Native Hawaiian opposition to telescope construction. In a conversation with Native Hawaiian cultural practitioner Ed Stevens in the late 1990s, UHH Astronomy Professor William Heacox remarked that he hadn't seen any opposition until recently, and he recalls that Stevens informed him that the opposition had always been there, but it hadn't been vocalized.¹²⁰ In the 2004 PBS Hawai'i documentary *First Light*, Stevens affirmed that "no one told them about it before, and they had no idea why the mountain was so special."¹²¹ Some astronomers have speculated that Native Hawaiian resistance to the telescopes on Mauna Kea was sparked by the drastic changes to the appearance of the summit caused by building three major observatories in just three years.¹²² Between 1996 and 1999, large domes housing the Keck II, Subaru, and Gemini North telescopes sprouted on the horizon. To some critics, the domes blighted the horizon like whiteheads, inspiring a popular "Pop da pimples" slogan among local activists.¹²³ An examination of articles in major Hawaiian

¹²⁰ Interview with William Heacox. 19 September 2012.

¹²¹ *First Light* (PBS Hawaii, 2004).

¹²² Interview with Bob McLaren. 11 September 2012.

¹²³ The origin of this slogan is unclear, but according to environmental activist Nelson Ho, mayor of Hawai'i County Herbert Matayoshi called the first two telescopes "pimples" on the face of the mountain. Interview with Nelson Ho. 17 September 2012. Matayoshi's reference to the telescopes as pimples is also noted in M.A. Gordon, *Recollections of 'Tucson Operations': the Millimeter-Wave Observatory of the National Radio Astronomy Observatory* (Springer, 2005), p. 137. The 'Pop Da Pimples' slogan is well known to Big Island residents and has surfaced on T-shirts, bumper stickers, and blog postings. See, for example, "Pop Da Pimples: Before you look into space, you need to malama this place...Mauna a Wakea!"

newspapers from 1990-1999 lends some credence to this theory, revealing that local media coverage of the observatories on Mauna Kea focused increasingly on Native Hawaiian cultural objections beginning in 1996.¹²⁴ As chronicled in numerous articles during this period, Native Hawaiians broke their previous silence on the issue by speaking out against the telescopes at Master Plan meetings and public rallies. Was the resistance simply prompted by too much development, too soon, or were other factors at play?

Conclusion

This chapter has shown that the timing of the American environmentalist movement made it possible for environmental advocates to voice an objection to astronomical development on Mauna Kea as soon as the first major telescope was proposed, yet Native Hawaiians did not come forward with their concerns until the mountain was studded with more than half a dozen major observatories. In the following chapter, I argue that Native Hawaiian narratives framing Mauna Kea as a sacred landscape did not emerge out of whole cloth in the late 1990s, but rather, that they were made *visible* at this time by Native Hawaiian anti-telescope activists. As I will show in chapter four, the apparent thirty-year delay in Native Hawaiian opposition to telescopes on Mauna Kea can only be understood within the historical context of the political and cultural movement popularly known as the Hawaiian Renaissance.

online at kahea.org. Accessed 29 November 2012. *Malama* is a Hawaiian word meaning to protect, to preserve, or to care for. A short segment showing T-shirts being stamped with the 'Pop Da Pimples' slogan appears in the documentary *Mauna Kea: Temple Under Seige* (Na Maka o Ka 'Aina, 2005).

¹²⁴ Newspapers surveyed include the *Honolulu Advertiser*, the *Honolulu Star-Bulletin*, the *Hawaii Tribune-Herald*, *West Hawaii Today*, and *Honolulu Weekly*. For a representative sampling, see "Observatories not universally welcomed," *Honolulu Advertiser*. 24 March 1996, A3; "Astronomy: Earthly Environs important, too," *Honolulu Advertiser*. 08 May 1996, A14; "Too many telescopes spoil serenity atop Mauna Kea," *Honolulu Star-Bulletin*. 08 June 1996, B1; "Mauna Kea operation must be reined in," *Honolulu Advertiser*. 02 June 1998, A6; "Public invited to discuss Mauna Kea Master Plan," *Honolulu Star-Bulletin*. 22 May 1999, A3; "Science vs spirit is key Mauna Kea issue," *Honolulu Star-Bulletin*. 18 June 1999, A4.

Chapter Four

Collaboration and Conflict: How Narrative, Identity, and Power Defined the Cultural Landscape of Mauna Kea

“If Queen Lili’uokalani had lived today, she might have been an astronomer.”—Michael West, former Associate Professor of Astronomy, University of Hawai’i at Hilo¹

“I think we have a lot more to learn about what our ancestors knew. What our ancestors knew, we’re still learning today. And so we want these sites to be protected.”—Kealoha Pisciotta, co-founder of *Mauna Kea Anaina Hou*²

On a sunny September morning, a nondescript building in the University of Hawai’i’s Science and Technology Park is about to become the center of a bitterly polarizing conflict within the island community. This is where the regular meeting of the University’s Office of Mauna Kea Management (OMKM) will convene in just a few minutes.³ The OMKM Board is charged with the stewardship of the Mauna Kea Science Reserve, an 11,288-acre region of Mauna Kea that is home to thirteen of the world’s most advanced telescopes. Locals from across the Big Island are arriving at this quiet corner of the University campus to watch the Board conduct its routine business affairs. They have come to ensure that the Board fulfills its *kuleana*⁴—its responsibility—to safeguard the cultural and natural resources of the mountain. People begin to trickle into the building, filing into a cramped, windowless room dominated by several conference tables where members of the OMKM and its cultural advisory board, *Kahu Ku Mauna*, are seated behind large name placards.

The crowd is largely composed of the same group of attendees who bother to show up every quarter: Native Hawaiians, environmentalists, astronomers, business leaders, observatory officials, and other concerned Big Island residents. As members of this diverse group recognize one another, they exchange greetings with characteristic Hawaiian *aloha*, but the tension in the

¹ Michael West, “There’s room for everybody on Mauna Kea,” *Honolulu Advertiser*. 17 November 2003. Available at <http://the.honoluluadvertiser.com/article/2003/Feb/17/op/op04a.html>. Accessed 19 September 2012.

² Kealoha Pisciotta, interview 01 January 2003. Excerpt available at “Mauna Kea-- from mountain to sea,” http://www.mauna-a-wakea.info/maunakea/F5_shrines.html. Accessed 20 November 2012. Pisciotta and other Native Hawaiians make similar comments in the documentary *Mauna Kea: Temple Under Seige* (Na Maka o Ka ‘Aina, 2005).

³ This description of the 18 September 2012 OMKM Board Regular Meeting is drawn from my personal observations. See also “MKMB Approved Minutes Sept 18, 2012.” Available at www.malamamaunakea.or. Accessed 04 January 2013.

⁴ The first use of less common Hawaiian words are italicized in this chapter. Based on the standards of the University of Hawai’i Style Guide, I use modern Hawaiian spellings for Hawaiian words unless quoting text written in an earlier style. For a more detailed explanation of my orthographical choices in this dissertation, see chapter three.

room is undeniable. Activists involved in an ongoing contested case against a colossal new observatory proposed for Mauna Kea take seats alongside observatory representatives. Some of the Native Hawaiians in attendance are known to be firmly opposed to the telescopes on Mauna Kea; others have worked closely with astronomers to bridge the cultural divide. Several people have come to the meeting armed with digital recorders, and one of the petitioners in the contested case is setting up her own tripod to take video of the session.

After the meeting is called to order by Chair Barry Taniguchi, the president of a local grocery chain, the Board runs through its reports on various environmental and telescope development studies before Taniguchi pauses to ask if there are any questions from the public. A man who has been standing near the door wearing a traditional Hawaiian bone fish hook necklace⁵ immediately responds, “Yeah, I got a question. When are you going to leave my ancestors alone and would you do this to yours?” The man is addressing Taniguchi directly but other members of the Board, including Christian Veillet, Executive Director of the Canada-France-Hawaii Telescope, appear visibly uncomfortable. Taniguchi replies, “We won’t answer that. Take it to the Burial Council. I’m going to ask you to cease.”

“Why, you can’t handle it?” the man fires back, and murmurs of agreement can be heard from some of the seated onlookers. “That’s not our kuleana. I’m not honoring your request to speak anymore,” Taniguchi answers curtly, and resumes a discussion on regulating the stacking of stones on Mauna Kea by Native Hawaiian cultural practitioners. Disgusted, the unidentified man angrily storms out of the room.

At a public meeting held on the University of Hawai’i campus in 2012, a confrontation between an opponent of astronomical development on Mauna Kea and members of a management board overseeing the observatories is anchored to the ancestral connection of Native Hawaiians to their sacred mountain.⁶ At the same meeting, astronomers, Native Hawaiians, and other community members earnestly discuss limiting the religious practice of stacking rocks to cultural and lineal descendants of Mauna Kea who can communicate with the spirits of the mountain. This open public dialogue about the spiritual significance of Mauna Kea to Native Hawaiians simply did not exist when the first telescopes were proposed on the

⁵ The Hawaiian bone fish hook necklace, known as the *makau*, represents a reverence for the ocean and is a common piece of jewelry worn by Native Hawaiians today. Though many necklaces are mass-produced, the art of bone carving is also tied to the cultural revival of the Hawaiian Renaissance because early Polynesian settlers made fish hooks out of whale and human bones. Necklaces in this style are also frequently carved today out of koa wood.

⁶ As noted in chapter three, I employ the term “Native Hawaiian” to refer to residents of the Hawaiian Islands who self-identify as native and may also belong to other racial backgrounds. Residents of the state who do not claim Native Hawaiian status are referred to as ‘Hawai’i residents’. For a further discussion of the terminology used, see chapter three.

mountain in the late 1960s. As the last chapter revealed, many members of the astronomy community felt blindsided in the late 1990s by the claim that the mountain's sacred attributes were jeopardized by telescope construction. Why did nearly thirty years elapse before Native Hawaiians began to vocally oppose the observatories? To explore this question, I begin this chapter with a brief history of the Hawaiian Renaissance to show how this nationalist movement laid the foundation for Native Hawaiians to voice their opposition to the observatories.

I then move into a discussion of how the reclamation of cultural identity forged in the Hawaiian Renaissance made it possible for Native Hawaiians to challenge perceived threats to important spiritual landscapes. In my examination of the geothermal controversies on the Big Island in the 1980s, I show that Native Hawaiians began to embrace their newfound cultural authority by forming alliances with environmental advocates to oppose the encroachment of the geothermal industry on a site considered culturally and environmentally vulnerable to development.

Continuing to chart the development of alliances between Native Hawaiians and environmentalists, I focus on two key historical moments. First, I examine how a coalition of Native Hawaiians and environmentalists successfully challenged telescope construction in the Keck Outrigger contested case beginning in 2002. Second, I analyze the ongoing legal battle over the proposed Thirty Meter Telescope project (TMT), originally scheduled to begin construction in 2013. TMT project planning has largely been defined in response to activist narratives about Mauna Kea that predated the telescope proposal. Well aware of the earlier controversies, TMT astronomers and administrators have made significant efforts to acknowledge narratives about the sacred attributes of Mauna Kea in nearly every stage of the planning process for the telescope, and they have sought new ways to address the challenge of

community engagement. As I will demonstrate, the TMT case reflects a fundamental shift in the way the American astronomy community is required to respond to social, cultural, and environmental concerns in the twenty-first century United States.

In particular, public outreach has become a central concern for Mauna Kea astronomers as a result of the controversy over the observatories. I assess the University of Hawai'i's efforts to resolve tensions over competing claims to the mountain through its Institute for Astronomy (IfA), again employing the 'trading zone' framework discussed in chapter two at Kitt Peak National Observatory (KPNO). In the early 2000s, the University of Hawai'i (UH) secured funding for several outreach programs directed at Native Hawaiians with the explicit goal of promoting a culturally-imbedded appreciation of astronomy. By depicting astronomy as the modern equivalent of Polynesian navigation by the stars, astronomers hoped that younger generations of Native Hawaiian students would recognize both the cultural and scientific value of the observatories on Mauna Kea.

The message that astronomy should be celebrated as integral to Native Hawaiian heritage is also materially articulated through the spatial geography of educational centers affiliated with the observatory. Similar to the KPNO Visitor Center's exhibits featuring basketry from the Tohono O'odham Nation, the cultural displays at the Mauna Kea Visitor Center and the University of Hawai'i at Hilo's (UHH) expansive 'Imiloa Astronomy Center seek to establish a trading zone "where astronomy meets Hawaiian culture."⁷ Incorporating oral history interviews with astronomers, observatory administrators, and activists, I analyze how these trading zones have been implemented and received in the Big Island community.

⁷ See www.imiloahawaii.org. Accessed 12 September 2012.

With particular focus on 'Imiloa, a sprawling \$28 million dollar museum and planetarium at UHH, I show how efforts to narrow cultural gaps by investing in these types of trading zones reflects the astronomy community's relatively recent struggle to balance a scientific agenda with social and environmental responsibility. Yet as I will argue, the themes of 'origins' and 'exploration' as represented at 'Imiloa mask the fundamentally incongruous historical and political meanings of these concepts for both astronomers and Native Hawaiians. Integrating astronomers' and Native Hawaiians' divergent conceptual understandings of 'origins' and 'exploration' has proven a novel path to communication and collaboration, but it has also effectively dissolved and homogenized the distinct cultural identities of both communities.

Throughout this chapter, I reprise my argument from earlier chapters that the use and meaning of the mountain is culturally constructed through the narratives of astronomers and Native Hawaiians. Early references to Mauna Kea by astronomers in the late 1960s emphasize its value as a prime observing site. In my comparison of astronomers' narratives about the role of astronomy in Hawai'i in the 1970s to more recent narratives generated by astronomers invested in the Keck Outriggers and the TMT, I identify a gradual shift in how the Mauna Kea astronomy community came to define the moral imperatives of their science. After the right to pursue astronomical development of the mountain came under repeated assault, some astronomers' narratives assumed a decidedly defensive tone, often invoking the claim that science, too, is a cultural tradition that must be safeguarded as the noble pursuit of knowledge. As the 2009 Comprehensive Master Plan produced for the University of Hawai'i summarized, "For the Hawaiian people Mauna Kea is their cultural connection or *piko* (umbilical cord) to *Papa* and *Wākea*, it is the beginning and the end. For the astronomical community Mauna Kea is the

scientific umbilical cord to the mysteries of the universe.”⁸ I argue that the emergence of such narratives represents not only the acceptance of other cultural claims on the mountain, but the attempt by the astronomical community to establish common ground with Native Hawaiians.

Identity, Tradition, and Politics in the Hawaiian Renaissance

The term ‘Hawaiian Renaissance’ was coined by George S. Kanahahele in a 1977 address to the Rotary Club of Honolulu to explain the cultural awakening then taking place in Hawai‘i.⁹ Kanahahele observed that “concomitant with this cultural rebirth is a new political awareness which is gradually being transformed into an articulate, organized but unmonolithic movement.”¹⁰ Throughout the 1970s, a nationalist movement had been steadily gaining momentum as both a reclamation of a distinct culture based on traditional Hawaiian values and beliefs and a rejection of cultural assimilation.

The ancestral connection to Polynesians figured prominently within the resurgence of interest in Native Hawaiian music, language, and performing arts.¹¹ As a means of reviving Hawaiian pride in seafaring traditions inherited from their Polynesian ancestors, Hawaiian canoeists built a replica of a Polynesian double canoe named the *Hökūle‘a* (Star of Joy) and sailed from Hawaii to Tahiti using traditional navigational techniques in 1976.¹² The connective

⁸ *Mauna Kea Comprehensive Management Plan. Prepared for the University of Hawai‘i by Ho‘akea, LLC dba Ku‘iwalu.* April 2009, p. iii. Available at <http://www.malamamaunakea.org>. Accessed 30 December 2012.

⁹ Kanahahele’s full speech was printed in the *Honolulu Advertiser*. See George Kanahahele, “Hawaiian Renaissance,” *Honolulu Advertiser*. 24 March 1977, p. 1.

¹⁰ Kanahahele, “Hawaiian Renaissance,” *Honolulu Advertiser*, p. 1.

¹¹ For an analysis of how music was used to reflect and advance the Hawaiian Renaissance, see George H. Lewis, “Da Kine Sounds: The Function of Music as Social Protest in the New Hawaiian Renaissance,” *American Music* 2 (1984): p. 38-52.

tissue binding the varied expressions of the Hawaiian Renaissance was the concept of “tradition.” As many scholars have observed, claims to tradition throughout the Pacific have played a central role in mapping indigenous identity, and the boundaries of tradition are actively debated among Native Hawaiian activists, Native Hawaiian scholars, and non-Native scholars.¹³

The revival of interest in Hawaiian traditions was not limited to cultural expression; it had far-reaching political and legal consequences. The focus on defining the parameters of a traditional Hawaiian identity fundamentally shaped debates over sovereignty and land rights taking place in the 1970s.¹⁴ For Hawaiian sovereignty activists who believed the United States was illegally occupying the Kingdom of Hawaii, reclaiming native lands was a means of retrieving a long-suppressed Hawaiian identity. As the proliferation of tourist, residential, and military development projects in the islands effectively pushed Native Hawaiians off rural lands, Native

¹² For an account of this voyage and its cultural significance within the context of the Hawaiian Renaissance, see Ben R. Finney, *Sailing in the wake of the ancestors: reviving Polynesian voyaging* (Honolulu: Bishop Museum Press, 2003); see also selected essays in K.R. Howe, ed., *Vaka moana: voyages of the ancestors: the discovery and settlement of the Pacific* (Honolulu: University of Hawaii Press, 2007).

¹³ In Pacific Island studies, “tradition” is a contested term with multiple meanings. Native Hawaiians often refer to tradition as a set of ethnically and culturally distinct ideas and practices that were established before contact with outsiders. Taken in this sense, the ‘outsiders’ are European colonizers. For historians and anthropologists, contact with ‘outsiders’ does not fully inscribe the beginning and endpoints of Native Hawaiian tradition, since the islands were visited by many non-Hawaiian groups who imparted cultural traditions. Instead of associating tradition with a well-defined and ‘authentic’ heritage rooted in pre-contact times, scholars tend to regard tradition as a concept in a constant state of flux. For discussions on the construction of “tradition” in the Hawaiian Renaissance, see Jocelyn S. Linnekin, “Defining Tradition: Variations on the Hawaiian Identity,” *American Ethnologist* 10 (1983): p. 21-252; Adrienne L. Kaeppler, “Recycling Tradition: A Hawaiian Case Study” *Dance Chronicle* 27 (2004): p. 293-311; Jane C. Desmond, “Invoking ‘The Native’: Body Politics in Contemporary Hawaiian Tourist Shows,” *The Drama Review* 41 (1997): p. 83-109.

¹⁴ The literature on indigenous perspectives of identity is voluminous. For relevant scholarship on Hawaiian identity, see R.T. Halualani, *In the name of Hawaiians* (Minneapolis: University of Minnesota Press, 2002); Laura Edles, “Rethinking ‘race’, ‘ethnicity’ and ‘culture’: Is Hawai’i the ‘model minority’ state?” *Ethnic and Racial Studies* 27 (2004): p. 37–68. The emphasis on reexamining the meaning of Hawaiian identity dates back at least to 1964, when John Dominis Holt published a widely read essay “On Being Hawaiian.” See J.D. Holt, *On being Hawaiian* (Honolulu: Kū pa’a, 1995 (1964)).

Hawaiians pushed back. Through the Native Hawaiian Legal Corporation, founded in 1974 “to remedy the injustices suffered by Native Hawaiians,” Native Hawaiians wielded new legal authority in land disputes.¹⁵ Four years later, the 1978 Hawaii State Constitutional Convention established the Office of Hawaiian Affairs (OHA) in response to the sovereignty movement spreading throughout Hawaii.¹⁶ OHA was granted authority to administer “ceded lands,” defined by the State Constitution as lands held in trust for Native Hawaiians, and the formation of the agency was upheld as a major achievement by Hawaiian nationalists. The legal and political reach of the blossoming cultural revival would be further tested in the Hawaiian geothermal energy controversy of the 1980s, a significant precursor to the Native Hawaiian opposition to telescope construction in the decade to follow.

Steam and Spirit

When an experimental geothermal power plant began operating in the Puna district of the Big Island in 1981, local residents revolted. Known to islanders as “Pele’s workshop” after Pele, the Kilauea Volcano’s goddess of fire, Puna’s fifty-mile stretch of coastal East Hawai’i is a variegated landscape of black-sand beaches, hardened lava flows, and steam vents. The geothermal plant was constructed to take advantage of the district’s volcanic activity by converting volcanic steam into electricity, a precious commodity on an island that depended almost exclusively on imported oil to meet its energy demands.¹⁷ The concept of renewable energy was promising, but the plant’s release of steam and sulfur byproducts alarmed Puna

¹⁵ For the mission statement of the Native Hawaiian Legal Corporation, see www.nhlchi.org. Accessed 29 November 2012.

¹⁶The Constitution of the State of Hawaii, Article XII. Hawaiian Affairs. Available at www.hawaii.gov/lrb. Accessed 12 November 2012.

¹⁷Paul Wood, “Steam Dreams: is geothermal energy destined to become a major part of Hawai’i’s energy future?” *Hana Hou!* 15 (2012): p. 101-107; p. 102.

residents and environmental groups, while Native Hawaiian groups accused the geothermal plants of violating the sacred domain of Pele. The Bureau of Land and Natural Resources (BLNR) conducted contested case hearings in 1982, and in spite of overwhelming community opposition to geothermal energy, the agency granted a conservation district use permit for the geothermal plant in 1983.¹⁸ A series of public hearings and further contested case hearings took place between 1984 and 1986, and following the BLNR's 1986 decision to permit further development of the geothermal resource subzone in Puna, geothermal activists decided they had had enough.

The Native Hawaiian Legal Corporation served as legal counsel to residents of the Volcano Community Association in a suit against the BLNR to contest the agency's approval of geothermal energy. In the State Supreme Court case, the appellants stated that BLNR was ignoring their religious claims on the land by allowing the Puna district to be developed as a geothermal resource. Building a geothermal energy plant would "desecrate the body of Pele by digging into the ground," an action that would "destroy the goddess by robbing her of vital heat."¹⁹

The Supreme Court ruled against the Volcano Community Association, but at the same time, the Court validated the religious claims of the appellants by emphasizing that their testimony on the religious value of the land was not in dispute. Rather, it was the failure of the appellants to demonstrate that the geothermal plant actually threatened religious practices at the project site that ultimately lost the case.²⁰ The judgment set aside questions of whether

¹⁸Dedman v. Board of Land & Natural Resources, 740 P. 2d 28 - Hawaii Supreme Court 1987. Available at www.peledefensefund.org. Accessed 10 November 2012. The BLNR was granted primary responsibility for administering geothermal resource zones in Hawaii under the terms of the 1983 Geothermal Energy Act. See Act 296, 3, 1983 Haw. Sess. Laws 638.

¹⁹Dedman v. Board of Land & Natural Resources, 740 P. 2d 28 - Hawaii Supreme Court 1987.

²⁰ Ibid.

Pele's annihilation would threaten religious practices because in the Court's estimation, the case hinged on the physical location of the power plant and not the spiritual construction of the landscape as a whole. Frustrated by this legal setback, attorneys formed the Pele Defense Fund in 1987 to combat the expanding geothermal industry in Hawai'i. The organization represented both Native Hawaiian and environmentalist interests in various cases, and the geothermal controversy continued to draw attention outside the courts as activists staged public protests in East Hawai'i. After losing several cases, the Pele Defense Fund finally won an injunction against the construction and operation of geothermal wells in 1992, and the geothermal developer decided to abandon the project.²¹

In many ways, the environmental and cultural opposition to geothermal energy in the 1980s set important precedents for the resistance to telescopes on Mauna Kea in the 1990s.²² Native Hawaiians and environmentalists, though not formally aligned, productively collaborated as activists to advance their respective agendas.²³ In the courtroom, standards of evidence were broadened to include narratives about the land as both a sacred space and an environmentally threatened resource. Some of the environmental litigants in the geothermal cases would even

²¹ Aluli v. Lewin, 828 P. 2d 802 – Hawaii Supreme Court 1992. Available at www.peledefensefund.org. Accessed 10 November 2012. For other geothermal case decisions, see Medeiros v. Hawaii County Planning Commission, 797 P. 2d 59 - Haw: Intermediate Court of Appeals 1990; Ulaleo v. Paty, 902 F. 2d 1395 - Court of Appeals, 9th Circuit 1990; Pele Defense Fund v. Puna Geothermal, 797 P. 2d 69 - Haw: Intermediate Court of Appeals 1990; Pele Defense Fund v. Puna Geothermal, 827 P. 2d 1149 - Haw: Intermediate Court of Appeals 1992; Pele Defense Fund v. Paty, 837 P. 2d 1247 - Haw: Supreme Court 1992; Pele Defense Fund v. Puna Geothermal Venture, 881 P. 2d 1210 - Haw: Supreme Court 1994. Available at www.peledefensefund.org. Accessed 10 November 2012.

²² The Pele Defense Fund members established a legal precedent protecting traditional access and gathering patterns that would later be cited by Native Hawaiian petitioners in a contested case against the Thirty Meter Telescope project. See Pele Defense Fund v. Paty, 73 Haw. 578, 620 (1992); Petitioners' Combined Narrative Exceptions to the Hearing Officer's Findings of Fact, Conclusions of Law, and Decision & Order. DLNR File No. HA-11-05 (CDUA HA-3568), p. 85.

²³ Nelson Ho, a Sierra Club leader who would later align with Native Hawaiians to oppose telescope construction on Mauna Kea to promote responsible land management practices on the mountain, was also involved in the opposition to geothermal plants in the 1980s. Interview with Nelson Ho. 17 September 2012.

draw upon their experience battling the BLNR and geothermal plants to fight telescope construction, so the legal challenge to geothermal energy companies and the BLNR laid a critical foundation for future activist efforts on the Big Island.

With the recent victories of Native Hawaiian legal groups and the political mobilization coalescing under the umbrella of numerous sovereignty groups across the state, the Hawaiian Renaissance was well established as a formidable cultural movement by the early 1990s. Persuasive evidence that the themes of the Hawaiian Renaissance commanded attention beyond Hawai'i's shores came in 1993, when President Bill Clinton signed the "Apology Resolution."²⁴ The Joint Resolution of Congress was a formal apology from the United States for the federal government's participation in the overthrow of the Hawaiian monarchy 100 years earlier. Though the Resolution had no bearing on disputes over ceded lands or other Native Hawaiian claims, it was widely heralded in the islands as yet another triumph for the Hawaiian sovereignty movement.

Revealing the Sacred

The first telescopes appeared on Mauna Kea in 1969, a decade before the Hawaiian Renaissance opened up a new dialogue on Native Hawaiian rights, but Native Hawaiians in the 1990s were politically empowered and increasingly organized. Throughout the 1990s, sovereignty activists continually sought unrestricted access to native lands and the right to practice traditional religion, intertwined goals that became a social, cultural, and political imperative for many Native Hawaiians. Maintaining a balanced relationship with the land, often accomplished through spiritual rituals, was the cornerstone of preserving the Native Hawaiian cultural identity re-forged in the Hawaiian Renaissance.²⁵ According to the Hawaiian saying

²⁴ United States Public Law 103-150. 103rd Congress Joint Resolution 19. 23 Nov. 1993.

ho'okahi no ka 'āina a me na kānaka (“the land and the people are one”), the loss of sacred lands and native ecosystems also signified the loss of a Hawaiian cultural identity tied to place. After witnessing the rapid development of Mauna Kea’s summit near the end of the decade, Native Hawaiian cultural practitioners like Kealoha Pisciotta were eager to exert a religious claim on the mountain.

As chapter two has shown, oral traditions about the sacredness of Mauna Kea to early Hawaiians were already commonly accepted by the astronomy community, and archaeological studies commissioned by the observatories had previously identified numerous shrines on the summit. Thus narratives describing Mauna Kea’s sacred *past* were well-established, but what of the modern claim that Mauna Kea was ‘still sacred’? Somewhat ironically, the very enterprise Native Hawaiians associated with threatening religious and cultural practice was also helping them to make a case for its preservation.

Narratives about the sacredness of Mauna Kea emerged in the late 1990s in part because astronomers and their supporters were required to fund detailed Native Hawaiian cultural studies for the first time as part of the Master Plan process. Not only were Native Hawaiians more secure in their legal rights to define the mountain as a sacred landscape, these narratives were actively solicited by the Mauna Kea Advisory Committee. Public hearings and written comments provided one avenue for Native Hawaiians to argue for the currency of religious practice on the mountain. Cultural specialist Kepa Maly also conducted 22 oral history interviews with Native Hawaiian *kupuna* (elders) in addition to significant archival work over a

²⁵ On the relationship between land and Hawaiian identity, see Davianna Pomaika'i McGregor, *Na Kua'aina: Living Hawaiian Culture* (University of Hawai'i Press, 2007). The protection afforded by the Hawai'i State Constitution for the traditional relationship of Native Hawaiians to the land was formally clarified by the State Supreme Court in HRS § 1-1. *Public Access Shoreline Hawaii v. Hawaii County Planning Commission* 79 Haw. 425, 440 (1995). Known as the “PASH” decision, the case reaffirmed traditional Native Hawaiian cultural rights on private property. See also *State v. Hanapi*, 89 Haw.177, 187 (1998).

two-year period to compile *mo'olelo* (historical narratives) of Mauna Kea's relationship to the Hawaiian people.²⁶ Elders affirmed both the past and present sacredness of Mauna Kea, revealing that Mauna Kea was regarded as the piko, or the origin point, for the Island of Hawai'i.²⁷ As the most sacred mountain in Hawai'i, Mauna Kea itself was considered a kupuna.²⁸ Many interviewees reported that their elders had traveled to the summit to worship or scatter ashes of relatives.²⁹

However, because the summit was considered the realm of the gods, as one interviewee explained, "...it was kind of a hallowed place that you know is there, and you don't need to go there. You don't need to bother it."³⁰ Only one interviewee out of twenty-two supported the observatories, and the rest believed further development was inappropriate.³¹ In Hawai'i, the opinions of the kupuna are deeply respected, so these concerns could not have been taken lightly, even by non-Native Hawaiian members of the Mauna Kea Advisory Committee. Combined with the oral and written testimony of cultural practitioners, accounts of Mauna Kea's sacredness indeed proved a persuasive influence on the Committee.

In its final recommendation to the UH Board of Regents in 1999, the Committee urged the Board not to approve further construction on Mauna Kea until a Master Plan was

²⁶ For an overview of the study methodology, see *Mauna Kea Science Reserve Master Plan, Appendix I*. 1999 Mauna Kea Science Reserve and Hale Pohaku Complex Development Plan Update: Oral History and Consultation Study, and Archival Literature Research. Ahupua'a of-Ka'ohe (Hamakua District) and Humu'ula (Hilo District), Island of Hawai'i. Prepared by Kepa Maly. February 1999, p. ii. Available at www.hawaii.edu/maunakea/appendix_i.pdf. Accessed 30 November 2012.

²⁷ *Mauna Kea Science Reserve Master Plan*, p. V-15.

²⁸ *Ibid.*

²⁹ *Mauna Kea Science Reserve Master Plan*, p. V-19.

³⁰ Pualani Kanaka'ole Kanahela, quoted in *Ibid.*, p.V-15.

³¹ The interviewee who supported the observatories believed the benefits of the scientific research "far out weighed [sic] other concerns." See *Mauna Kea Science Reserve Master Plan, Appendix I*, p. iv.

implemented that attended to Native Hawaiian concerns.³² This stance marked a profound shift in the power structure of the different interest groups invested in the use and control of the mountain. In previous Master Plan incarnations, the university's consideration of cultural issues was relegated to a brief sentence or paragraph on identifying and preserving archaeological artifacts. In 1999, the fate of future telescope construction was expressly tied to addressing Native Hawaiian cultural claims on the mountain. The breadth of the Mauna Kea Advisory Committee's community engagement activities was another compelling indicator of the pressure felt by the UH's Institute for Astronomy (IfA) to acknowledge and respond to cultural concerns. As the completed Master Plan would later attest, "The master plan process has triggered the most extensive assessment and consultation process in the history of Mauna Kea."³³

The authority of cultural narratives about the mountain would become even more apparent as the conflict spilled into the new millennium and the scattered community opposition to astronomical development on Mauna Kea crystallized into organized resistance against the Keck Outrigger telescopes.

"A Time of Collaboration"

In a 2001 letter to Sierra Club leader Nelson Ho, IfA astronomer Frederic Chaffee urged, "Let us all pledge that the new millennium will be a time of collaboration between the Observatories, the Sierra Club, Native Hawaiians and all others concerned with the sanctity of Mauna Kea. I am determined that the Outrigger Telescopes will serve as a model of such a

³² *Mauna Kea Science Reserve Master Plan*, "Community Input: Process, Comments, and Responses," p. XII-1.

³³ *Voices and Visions of Mauna Kea: Mauna Kea Science Reserve Master Plan and Implementation Process Summary*. Prepared by the University of Hawai'i. March 2000, p. 2. Available at www.hawaii.edu/maunakea. Accessed 29 November 2012.

collaboration.”³⁴ Identifying himself as a lifetime Sierra Club member who respected the physical and cultural environment of Mauna Kea, Chaffee hoped to persuade Ho that the IfA was imposing “very stringent controls” in the Environmental Assessment for the recently proposed Keck Outrigger Telescopes project.³⁵ Chaffee’s message was likely intended as an idealized vision of future relations between competing interests on Mauna Kea, but the controversy over the Keck Outrigger telescope project had already swelled past the point of amicable collaboration.

The Outrigger conflict was initiated in the midst of the public debate over the Master Plan in 1999, when the IfA issued a Draft Environmental Assessment (DEA) for a proposed interferometer telescope project on Mauna Kea consisting of six 1.8-meter telescopes, called “Outriggers.” Some Native Hawaiians instantly took issue with the name selected for the additional telescopes, a deliberate reference to the outriggers, or support structures, of canoes used in Polynesian navigation.³⁶ NASA sought to fund the construction, installation, and operation of the Outriggers near the existing twin Keck I and Keck II telescopes.³⁷ The Outriggers were to be a critical element of NASA’s “Origins” Program, dedicated to the search for life in the universe, and the existing infrastructure of the Keck telescopes was an ideal

³⁴ Frederic H. Chaffee to Mr. Nelson Ho. 13 February 2001 in *Environmental assessment for the Outrigger Telescopes Project: Mauna Kea Science Reserve*, Island of Hawai’i (Washington, D.C.: National Aeronautics and Space Administration, Office of Space Science, 2002). February 2002. UH Manoa: Hamilton Hawaiian Library.

³⁵ Frederic H. Chaffee to Mr. Nelson Ho. 13 February 2001 in *Ibid.*

³⁶ Joseph E. Ciotti, “Historical Views on Mauna Kea: From the Vantage Points of Hawaiian Culture and Astronomical Research,” *The Hawaiian Journal of History* 45 (2011): p. 147-166; p. 157.

³⁷ Four of the six scopes would be installed in 2002 with operations anticipated for 2003. Pending available funding, the on-site construction, installation and operation of Outriggers five and six would begin in 2007. See *Environmental assessment for the Outrigger Telescopes Project*, p. 5.

location for the interferometer.³⁸ The DEA stated that the IfA anticipated a finding of “no significant impact” for the telescopes, a conclusion that was immediately criticized by cultural and environmental groups as premature and biased.³⁹ The IfA’s determination of “no significant impact” was regarded as a major conflict of interest by some telescope opponents because although NASA was funding the project, the UH was known to have a stake in building the Outrigger telescopes.

The Hawaii State Historic Preservation Division (SHPD) also took issue with the IfA’s finding. The SHPD was then in the process of reviewing historical, ethnographic, and archaeological evidence about Mauna Kea to contribute to the historic preservation plan for the summit region, and they found that the crater known as *Pu’u Hau Oki* was of great cultural and historical importance.⁴⁰ The SHPD stated, “Given our conclusion that Pu’u Hau Oki is part of an historic property, we believe the proposed construction of four to six outrigger telescopes on the site of the W.M. Keck Observatory will have an ‘adverse effect’ both on this historic property

³⁸ NASA considered eleven alternate sites, but all other sites failed to meet its two-tiered evaluation criteria based on physical conditions and feasibility factors such as cost. Arizona’s Mt. Graham, the subject of chapters five and six, was among the sites considered. Mt. Graham met NASA’s “Tier 1” criteria because the physical location was suitable for the interferometer, but it failed to meet the cost-efficient Tier 2 criteria because the design of the Large Binocular Telescope on Mt. Graham not compatible with operating the outriggers as an interferometer, so extensive new facilities would have to be constructed. Mt. Graham’s status as a habitat for a federally listed endangered species was also mentioned as a reason for its rejection as a potential site for the Outriggers. See *Environmental assessment for the Outrigger Telescopes Project*, p. 59.

³⁹ *Draft environmental assessment/anticipated finding of no significant impact: W.M. Keck Observatory, Keck Telescope Interferometer Outrigger Telescope Project*. March 1999. UH Manoa: Hamilton Hawaiian Library.

⁴⁰ Don Hibbard, Administrator State Historic Preservation Division to Dr. Robert A. McLaren, Interim Director, Institute for Astronomy. 03 May 1999, p. 2, in *Environmental assessment for the Outrigger Telescopes Project*.

and on the summit region which we believe is eligible for inclusion in the National Register as an historic district...”⁴¹

The soon-to-be-completed Master Plan was supposed to address exactly these types of management hurdles related to building new telescopes, but when the plan was adopted by the University Board of Regents in 2000, many cultural and environmental activists were bitterly disappointed.⁴² Dismissing the authority of the Master Plan altogether, Royal Order of Kamehameha I chief Kaliko Kanaele wondered, “How does a master plan conform to the plan of the gods?”⁴³

The Master Plan may have been unpopular, but it responded to a top priority for critics of the UH’s management practices by establishing in 2000 a regulatory board called the Office of Mauna Kea Management (OMKM) and the community-based Mauna Kea Management Board (MKMB), attached to the University of Hawai’i at Hilo. Under the Master Plan, a panel of cultural experts called *Kahu Ku Mauna* would be responsible for advising the OMKM and the MKMB on cultural matters affecting the Mauna Kea Science Reserve. Many of the OMKM members were the same people who served on an advisory group responsible for working out the final details of the Master Plan.⁴⁴ Native Hawaiian Ed Stevens assumed a leadership role in Kahu Ku Mauna because “we talk about the observatories up there and we stand in a circle and

⁴¹Don Hibbard to Dr. Robert A. McLaren, p. 3, in *Ibid*.

⁴²As the petitioners in the contested case over the Keck Outriggers would later argue, the Master Plan was never reviewed or approved by the Board of Land and Natural Resources. See Board of Land and Natural Resources, State of Hawai’i. Contested Case Hearing. DLNR File No. HA-02-06, p. 22. Available at <ftp.nist.gov>. Accessed 10 November 2012.

⁴³ Kaliko Kanaele, Royal Order of Kamehameha I. Na Mako o Aina Presents Keck Outrigger Telescopes Project town meeting, Hilo [videorecording]. 03 October 2001. UH Manoa: Sinclair AV Center.

⁴⁴ Interview with Bob McLaren. 11 September 2012.

talk about it, and all you hear is anger. You hear anger about everything to do with what's going on on the mountain. And I remind them that it's done and we have to let go of that and that we can't go to the mountain, to that most sacred place, carrying anger with us."⁴⁵ Stevens was one of several Native Hawaiians who grappled with troubling questions of cultural identity by becoming involved with astronomy interests on the mountain.

The Master Plan also created new ranger positions funded by the IfA. Rangers would provide a physical presence on the mountain in order to monitor public, observatory, and commercial activities, and the OMKM recruited Native Hawaiians for the new job. When Native Hawaiian James Kimo Pihano was approached about working on the mountain, he was deeply conflicted. Pihano was once part of an anti-astronomy group, and he gathered at Mauna Kea with elders and chiefs on the island to pray about whether to accept the position. Pihano eventually decided that being a ranger meant he could bring awareness to "this science world up here, this culture up here."⁴⁶ Even after becoming a ranger in 2000, Pihano's internal tension over working for the IfA persisted. As Pihano recalled, "when I first came up here, I was angry and it took a while for me to kind of pray on it, think about it, and get over my anger so I can continue my work up here."⁴⁷

Denouncing the provisions of the 2000 Master Plan as a sham of responsible stewardship, a new nonprofit group formed that same year called KAHEA: The Hawaiian-Environmental Alliance. KAHEA marked the first formal grassroots collaboration between cultural and environmental activists, a sign that the opposition to the observatories was

⁴⁵ Ed Stevens, quoted in *First Light* (PBS Hawaii, 2004). My thanks to Bob McLaren for generously providing a copy of this documentary.

⁴⁶ James Kimo Pihano, quoted in *First Light* (PBS Hawaii, 2004).

⁴⁷ Ibid.

becoming increasingly organized.⁴⁸ When NASA held a series of town hall meetings on the Big Island in Kona, Waimea, and Hilo about the Outrigger project in 2001, KAHEA members were present to voice their objections.⁴⁹

At these meetings, several key concerns consistently emerged from KAHEA members and several groups identifying strictly as Native Hawaiian or environmentalist in orientation. A frequently heard accusation centered on NASA's decision to prepare an Environmental Assessment (EA) instead of an Environmental Impact Statement (EIS). An EA is a concise public document prepared by a federal agency on a proposed development project that briefly provides evidence and analysis for either a finding of no significant impact or a full EIS. The comments received during the town hall meetings were to be included in the EA prepared by NASA, but activists felt their interests would be better served through the EIS process. Written comments collected for the EA shed further light on the magnitude of the community's desire for a full EIS.

The Hawaii Island Burial Council, the Advisory Council on Historic Preservation, and the Office of Hawaiian Affairs all wrote letters to NASA requesting a full EIS to safeguard cultural interests.⁵⁰ Environmental groups such as the Conservation Council for Hawai'i and the Sierra Club found fault with the EA's conclusion that the "operation of the Outrigger Telescopes would

⁴⁸ *Kahea* means "the call" in Hawaiian, and "KAHEA" is an acronym for Ka (the) Hawaiian-Environmental Alliance. See www.keahea.org. Accessed 30 November 2012.

⁴⁹ Two "Open House" meetings were held by NASA in Feb 2001 in Hilo and Kona, and four "Town Hall" meetings were held in October 2001 in Kona, Waimea, and Hilo. See *Environmental assessment for the Outrigger Telescopes Project*, p. 10.

⁵⁰ See Nalei Pate-Kahakalau, Chairman, Hawai'i Island Burial Council to Mr. Rick Howard, Program Executive, Advanced Technology and Mission Studies Division, Office of Space Science and Mr. Kenneth M. Kumor, NASA NEPH Coordinator. 16 March 2001; Colin Kippen, Jr., Deputy Administrator, Hawaiian Rights Division to Richard J. Howard, Senior Program Executive, Office of Space Sciences. 23 February 2001, in *Environmental assessment for the Outrigger Telescopes Project*, Appendix I.

have little, if any, impact on Wēkiu bug habitat,” and demanded an EIS to further study the Wēkiu bug population.⁵¹ Environmentalist and entomologist Fred Stone noted that the 1997-1998 field assessment of the Wēkiu Bug conducted for the Master Plan revealed a critically low population of only a dozen bugs that were mostly concentrated in the Pu’u Hau ‘Oki crater.⁵² Stone argued that “numbers were so low that ANY further change to the area could be fatal to the few remaining individuals. No construction should be begun...”⁵³ Suspicious of NASA’s proposed “mitigation measures” for the bug, Stone further stated that “by failing to specify how the mitigation and activities will integrate into the Mauna Kea Science Reserve Master Plan, the proposed Keck Outrigger Telescopes Project is following the practice of piece-meal development of the summit which typified the period covered by the previous Management Plan.”⁵⁴

The “Origins” of Colonialism

The OMKM also weighed in on the polarizing EA vs. EIS debate, since evaluating the Outrigger proposal was one of its first management tasks. Making a case for why the EA was insufficient, the OMKM stated, “Those concerns are deserving of greater in-depth analysis of the cumulative effects of the proposed project than the EA affords. They deserve more than a mere listing of the existing observatories and a discounting of the probable impact of the new

⁵¹ See Karen Blue, Executive Director, The Conservation Council for Hawai’i to Richard J. Howard, Senior Program Executive, Office of Space Sciences. 30 March 2001, in *Environmental assessment for the Outrigger Telescopes Project*, Appendix I, p. 9.

⁵² See F.G. Howarth and F.D. Stone. *An Assessment of the Arthropod Fauna and the Aeolian Ecosystem Near the Summit of Mauna Kea, Hawai’i*. B.P. Bishop Museum. Honolulu, Hawai’i, Volume 2. 1982; F.G. Howarth, G.J. Brenner and D.J. Preston. “An Arthropod Assessment within selected areas of the Mauna Kea Science reserve: final report” in *Mauna Kea Science Reserve Master Plan*, Appendix J, May 7 1999.

⁵³ Fred Stone, Ph.D. Hawaii Community College to Richard J. Howard, Senior Program Executive, Office of Space Science, NASA Headquarters. 13 February 2001, p. 1, in *Environmental assessment for the Outrigger Telescopes Project*, Appendix I.

⁵⁴ *Ibid*, p. 3.

observatories and their construction.”⁵⁵ Refuting the idea listed in the EA that the outriggers would not add appreciably to the cumulative impact due to their small size, the OMKM pointed out that “the impact must be measured not merely in visual terms, or in terms of construction impacts, but in spiritual terms—in terms of the project’s impact on the native psyche, on the spiritual connection between Native Hawaiians and their beloved mountain.”⁵⁶ The OMKM was essentially criticizing NASA’s failure to evaluate the Outrigger project within the Native Hawaiian cultural and spiritual context, a charge that exposed deeper tensions lurking beneath the EA vs. EIS controversy.

Letters submitted to NASA as part of the DEA process provide revealing glimpses of how some Native Hawaiians’ views of astronomical science in general—and NASA, as a federal agency, in particular—were starting to be conflated with colonialist oppression. For many commentators, the fact that the telescopes were part of NASA’s Origins program to search for the origins of life in the universe raised epistemological questions about the primacy of modern science over indigenous ways of knowing. The *Hui Malama I Na Kupuna O Hawai’i Nei* (Group Caring for the Ancestors of Hawai’i, “Hui Malama”) was established in 1988 to protect ancestral Native Hawaiian objects following the removal of over one thousand ancestral Native Hawaiian remains from sand dunes on Maui’s Honokahua for the Ritz Carlton Hotel. Hui Malama wanted NASA to understand that oral history provided Native Hawaiians with “layers upon layers of answers to questions about our origins that we find more than satisfies our own curiosity as to

⁵⁵ “The Office of Mauna Kea Management’s Comments on NASA’s Draft EA Regarding NASA’s Forthcoming Application to Install and Operate Six Outrigger Telescopes in the Proximity of the WMKO Within the Mauna Kea Science Reserve,” 23 February 2001, p. 5, in *Environmental assessment for the Outrigger Telescopes Project*.

⁵⁶ Ibid.

where we come from.”⁵⁷ Declaring Native Hawaiians to be in a state of emergency due to “the illegal taking of our sovereign authority and lack of recognition by the United States and other international partners, we are compelled to set aside the question whether we are alone as being irrelevant to our very survival.”⁵⁸ Commenting on the impact of the existing Keck telescopes, Hui Malama lamented that “we are again reminded that as the indigenous but colonized people of the *pae ‘aina* (the Hawaiian Islands), our fundamental cultural values including spirituality are outweighed by the colonizer’s values, be it scientific, economic or both.”⁵⁹

In a similar response to NASA’s EA section justifying the need for the Outriggers as part of the Origins program, The Royal Order of Kamehameha I (ROOK I) wrote NASA to provide a Native Hawaiian context for the scientific search for origins. ROOK I’s letter pointed out that

The Native Hawaiian peoples have an ancient (millennia old) understanding of man’s origin and his relationship to the cosmology of the Universe...While the search for better understanding into the Universe and our human relationship to the heavens is a noble endeavor and should be supported, Native Hawaiians cannot support it at the expense of our own heritage. Nor can we support any activities that would impede our continued knowledge and practice of astronomy and cosmology.⁶⁰

NASA’s response to ROOK I acknowledged this Native Hawaiian perspective by stating, “Thank you for your comments on your important point of reference. NASA appreciates the

⁵⁷ Hui Malama I Na Kupuna O Hawai’i Nei Regarding Draft Environmental Assessment for Outrigger Telescopes Project (December 2000) April 10, 2001, p. 2, in *Environmental assessment for the Outrigger Telescopes Project*, Appendix I.

⁵⁸ Ibid.

⁵⁹ Ibid.

⁶⁰ Kuauhau Mamo Naliko Markel, Kaka’olelo Ali’i Sir Robert McKeen Jr., and Ali’i Aimoku Ali’i Sir Paul Neves K.G.C.K., The Royal Order of Kamehameha I to Mr. Richard Howard Senior Program Executive, Office of Space Sciences. 24 March 2001, p. 4, in *Environmental assessment for the Outrigger Telescopes Project*, Appendix I.

history and the use of astronomy by Native Hawaiians.”⁶¹ Though NASA’s terse reply did not invite much in the way of further dialogue with ROOK I, as a whole, NASA’s commitment to engaging with minority communities was emerging as a key initiative for the agency.

Through its newly established Office of Space Science (OSS) Education and Public Outreach program (EPO), NASA was funding a broad range of outreach activities at planetariums, museums, schools, and other venues with the goal of reaching audiences that were historically underrepresented in the space sciences, including minority groups. 2001 marked only its second year of formal operation, but the Annual Report on the program had more than doubled in volume, indicating that scientists were extremely enthusiastic about participating in EPO activities. In 2001, there were nearly one thousand OSS-affiliated scientists and engineers partnered with organizations in all 50 states.⁶² The reach of the OSS Education and Public Outreach program extended to the Big Island as well, with astronomers working to ease tensions between Native Hawaiians and the observatories through the New Opportunities through Minority Initiatives in Space Science program discussed later in this chapter. As Casper Bruun Jensen and Brit Ross Winthereik have pointed out in their studies of aid development partnerships, the discourse of partnership may be viewed as “a particularly insidious rhetoric, precisely because it seems to hide power under an ideological smoke screen of equality, commonality and shared win-win situations.”⁶³ For astronomers, these partnerships offered rewarding opportunities to narrow cultural gaps, and astronomers on the Big Island were quite willing to invest their time and other resources to facilitate open communication with Native

⁶¹ The Royal Order of Kamehameha I to Mr. Richard Howard.

⁶² Jeffrey D. Rosendhal, Education and Outreach Director, Office of Space Science, in *The National Aeronautics and Space Administration Office of Space Science Education and Public Outreach Annual Report FY 2001*, p. 3. Available at science.nasa.gov. Accessed 08 December 2012.

⁶³ Casper Bruun Jensen and Brit Ross Winthereik, *Monitoring Movements: Infrastructures and Partnerships in Development Aid. Infrastructure series* (Cambridge, MA: MIT Press, 2012), p. 56.

Hawaiians. For some Native Hawaiians, however, framing public outreach collaborations as a partnership between the astronomy and Native Hawaiian communities simply glossed over the historical power asymmetries between these groups, and Native Hawaiian activists were unmoved by these attempts when it came to building the Outriggers.

A Memorandum of (Dis)agreement

The outrage in the Big Island community over NASA's insistence on preparing an EA instead of an EIS was sustained by the implication that this decision stemmed from a fundamental disregard for cultural and environmental values. Attempting to diffuse the rapidly escalating debate over the EIS issue, NASA generated a Memorandum of Agreement (MOA) in March 2002 based on proposals for on-and off-site mitigation of potential impacts to cultural resources. The only cultural group to sign on was *Ahahui Ku Mauna*, with the caveat that the signature was "not an endorsement of the proposed Keck Outrigger Project."⁶⁴ Conspicuously absent from the MOA were the signatures of cultural groups such as KAHEA that had been consulted for the EA. This could hardly have been surprising to IfA and NASA officials, however, since those same groups had filed a petition for a contested case against the Outrigger project the previous day.⁶⁵

KAHEA had already set a precedent for cultural and environmental alliances that owed much to the activist collaborations of the 1980s geothermal controversy, and now KAHEA joined with other Native Hawaiian and environmentalist groups in a contested case to block the state

⁶⁴ Edward Stevens, Spokesperson for the Ahahui Ku Mauna. 21 March 2002. Consulting Parties who refused to sign the MOA were Hawaii Island Burial Council, Hui Malama I Na Kupuna O Hawaii Nei, Mauna Kea Anaina Hou, Office of Hawaiian Affairs, Office of Mauna Kea Management, and the Royal Order of Kamehameha I. See *Final environmental impact statement for the Outrigger Telescopes Project: Mauna Kea Science Reserve*, Island of Hawai'i. National Aeronautics and Space Administration, Universe Division, Science Mission Directorate. February 2005. V. 1, p. xv.

⁶⁵ DLNR File No. HA-02-06, p. 4.

permit for the Outrigger project. The petitioners represented diverse backgrounds and perspectives on the mountain's significance. Kealoha Pisciotta, whose story about the desecration of her family shrine was well known to her former IfA colleagues, was the president and co-founder of the cultural organization *Mauna Kea Anaina Hou*.⁶⁶ Other cultural organizations such as the *Ilio`ulaokalani* Coalition, the ROOK I, and environmental groups such as the Sierra Club jointly filed written petitions for the contested case hearing.⁶⁷

Due to a series of lengthy delays, the contested case hearings on the permit would not even begin until February of the following year. Just one month after the petition was filed for the Outrigger contested case, however, NASA's EA became the subject of a federal lawsuit filed by the OHA. Representing broad consensus among Native Hawaiians opposed to the Outrigger project, the OHA again called for an EIS by challenging NASA's EA in the Honolulu U.S. District Court in 2002.⁶⁸

In June 2003, the Court remanded the EA and instructed NASA to reassess its findings on the cumulative impacts of the project. OHA attorney Lea Hong called the judgment a victory,

⁶⁶ See chapter three for more background on Pisciotta's grievance with the Mauna Kea astronomy community.

⁶⁷ For a list of petitioners and their affiliations, see DLNR File No. HA-02-06, p. 1.

⁶⁸ See Pat Omandam, "OHA sues for environmental report on Mauna Kea project," *The Honolulu Star-Bulletin*. 23 April 2002. A few months after filing the lawsuit against NASA, OHA became involved in a controversy about the commercialization of biotic material collected from the Hawaiian archipelago by biotechnology companies contracting with the University of Hawai'i. In Stefan Helmreich's study of marine microbiologists, he shows that OHA's concerns were based on Native Hawaiian property rights and potential revenues from the commodification of these marine microbial samples. Since submerged lands are included in the inventory of ceded lands and OHA receives 20 percent of revenues derived from ceded lands, Native Hawaiian attorneys sought to pass a bill in the State Senate in 2003 that would establish a three-year moratorium on the practice of collecting environmental samples from Hawai'i's marine ecosystem. Claiming Hawaiian waters as part of the public trust was part of a broader argument about claiming Hawaiian biodiversity as a valuable Native Hawaiian resource, which was also central to OHA's insistence that NASA should prepare a full EIS to account for the environmental and cultural impacts of the Outrigger project. See Helmreich, *Alien Ocean: Anthropological Voyages in Microbial Seas* (Berkeley: University of California Press, 2009), especially Chapter three, "Blue-Green Capitalism: Marine Biotechnology in Hawai'i," p. 106-144.

“not just for OHA and native Hawaiian organizations, but it is an important decision in terms of informing federal agencies they need to do appropriate cumulative impact analysis in environmental assessments.”⁶⁹ When asked to comment about the ruling, Associate Director of the IfA Bob McLaren optimistically asserted, “the university remains convinced that spiritual, cultural and environmental values can be integrated with scientific endeavors for the benefit of all.”⁷⁰

In a surprising move later that year, NASA jointly announced with the OHA that it would prepare a full EIS, although the court order required only a revision of the existing EA. NASA published its Notice of Intent in the Federal Register and all the major Hawaiian newspapers, raising public awareness about the first comprehensive federal EIS ever prepared to address the cultural and environmental impact of telescope construction on Mauna Kea.⁷¹

NASA issued the Draft Environmental Impact Statement (DEIS) for the Outrigger Telescopes Project in July 2004, and public comment period began the following month. Public meetings were held throughout August and early September on the Big Island, Maui, and O’ahu, and the public was also encouraged to submit comments through mail, email, or telephone.⁷² At these meetings, “participants were able to enjoy light food while they browsed limited

⁶⁹ Lea Hong, quoted in Leila Fujimori, “Mauna Kea telescopes hit roadblock,” *Honolulu Star-Bulletin* 17 July 2003.

⁷⁰ Robert McClaren, quoted in *Ibid.*

⁷¹ 68 Federal Register (FR) 75285.

⁷² A total of 184 participants registered at the public meetings, and 329 written comments were received during the comment period. See *Final environmental impact statement for the Outrigger Telescopes Project*, Appendix G: Response to Comments, G-1.

display materials,” followed by opening remarks by DEIS team members, with the remainder of the meeting dedicated to comments from the public.⁷³

In the Final Environmental Impact Statement (FEIS) issued the following year, oral comments from the scoping meetings are summarized, resulting in a sterile account of the exchanges between members of the public and NASA officials. By watching videotapes of the meetings, however, these encounters between scientists and nonscientists emerge as awkward confrontations that expose the steadily widening ideological gulf separating different stakeholders in the mountain.⁷⁴

Themes of colonization and cultural suppression were commonly articulated in both oral and written comments by Native Hawaiian groups and individuals. Though NASA categorized comments on the distribution of income from ceded lands and the overthrow of the Hawaiian monarchy as “beyond the scope” of the EIS, it is telling that many Native Hawaiians employed colonialist rhetoric to discuss a federally funded scientific project.⁷⁵ The observatories on Mauna Kea were swiftly becoming symbols of colonialist acquisition. It was a doubly alienating characterization of the dynamics of power on the mountain—astronomers no more wished to be considered ‘colonizers’ than Native Hawaiians wished to submit to the perpetuation of colonization. Haunani-Kay Trask has noted that

⁷³ *Final environmental impact statement for the Outrigger Telescopes Project*, Appendix G: Response to Comments, G-2.

⁷⁴ See NASA EIS public scoping meetings on the Outrigger Telescopes Project [videorecording]. Kona - Hilo - Waimea - Honolulu -Wai‘anae. January 2004 (Nā‘ālehu, Hawai‘i: Nā Maka o ka ‘Āina, 2004.) UH Hilo.

⁷⁵ Other topics deemed beyond the scope of the EIS included the \$1 per year lease rent received by UH from each observatory, the approval of the 2000 Master Plan by the DLNR, the Conservation District Use Application by UH, and the relationship between NASA and the Department of Defense. See *Final environmental impact statement for the Outrigger Telescopes Project*, p. V. 1; xi. UH Manoa: Hamilton Hawaiian Library.

neocolonialism refers not only to dominant colonial retentions but also to psychological injuries suffered by the colonized that continue to wound our internal and external lives. Part of neocolonialism, of course, is the ideological position that all is well; in other words, that decolonization has occurred. Therefore, problems and conflicts are post-colonial and the fault of the allegedly independent peoples. Nothing could be more inaccurate.⁷⁶

Native Hawaiians repeatedly referred to the Outriggers as part of a neo-colonialist agenda because the project reinforced the ideological position that all was *not* well: Native Hawaiians were still a dispossessed people subject to the authority foreign interests that wished to appropriate Hawaiian land. As tensions deepened through the discourse of colonialism, the kind of collaboration envisioned by Chaffee in his 2002 letter to Sierra Club leader Nelson Ho seemed an increasingly fanciful possibility.

The dueling epistemological claims on the mountain were well summarized by John T. Harrison of the UH Environmental Center, who conducted a review of the EIS just prior to the release of the FEIS 2004.⁷⁷ According to Harrison, the conflict over Mauna Kea stemmed from two competing constructions of the mountain: “a cultural perspective that views the mountain as a sacred temple and that of a Western scientific perspective that views the mountain as a scientific temple.”⁷⁸ In Harrison’s frank assessment of the EIS, “rather than seeking enhanced strategies to bridge cultural perspectives, this document adopts the presumptive stance that the scientific arguments for the proposed action trump cultural sensitivities. As such, it’s difficult to

⁷⁶ Trask, *From a Native Daughter: Colonialism and Sovereignty in Hawai'i* (Monroe, Me.: Common Courage Press, 1999), p. 102-103.

⁷⁷ The review was conducted with the assistance of Ethnic Studies Professor Davianna McGregor and Urban and Regional Planning Professor Karen Umemoto. See John T. Harrison, Ph.D., University of Hawaii Environmental Coordinator to Dr. Carl B. Pilcher. 01 October 2004 in *Final environmental impact statement for the Outrigger Telescopes Project*, G-174-176, p. G-174.

⁷⁸ *Ibid*, p. G-176.

imagine an outcome that promotes compromise and coexistence of the inherently dichotomous Native Hawaiian and technical perspectives.”⁷⁹

Sinking the Outriggers: the Keck Outrigger contested case

Harrison’s evaluation of the EIS was certainly shared by the coalition of Native Hawaiians and environmentalists who were still fighting the Outriggers through the ongoing contested case, even after the BLNR granted a land use permit for the project in 2004. In testimony before the BLNR, cultural practitioners explained that the telescopes were “an obstruction of sight. Now when our kahuna go up there, they cannot turn 360 degrees and see all the places...they have to walk around the telescopes and that’s inappropriate.”⁸⁰ Another Native Hawaiian petitioner testified that “alterations to the sacred landscape destroy reference points critical to the potency of Native Hawaiian oral traditions. No one has a right to change our genealogies.”⁸¹

Though the contested case had many supporters across the Hawaiian Islands, there were also many Native and non-Native residents who believed opposing the observatories was a bad move for the state and its people. In a letter to the editor, Big Island resident Brian Lievens called the Wēkiu bug a “cockroach” and denounced the mountain’s sacredness because “the ancient Hawaiians did not hold Sunday services on the summit.”⁸² Lievens went on to suggest that if the case against the Outriggers was successful, “the government of Chile will be welcoming the next generation of astronomers with their telescopes in the quest to view the

⁷⁹ *Final environmental impact statement for the Outrigger Telescopes Project*, p. G-175.

⁸⁰ Quoted from Exhibit F-5 in App. I-K at 6-7, Contested Case Hearing. DLNR File No. HA-02-06, p. 46.

⁸¹ *Ibid.*

⁸² Brian Lievens, “Ditch Diggers- or star gazers,” *West Hawaii Today*, Letter to Editor. 29 August 2004.

infinite. Meanwhile our kids will continue to dig ditches.”⁸³ Though somewhat bluntly articulated, Lievens’ message resonated with many island residents who appreciated the observatories as a scientific and economic boon to the state.

According to a ‘no-action’ alternative presented in the 2002 EA for the Outriggers, the State of Hawaii would lose an estimated \$10 to \$11 million for the on-site construction and installation of the Outriggers in addition to the loss of revenues for operating the telescopes.⁸⁴ Environmentally, no funding for Wēkiu bug on-site monitoring associated with the Outrigger project would take place, and further studies of the bug population were exactly what environmentalists were calling for at the time.⁸⁵ Scientifically, the cost of not building the Outriggers would also be deleterious. The 10-meter Keck I and Keck II telescopes were set to operate at the forefront of ground-based observational astronomy by making use of adaptive optics technology. Using a laser to create an artificial guide star on the Keck II, the blurring of a star could be corrected with computer-controlled adjustments to reduce the effect of atmospheric disturbances, resulting in exceptionally clear images of astronomical objects. The Keck I and Keck II telescopes were designed with the ability to function in tandem as a large interferometer, and the addition of the Outriggers would greatly enhance the Keck array, producing images with unprecedented resolution.⁸⁶

However, the only desirable resolution for Native Hawaiians who opposed the observatories was a complete removal of all telescopes at the summit, and the petitioners in the

⁸³ Lievens, “Ditch Diggers- or star gazers.”

⁸⁴ *Environmental assessment for the Outrigger Telescopes Project*, p. 11.

⁸⁵ Ibid.

⁸⁶ The Keck domes are 85 meters apart. See www2.keck.hawaii.edu/optics/ao/. Accessed 07 December 2012.

contested case hoped that revoking the land use permit for the Outriggers would be the first step in decommissioning other major telescopes on the summit. After the contested case dragged on for two more years and NASA pulled the funding on the Outriggers, a judge reversed the permit for the Outriggers in August 2006, calling for a more comprehensive management plan that would evaluate the natural and cultural resources at the summit.⁸⁷

Of course, anti-telescope activists viewed the decision as a major victory, but IfA Director Rolf-Peter Kudritski downplayed the decision, telling reporters, “the telescopes weren’t going to be built anyway.”⁸⁸ The Outriggers may have been doomed, but the IfA expected more telescope proposals to follow, and the contested case had demonstrated that Native Hawaiian narratives about Mauna Kea’s sacredness could stall or otherwise severely limit telescope development. Preserving the future of astronomy on Mauna Kea clearly necessitated finding some way to bridge the cultural gaps between astronomers and Native Hawaiians. But what if astronomy itself could be shown to be part of the Native Hawaiian cultural heritage? Naming the Keck interferometers “Outriggers” to metaphorically connect early Hawaiian navigation with modern astronomical exploration suggests that astronomers were already beginning to strategically focus on the similarities between Native Hawaiians and astronomers by the late 1990s.

As I will argue, astronomers increasingly seized upon this strategy after 2000, producing new narratives emphasizing the historical relationship between Native Hawaiians and astronomy to position their science as intrinsically part of Native Hawaiian culture. Some

⁸⁷ “Ruling could block Mauna Kea projects,” *Pacific Business News*. 08 August 2006; “Telescope plan loses funding, NASA pullout likely to kill Mauna Kea’s Outrigger Project,” *Honolulu Advertiser*. 25 June 2006, p. A1.

⁸⁸ “Ruling could block Mauna Kea projects.”

astronomers went further, invoking the language of the sacred to defend astronomy on the mountain.

Ancient Polynesians and Modern Astronomers: 'Brothers and Sisters' in Exploring the Heavens

In a 1974 report issued by the Institute for Astronomy that provided "A Brief History of Astronomy on Mauna Kea," the IfA explained that "the current focus on astronomy at Mauna Kea can be dated to 1963" with Kuiper's arrival in Hawai'i.⁸⁹ After astronomers were forced to respond to the highly critical 1998 State Audit, it became apparent that building more telescopes depended in part on accepting and accommodating the Native Hawaiian cultural construction of the mountain, and the timeline of Mauna Kea's association with astronomy was dramatically extended in the dominant narratives of astronomers. The new strategic emphasis on the commonalities between astronomy and Native Hawaiian history is unmistakably evident in an 8-page pamphlet summarizing the 2000 Master Plan for broad public consumption.

On the cover of the pamphlet, King David Kalakaua is quoted as stating, "It will afford me unfeigned satisfaction if my kingdom can add its quota toward the successful accomplishment of the most important astronomical observation of the present century and assist, however humbly, the enlightened nations of the earth in these costly enterprises..."⁹⁰

Following King Kalakaua's apparent endorsement of astronomy is a quote from Keck Observatory Director Frederic Chaffee, who observes

After all, the ancient Hawaiians were among the first great astronomers, using the stars to guide them among the islands in the vast Pacific, centuries before anyone else had developed such skill. Long before Europeans and mainlanders, Hawaiian astronomers

⁸⁹ Mauna Kea - an overview. University of Hawaii Institute for Astronomy(Honolulu) July 1974, p. 6. UH Manoa Hamilton Hawaiian Library.

⁹⁰ King David Kalakaua, quoted in *Voices and Visions of Mauna Kea*.

were studying the heavens with awe and wonder, the same feelings that draw modern astronomers to study the heavens. At this very deep level, I feel we are brothers and sisters.⁹¹

Chaffee's reference to the ancient Hawaiians as his "brothers and sisters" is not based on genealogical ties, but on their mutual practice of astronomy, which connects them at a "deep level."

Other quotes found throughout the pamphlet represent variations on the same theme, emphasizing that astronomers and Native Hawaiians share intertwined goals and history. In one selection, an astronomer points out, "Hawaiian and astronomical questions are similar. Where do we come from, where are we going?"⁹² In another quote, a Native Hawaiian asserts, "Stargazing from Mauna Kea and the success of *Hokule'a* are all tied together."⁹³ *Höküle'a*, as described earlier in this chapter, is the replica of the Polynesian voyaging canoe built in the 1970s that is famous to Native Hawaiians as a potent symbol of the Hawaiian Renaissance. Each page of the Master Plan informational pamphlet bears an iconic image of a Polynesian canoe intended to represent *Höküle'a*. The Master Plan process is also described as a "voyage of discovery" throughout the pamphlet, putting a finer point on the imagery of Polynesian navigation situated in a document about modern astronomical observatory planning.

The focus on making connections between early Native Hawaiians and modern astronomy is explicitly stated in the pamphlet's Introduction, which identifies the "related

⁹¹ Frederic Chaffee, quoted in *Voices and Visions of Mauna Kea*.

⁹² Jim Kennedy, Operations Manager, Gemini Observatory Northern Operations Center, quoted in *Ibid*, p. 5.

⁹³ Herring Kalua, quoted in *Ibid*, p. 2.

themes of exploring the origins of the universe and origins of Native Hawaiian culture,” and the graphics accompanying this message are also emblematic of this narrative shift (see Figure 4).⁹⁴

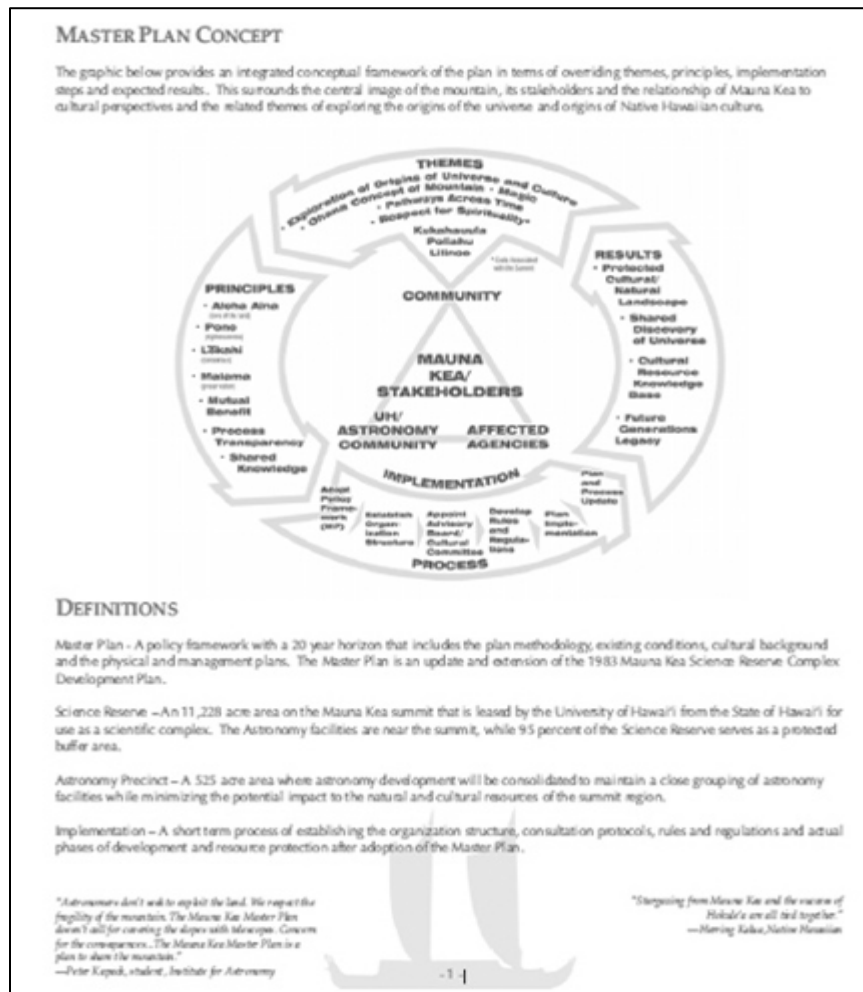


Figure 4. Voices and Visions of Mauna Kea: Mauna Kea Science Reserve Master Plan and Implementation Process Summary, p. 1. In this graphic of the Master Plan process, Mauna Kea stakeholders (identified as “UH/Astronomy Community,” “Affected Agencies,” and “Community”) surround a central triangular image of the mountain, and exploring the origins of the universe is represented alongside exploring the origins of Native Hawaiian culture as related “Themes” to be addressed in the planning process. The Polynesian canoe logo can be seen at the bottom center of the page.

⁹⁴ *Voices and Visions of Mauna Kea*, p. 1

Astronomers also made another key claim that overlapped with Native Hawaiian narratives. Borrowing from cultural discourse related to Native Hawaiian spiritual constructions of the mountain, astronomers began to argue that astronomy constituted an equally valid cultural practice. Some astronomers even defended their science as another form of religion that depended on access to the mountain's summit. As the Keck Outrigger contested case hearings were held during the second week of February 2003, UH Associate Professor of Astronomy Michael West's article "There's room for everybody on Mauna Kea" appeared in the *Honolulu Advertiser*.⁹⁵

In his article, West recounted his recent experience on a traditional Hawaiian voyaging canoe and speculated that "if Queen Lili'uokalani had lived today, she might have been an astronomer."⁹⁶ After West acknowledged that the astronomy community had been, "through ignorance or arrogance, insensitive to the sanctity of Mauna Kea to some Hawaiians" for many years, he argued

sensitivity to other cultures is a two-way street. Science, too, is a culture, an ancient one whose roots go back to the dawn of human civilization. Today the science of astronomy transcends race, religion and language. Calls from some Native Hawaiian and environmental groups for the dismantling of telescopes on Mauna Kea or banning future development there are also culturally insensitive because they ignore the kinship astronomers feel with the mountain as they explore the cosmos in what is ultimately a spiritual quest for them, too.⁹⁷

West's emphasis on the shared spiritual appreciation of Mauna Kea by astronomers and Native Hawaiians belies the markedly different political and cultural contexts of their respective

⁹⁵ Michael West, "There's room for everybody on Mauna Kea," *The Honolulu Advertiser*. 17 February 2003.

⁹⁶ Ibid.

⁹⁷ Ibid.

cultural constructions of the mountain. Mauna Kea has spiritual meaning for astronomers because the mountain offers an ideal platform for instruments that aid astronomers in decoding the great mysteries of the universe. The mountain is unquestionably part of the cultural practice of astronomy, but when astronomers look at Mauna Kea, most see a physical site that serves their scientific agenda. Though astronomers may regard the mountain landscape with a certain reverence as a uniquely beautiful and useful starting place for a spiritual journey of scientific discovery, they do not believe the mountain is a living being populated by gods and spirits that marks the center of creation. By contrast, Native Hawaiians who worship Mauna Kea do not believe the mountain serves them, but rather, that they must be of service to the mountain by leaving offerings for the deities who reside there. While federal funding has given astronomers great freedom to pursue their cultural practice on the mountain, Native Hawaiians have only recently been politically endowed with the rights to reclaim their cultural practices on the mountain, often with significant bureaucratic restrictions. The 1998 State Audit pointed out that practicing native religion on Mauna Kea involved seeking permission to access the land from the IfA, then obtaining a Conservation District Use Application from the DLNR, a process that was deemed “excessive and onerous.”⁹⁸

By framing the mountain as sacred to astronomers and describing astronomers as victims of cultural insensitivity, West effectively inverted the dynamics of power imbedded in narratives about the mountain’s stakeholders. At the same time, West introduced the notion of science as a distinct culture, a view that was not necessarily in wide circulation beyond scholarly discourse. In her study of high-energy particle physicists working at the Stanford Linear Accelerator Center in the 1980s, anthropologist Sharon Traweek found that physicists

⁹⁸*Audit of the Management of Mauna Kea and the Mauna Kea Science Reserve. A Report to the Governor and the Legislature of the State of Hawaii.* Report No. 98-6 February 1998, p. 23.

constructed “an extreme culture of objectivity” by building up images of their professional identity as essentially divorced from culture.⁹⁹ Yet other ethnographies of scientists have found that it is not uncommon for scientists to deploy the rhetoric of “culture,” a concept often drawn from exposure to anthropology coursework in college.¹⁰⁰ For the Mauna Kea astronomy community, it seemed that “abiding in ‘culture’” served an important purpose.¹⁰¹ If science was a vulnerable cultural practice warranting protection, and astronomical and Native Hawaiian cultures were bound up in the same voyage of exploration and discovery, it should be possible to work together in recognition of these common ties.

Paul Coleman, a Native Hawaiian astrophysicist, agrees with some of West’s assessment. Coleman describes himself as living “in both worlds” as the only Native Hawaiian to study astronomy professionally, and he argues that Hawaiian identity is fundamentally not about language, *‘ohana* (family), or a connection to the land. To be Hawaiian means that “some ancestor of yours came here in a canoe” because “they were led here by an astronomer. There’s no way to find Hawai’i without a good command of astronomy.”¹⁰² When asked if he believed Hawaiian identity was centered on navigation, anti-telescope activist and Royal Order of Kamehameha I chief Paul Neves responded, “I agree. But we did not desecrate the bones of

⁹⁹ Traweek, *Beamtimes and Lifetimes: The World of High-Energy Physicists* (Cambridge: Harvard University Press, 1988), p. 162.

¹⁰⁰ During fieldwork in the mid-1990s among Artificial Life scientists at the Santa Fe Institute for the Sciences of Complexity in New Mexico, Stefan Helmreich noted the tendency toward “abiding in ‘culture’” among researchers who invoked an understanding of “culture” derived from college anthropology courses as undergraduates. See Stefan Helmreich, “After Culture: Reflections on the Apparition of Anthropology in Artificial Life, a Science of Simulation,” *Cultural Anthropology* 16 (2001): p. 612-127; p. 612. See also Götz Hoeppe, “Astronomers at the Observatory: Place, Visual Practice, Traces.” *Anthropological Quarterly* 85 (2012): p. 1141-1160.

¹⁰¹ See Helmreich, “After Culture,” p. 612.

¹⁰² Interview with Paul Coleman. 13 September 2012.

our people in the process, did we?” Emphasizing the point further, Neves continued, “we studied the stars. We didn’t try to claim ownership of the place where we viewed them.”¹⁰³

Outreach Astronomy and Hawai’i’s *keiki*

The narrative linking modern astronomy to Polynesian navigation was not aimed solely at justifying telescope construction or mitigating the current conflict between astronomers and Native Hawaiians. Some astronomers reasoned that reinforcing the connections between Polynesian voyaging and modern astronomy to the younger generation of Native Hawaiians would prevent *future* objections to astronomical development on the mountain and might even inspire some *keiki* (children) to pursue astronomy professionally. Coleman reasoned, “It’s so much an integral part of our life as Hawaiians—astronomy—that we should be doing the most we can to make sure that we’re still on top of it.”¹⁰⁴ Native Hawaiian Chad Kālepa Baybayan, who has been a leader in the Polynesian voyaging renaissance since the 1970s as a captain of the canoes *Hökūle’a*, *Hawai’iloa*, and *Hökūalaka’i*, agrees that modern astronomy provides an essential link between the cultural past and future of Native Hawaiians. In 2011, Baybayan asserted, “As a Hawaiian, I recognize that I am a descendant of some of the best naked-eye astronomers the world has known and it is culturally consistent to advocate for Hawaiian participation in a field of science that continues to enable that tradition and a field in which they ought to lead. I firmly believe that the highest level of desecration rests in actions that remove the opportunity and choices from the kind of future our youth can own.”¹⁰⁵

¹⁰³ Interview with Paul K. Neves. 17 September 2012.

¹⁰⁴ Interview with Paul Coleman. 13 September 2012.

¹⁰⁵ Chad Kālepa Baybayan, Captain and Navigator *Hökūle’a*, *Hawai’iloa*, *Hökūalaka’i*. Testimony. 24 May 2011. Courtesy of Kālepa Baybayan.

This rationale was tested in 2002, when UHH Astronomy Professor Richard Crowe partnered with Native Hawaiian UHH Professor of Education Alice Kawakami to launch the NASA-funded New Opportunities through Minority Initiatives in Space Sciences (NOMISS) program.¹⁰⁶ The purpose of the program was to “bring together the concepts of modern space science, the history of Hawaiian celestial navigation and traditions of the land.”¹⁰⁷ As a means of addressing the tensions between Native Hawaiians and the observatories on Mauna Kea, NOMISS sought to recruit and engage minority K-12 and university students, particularly Native Hawaiians, in educational opportunities that would reinforce “the Hawaiian cultural context and its application and relevance to the study of space science.”¹⁰⁸ NOMISS educational outreach activities ranged from “AstroVaganza” teaching retreats for astronomy educators that blended Polynesian navigation and astronomy curricula to summer astrophysics courses on Mauna Kea aimed at Native Hawaiian undergraduate students.¹⁰⁹ These activities were carried out with support from the Mauna Kea observatories, the Polynesian voyaging community on the Big

¹⁰⁶ National Aeronautics and Space Administration Office of Space Science Education and Public Outreach. Annual Report FY 2001, p. 21. Available at www.science.nasa.gov. Accessed 05 December 2012. The NOMISS program fell under the umbrella of the NASA Minority University Education and Research Partnership in Space Science division. As I discuss in more depth in the Forward of this dissertation, I was a participant in the NOMISS Summer Observational Astrophysics program in 2002-2003. Through the NOMISS grant, the UHH Department of Physics and Astronomy offered a course in modern observational astrophysics in the summers of 2001-2003 that permitted participants to gain observing experience with CCD photometry and spectroscopy using research-grade telescopes on Mauna Kea. For a description of the inaugural year of the course, see Susan Collins, “UH Hilo students conduct research atop Mauna Kea,” *Hawai'i Tribune-Herald*. 09 August 2001, p. 18. Available at hubble.uhh.hawaii.edu/images/index.html. Accessed 03 December 2012.

¹⁰⁷ New Opportunities through Minority Initiatives in Space Science (NOMISS). *NASA Office of Space Science Education and Public Outreach Conference. ASP Conference Series 319* (2004): p. 102-106; p. 102.

¹⁰⁸ New Opportunities through Minority Initiatives in Space Science (NOMISS). *NASA Office of Space Science Education and Public Outreach Conference*, p. 102.

¹⁰⁹ For a full description of NOMISS outreach activities held during 2001, see Richard Crowe and Alice J. Kawakami, “NOMISS: Integrating Space Science and Culture Through Summer Programs and Professional Development Experiences,” *NASA Office of Space Science Education and Public Outreach Conference ASP Conference Series* (2004): p. 267-269.

Island, and many local businesses.¹¹⁰ At the K-12 as well as the university level, the NOMISS project encouraged Native Hawaiian youth to appreciate the observatories as part of their cultural heritage by focusing on the related themes of “exploration” and “discovery.” In Crowe’s and Kawakami’s estimation, “the impact of these experiences for teachers and students, professors and astronomers has been nothing short of life-changing.”¹¹¹

“Where astronomy meets Hawaiian culture”¹¹²

The rhetorical use of “exploration,” “discovery,” and “origins” as common themes uniting astronomers and Native Hawaiians became a brick-and-mortar reality with the founding of a \$28 million astronomy education center called ‘Imiloa in 2006.¹¹³ Much like the KPNO Visitor Center examined in chapter two, ‘Imiloa can be interpreted as a ‘trading zone.’ Within trading zones, distinct communities possessing seemingly incommensurable belief systems develop ‘contact languages,’ or regions of local coordination, that permit communication.¹¹⁴ Every aspect of ‘Imiloa was painstakingly designed to mediate tensions between scientific and

¹¹⁰ New Opportunities through Minority Initiatives in Space Science (NOMISS). *NASA Office of Space Science Education and Public Outreach Conference*, p. 104.

¹¹¹ Richard Crowe and Alice J. Kawakami, “NOMISS: Integrating Space Science and Culture Through Summer Programs and Professional Development Experiences,” p. 104.

¹¹² This is the slogan for the ‘Imiloa Astronomy Center of Hawai‘i. See www.imiloahawaii.org. Accessed 02 December 2012.

¹¹³ Ciotti, p. 104. Much of ‘Imiloa’s original funding came from NASA and the center has relied largely on earmarked federal funds to support its annual \$3 million budget since then, with supplemental funding from private donations. See John Burnett, “Earmarks keep Imiloa afloat,” *West Hawaii Today*. 07 January 2013.

¹¹⁴ As detailed in chapter one, the concept of a trading zone proposed by Peter Galison is a “social, material, and intellectual mortar” that unites disparate cultures with different forms of argumentation derived from different theoretical backgrounds. Drawing from anthropological studies of how different cultures overcome barriers to trade through the development of specialized contact languages, Galison argues that local coordination can exist between two distinct groups even when the two parties disagree about broader meanings. See Galison, *Image and Logic: A Material Culture of Microphysics* (Chicago: University of Chicago Press, 1997), p. 783-784; 802.

nonscientific cultures while creating a dynamic forum for exchange, resulting in a ‘pidgin’ language that allowed for effective collaboration.¹¹⁵ However, integrating the disparate cultural domains of astronomers and Native Hawaiians was no easy feat, nor was it even a desirable objective for all participants in the conflict over the observatories on Mauna Kea.

‘Imiloa was the brainchild of Marlene Hapai, a UHH Professor of Biology who witnessed the heightened tensions between the Mauna Kea astronomy community and Native Hawaiians during the 100th anniversary of the overthrow of the Hawaiian monarchy.¹¹⁶ Hapai recognized that a science education center and planetarium might offer a much-needed ‘neutral’ physical and social space to generate a productive dialogue on the scientific and cultural uses of Mauna Kea. Certain elements of this idea to merge physical and social spheres of astronomers and Native Hawaiians had already been put into practice on a much smaller scale directly at the site of the controversy. To situate the unique position ‘Imiloa would eventually come to occupy in the Mauna Kea conflict, I will first briefly examine two existing sites on the mountain that failed to develop into meaningful trading zones.

The Visitor Information Station, known informally as the “VIS,” was established on Mauna Kea in 1983 just below the 9,200-foot mid-level base camp for astronomers called *Hale Pōhaku* (house of stone).¹¹⁷ With a design similar to the KPNO Visitor Center, the VIS is a 950-square foot facility that houses a modest display space featuring exhibits on astronomy and

¹¹⁵ Here I am employing the term ‘pidgin’ as used by Peter Galison in his description of the contact languages developed by disparate cultures who form trading zones, not to be confused with Hawaiian Pidgin, the creole language that developed on Hawaiian sugar plantations in the mid-nineteenth century.

¹¹⁶ Ciotti, p. 159.

¹¹⁷ See “Education and Research,” p. VI-4 in *Mauna Kea Science Reserve Master Plan*. The VIS is part of the Onizuka Center for International Astronomy, named after Ellison Shoji Onizuka, an astronaut born in Hawai’i who died on the Space Shuttle Challenger in 1986. For photos of the VIS, see <http://www.ifa.hawaii.edu/info/vis/>. Accessed 02 December 2012.)

Hawaiian culture and a gift shop selling observatory-themed merchandise. Geared primarily toward tourists of the observatories, the VIS hosts nightly public stargazing events led by volunteers. Since January 2003 (one month before the Keck Outrigger contested case hearings), the stargazing outreach nights have been preceded by a monthly presentation called *Malalo o ka Po Lani* (“Under the Night Sky”). These special presentations on Mauna Kea’s significance to Native Hawaiians are led by cultural practitioners, and over the years, the topics have featured Native Hawaiian chants, stories, music, and indigenous knowledge about the mountain.¹¹⁸

Though the simple coexistence of astronomy and Native Hawaiian culture represented at the VIS is meant for tourist consumption, the meeting rooms, dining areas, and recreational spaces of Hale Pōhaku are off-limits to casual visitors. Here, VIS staff—many of whom are Native Hawaiians—socialize with astronomers, technicians, cafeteria workers, and other employees of the observatories on a regular basis. Whether acclimating to the high elevation before ascending to the summit or waiting out observing conditions, there is ample time to engage in conversation, and some astronomers and Native Hawaiians have forged friendships within the social environment of Hale Pōhaku even when disagreeing about the construction of telescopes on the mountain.¹¹⁹ Native Hawaiian cultural practitioner and Mauna Kea ranger James Kealii Pihana explained, “I’ve enjoyed working with many astronomers who are generally

¹¹⁸ For a complete list of *Malalo o ka Po Lani* speakers, see www.ifa.hawaii.edu/info/vis/. Accessed 02 December 2012.

¹¹⁹ This description of the social atmosphere at Hale Pōhaku is drawn largely from my personal observations during the summers of 2002 and 2003, when I dined and participated in recreational activities with astronomers and staff. On several occasions at Hale Pōhaku, I witnessed Native Hawaiians and astronomers greeting one another with the traditional Hawaiian custom of placing their foreheads together. My involvement at Mauna Kea is further discussed in the Preface to this dissertation. See also the description of the multiple uses of the mid-level facilities in “Education and Research,” p. VI-7 in *Mauna Kea Science Reserve Master Plan*. Japan’s Subaru Telescope has a virtual tour that provides pictures and short descriptions of the Hale Pōhaku experience, including the social spaces for astronomers and staff. See <http://www.naoj.org/NAOJ/SVTour/07.html>. Accessed 03 December 2012.

people of goodwill and from whom I have learned much about the stars. But despite all of their scientific accomplishments, I do feel that much more needs to be done to bring awareness of and respect for Hawaiian culture on the mountain.”¹²⁰

As sites of exchange between astronomers and Native Hawaiians with the potential to reconcile the longstanding tensions between these groups, both the VIS and Hale Pōhaku clearly left much to be desired. While the VIS focused on promoting a positive image of the relationship between scientific and cultural interests, the informational displays and cultural nights were intended for outsiders to the controversy over the mountain. Hale Pōhaku, by contrast, offered a physical and social space for more sustained interactions between astronomers and Native Hawaiians. But Native Hawaiians who worked on the mountain represented only a small subgroup of the total Native Hawaiian population. Friendships between astronomers and their Native Hawaiian colleagues were not likely to be the vehicle for lasting change, particularly after Pisciotta’s story of her family shrine’s desecration was publicized. Further, with the advent of remote control rooms located off the mountain, astronomers were increasingly able to collect data in more comfortable locations.¹²¹ This technological shift was slowly resulting in less demand for the Hale Pōhaku facilities, so its future as a meeting place between scientists and nonscientists on Mauna Kea was uncertain.¹²²

The Big Island lacked a true gathering place for astronomers, Native Hawaiians, and the rest of the Big Island community to communicate with one another outside of the courts or

¹²⁰James Kealii Pihana, quoted in Leslie Lang and David A. Byrne, *Mauna Kea: A Guide to Hawai‘i’s Sacred Mountain* (Honolulu: Watermark Publishing, 2005).

¹²¹ For a discussion of remote observing stations available to Mauna Kea astronomers in 2000, see “Education and Research,” p. VI-7 in *Mauna Kea Science Reserve Master Plan*.

¹²² Ibid.

confrontational public hearings. When Hapai suggested that establishing such a venue would facilitate a resolution of tensions over the development of Mauna Kea, the University of Hawai'i immediately embraced the idea. Incorporated into the 2000 Master Plan as the "Mauna Kea Astronomy Education Center," the facility later named 'Imiloa demanded extensive collaboration between astronomers and Native Hawaiians.¹²³

Construction for 'Imiloa began on the UHH Science and Technology Park on campus in 2002, with \$28 million in NASA funds and other federal grants to support the project. A far cry from the 950-square foot VIS, 'Imiloa encompassed a sprawling 40,000 square feet, with 12,000 square feet devoted to exhibit space. The rest of the facility was comprised of a 16-meter planetarium dome seating 120, a restaurant, a 2,500 square-foot event hall, a museum store, and a classroom.¹²⁴ In 2006, 'Imiloa opened its doors to the public, commencing a bold new experiment in merging the physical and cultural spaces of astronomers and Native Hawaiians.¹²⁵ At the dedication ceremony, Master Polynesian Navigator Nainoa Thompson described the center as a special place of integrated values "where the cornerstone of those values is the importance of exploration."¹²⁶

¹²³ See *Mauna Kea Science Reserve Master Plan*, p. VI-11. Astronomers played an active role in many aspects of 'Imiloa's development. For example, Gemini Observatory loaned a console for use in a Gemini-themed Virtual Observatory exhibit and the observatory worked directly with 'Imiloa planners as scientific content advisors. See "'Imiloa Astronomy Center of Hawai'i Opens in Hilo." February 2006. www.gemini.edu/node/176. Accessed 30 December 2012.

¹²⁴ "'Imiloa Fact Sheet." Available at <http://www.imiloahawaii.org/assets/FactSheet2012.pdf>. Accessed 03 December 2012.

¹²⁵ Leslie Lang and David A. Byrne, *Mauna Kea: A Guide to Hawai'i's Sacred Mountain*, p. 122.

¹²⁶ Nainoa Thompson, quoted in "'Imiloa Astronomy Center of Hawai'i Opens in Hilo." Gemini Observatory. www.gemini.edu/node/176. Accessed 30 December 2012.

Connecting earth and sky

The exterior of the facility is a stunning complex of three commanding titanium peaks symbolizing the Big Island's most prominent mountains: Mauna Kea, Mauna Loa, and Hualalai. Bordering the main buildings, a Native Hawaiian botanical garden features plants brought to the islands on canoes by Polynesian navigators. The cultivation and display of native plants imparts the message that Hawai'i's native ecosystem is a valuable natural and cultural resource, an important acknowledgement of the UH's efforts to preserve Mauna Kea's native flora and fauna in the wake of environmentalist critiques. Inside 'Imiloa, visitors are welcomed by large graphic panels with captioning in Hawaiian and English.¹²⁷

Strikingly, the themes of 'origins' and 'exploration' that have become central to astronomers' narratives are highlighted throughout 'Imiloa's exhibition spaces. The Hawaiian *Kumulipo* ("Beginning-in-deep-darkness") is a traditional chant of more than 2,000 lines that accounts for the origin of life in the universe through a genealogical story.¹²⁸ Displays of this Hawaiian creation story are complemented by a short film explaining the Big Bang theory of the origin of the universe.¹²⁹ Throughout the Keck Outrigger controversy, Native Hawaiians reacted strongly against the justification for the Outriggers as part of NASA's "Origins" program, declaring the neglect of native knowledge about Mauna Kea's role in the origins of the universe

¹²⁷ For the team of administrators, scientists, and community members who participated in planning 'Imiloa, bilingual captioning for all exhibits and signs in 'Imiloa was an important requirement. On this point, see Ciotti, p. 159.

¹²⁸ The full text of the *Kumulipo* in Hawaiian and a translated version with commentary is available online at the Internet Sacred Text Archive. In this origin story, Wakea, the Sky Father, joins with Papa, the Earth Mother, who gives birth to the Hawaiian Islands. The Island of Hawai'i is the eldest child of Papa and Wakea, and Mauna Kea is the child's *piko*, or navel. See <http://www.sacred-texts.com/pac/ku/index.htm>. Accessed 03 December 2012.

¹²⁹ My first visit to 'Imiloa was in August 2007 as a tourist and I returned as a researcher in September 2012.

a condescending oversight. At 'Imiloa, the indigenous account is no longer ignored, and the organization of the exhibits imparts the strong message that astronomical and Native Hawaiian perspectives on origins can be understood as analogous explanations.

'Imiloa means "to explore" in Hawaiian, and the theme of 'exploration' dominates other areas of the display space.¹³⁰ Echoing astronomers' narratives found in the 2000 Master Plan informational pamphlet, this important theme is communicated in 'Imiloa exhibits by drawing parallels between Polynesian celestial navigation and modern astronomical inquiry. Astronomical observatories are presented alongside traditional Hawaiian canoes to underscore that both can be viewed as instruments of exploration.

Both themes of 'origins' and 'exploration' are seamlessly integrated in 'Imiloa's main attraction, a captivating planetarium show called *Maunakea: Between Earth and Sky*.¹³¹ In the beginning of the show, Mauna Kea's origin and significance are introduced as part of the Hawaiian creation story:

And where once *Papa*, the earth mother, and *Wakea*, the sky father were one, in time, they became separate. Between stood a mountain tall and strong, a sacred piko, a sacred bond to connect earth and sky. A sacred connection to the cosmos. Behold Mauna a Wakea, mountain of Wakea, the sky father!¹³²

The narration explains that the islands were the realm of "the gods alone" until humans looked to the stars and used them to make their way to the islands. The Polynesians who settled the Hawaiian Islands are described as "sophisticated engineers, explorers, navigators,

¹³⁰ See www.imiloahawaii.org. Accessed 03 December 2012.

¹³¹ *Maunakea: Between Earth and Sky*. Digital Planetarium Show produced by Evans and Sutherland (Hilo, Hawai'i: 'Imiloa Astronomy Center, 2006).

¹³² *Ibid.*

and astronomers who could read the secrets of the stars, the winds, the clouds, and the birds to fathom position and course, to explore the vast Pacific, to discover this Hawai'i."¹³³ Just ten minutes into the show, then, 'origins' and 'exploration' emerge as two key themes closely associated with Mauna Kea and astronomy that are also rooted in Hawaiian history. These themes are then linked to modern astronomy on the mountain as the show continues. First, the period of colonization is euphemistically referred to as "the next wave of discovery" by others who shared "a common passion for exploration."¹³⁴ The narration then deftly combines the Hawaiian origin story, Mauna Kea, and astronomy by declaring, "Today, the age-old connection that Mauna Kea forms between earth and sky has seen yet another rebirth, a new connection. For today, Mauna Kea has also become the site of the largest collection of astronomical observatories in the world."¹³⁵ After establishing the observatories on Mauna Kea as the mountain's most recent instance of "rebirth" in this way, the narration briefly evaluates the controversy over the mountain, again drawing from the theme of 'exploration':

The observatories are not without controversy because they occupy the loftiest summit, with its proud and sacred history, but through their essence, as quiet vehicles of exploration, many seek a balance that allows the spiritual, cultural, and scientific to coexist in harmony. The observatories, like the mountain on which they stand, form a connection between earth and sky, between Papa and Wakea.¹³⁶

The show concludes with a discussion of the scientific capabilities of the major telescopes at Mauna Kea and a flight through the Gemini Observatory.

¹³³ *Maunakea: Between Earth and Sky*.

¹³⁴ *Ibid.*

¹³⁵ *Ibid.*

¹³⁶ *Ibid.*

The interweaving of Native Hawaiian and astronomical beliefs and practices in the planetarium show immerses visitors in the narrative that has been widely adopted at 'Imiloa and within the Mauna Kea astronomy community: both cultures share the common spirit of exploration and possess knowledge systems that come to bear on the origins of life in the universe. But the show is more than an entertaining visualization of this narrative; it is also representative of the kind of collaboration between the astronomy and Native Hawaiian communities that rationalized 'Imiloa's construction in the first place. Funded by grants from NASA and the major observatories at Mauna Kea and produced with Native Hawaiian cultural consultation, the planetarium show necessitated and contributed to a material and social trading zone in order to come to fruition.¹³⁷ Its very existence marks a concrete achievement of 'Imiloa's approach to reconciling the tensions between these communities in conflict.¹³⁸

As "a gathering place that advances the integration of science and indigenous culture," 'Imiloa has certainly provided a unique physical and social forum for cross-cultural communication.¹³⁹ However, I argue that key epistemological distinctions are obscured by the facade of conceptual convergence presented for public consumption at 'Imiloa. When astronomers and Native Hawaiians agreed to parse their radically divergent cosmologies through a shared discourse of 'origins' and 'exploration,' the social and material trading zones of 'Imiloa were rendered apolitical and ahistorical.

¹³⁷*Maunakea: Between Earth and Sky* (end credits).

¹³⁸Because 'Imiloa is a branch of the UHH dedicated to outreach activities, part of its mission statement is to augment educational curriculum in Big Island primary and secondary schools. This means the show is commonly viewed by students in K-12 school field trips and undergraduate astronomy courses, so the show's content will play an ongoing role in generating new conversations among Native Hawaiian youth about astronomy in Hawai'i's past and present. For more on 'Imiloa's formal partnerships with local schools, see www.imiloahawaii.org. Accessed 03 December 2012.

¹³⁹This description is found at www.imiloahawaii.org. Accessed 03 December 2012.

‘Imiloa’s exhibits and planetarium show draw a clear correlation between Native Hawaiian and astronomical understandings of origins, yet as the Keck Outrigger controversy revealed, these concepts have frequently stood in tension. In the early 2000s, astronomers saw Mauna Kea as an ideal site for a telescope array that would aid in the search for the origins of life in the universe, while Native Hawaiians saw Mauna Kea itself as the place where all life originated. Consequently, some Native Hawaiian groups found the idea of searching for the origins of life *at the very locus of the origins of life* both paradoxical and insulting. Whether accounting for the genesis of the universe or life within it, Native Hawaiians already possess an unproblematic origin story; astronomers continue to view origins as a riddle with a scientific solution. At ‘Imiloa, these incongruencies between the scientific and indigenous conceptions of origins are glossed over to stress a common understanding of the importance of origins to both groups. Presenting astronomical and Native Hawaiian views of origins as wholly analogous may facilitate communication, but it can also be viewed as a profound misrepresentation of identity. Comprehending origins is perhaps equally fundamental to the identity of Native Hawaiians—traced genealogically to Mauna Kea—and astronomers, who rely on knowledge of the Big Bang theory to guide their work. Reducing the concept of origins to a pidgin language permits a cross-cultural dialogue that might otherwise be unattainable, but it also alters the cultural meaning of the concept for both groups, thereby distorting indigenous and scientific identities.

The theme of exploration, too, is particularly laden with potent political and cultural meanings for Native Hawaiians. The iconography of *Hökūle‘a* that stood in as shorthand for both indigenous and scientific exploration in the 2000 Master Plan literature is currently featured throughout ‘Imiloa’s display spaces. Yet Polynesian navigation, which has been integrated into astronomers’ narratives and now figures so prominently in ‘Imiloa’s exhibits and activities, was only recently liberated as a cultural practice by the Hawaiian Renaissance of the

1970s. Native Hawaiians are thus just a few decades removed from the cultural renaissance that enabled them to embrace the artisanal and methodological trappings of traditional exploration by canoe. By contrast, exploration through telescopes has always been an integral part of astronomical practice, limited only by the constraints of patronage, technological limitations, and access to instruments. By appropriating and manipulating such a well-known symbol of Hawaiian exploration, 'Imiloa's scientific and native consultants transformed the Polynesian canoe from an emblem of a pivotal rebirth in Native Hawaiian culture into a statement about the equivalence of indigenous and scientific practices.

'Imiloa is indeed a functioning trading zone, but one that functions only by submerging distinct scientific and Native Hawaiian epistemologies in a mutually agreed-upon conceptual language. The political and cultural-imbeddedness of concepts connected to identity and political power seem to have been lost in the cross-cultural dialogue at 'Imiloa, but what has been gained by forming this kind of trading zone? It is too early to evaluate the long-term success of 'Imiloa's agenda, but Native Hawaiians who work at 'Imiloa have personally observed positive changes in community relations since the center has been in operation.

'Imiloa's Navigator-in-Residence, Native Hawaiian Chad Kālepa Baybayan, directs youth outreach activities that promote the understanding of navigational methods as an indigenous form of science and engineering.¹⁴⁰ In 2012, Baybayan pointed out that 'Imiloa's promotion of

¹⁴⁰ Baybayan holds the elite title of Pwo Master Navigator and was one of the original leaders of the traditional voyaging expeditions that began during the Hawaiian Renaissance in the 1970s. Baybayan was made the Associate Director of 'Imiloa in 2011.

the related values of science and Native Hawaiian cultural practices inscribed in its navigation programs have become enormously popular with Big Island locals.¹⁴¹

‘Imiloa’s Executive Director, Ka’iu Kimura, noted that before ‘Imiloa, confrontational public meetings were the main venue for Native Hawaiians and astronomers to engage with one another. Through the Astronomer-in-Residence position at ‘Imiloa and a regular schedule of guest lectures by other astronomers, Kimura believed ‘Imiloa had become a non-threatening place for the Mauna Kea astronomy community to interact with the Native Hawaiian community, as well as other Big Island residents and tourists.¹⁴² By establishing a pidgin language centered on themes of ‘exploration’, ‘origins’, and ‘discovery’, Native Hawaiians and astronomers could collaborate while still fundamentally disagreeing about broader concepts. In this way, the long-embattled cultures of astronomers and Native Hawaiians had entered into a productive new dialogue, but these newly-forged connections were tested by the proposal of another major telescope on Mauna Kea.

Too Big to Fail? The Thirty Meter Telescope Proposal

In 2006, just as ‘Imiloa was welcoming its first visitors, the IfA and BLNR were evaluating a new proposal for the largest and most powerful optical telescope in the world. In a decadal survey of ground- and space-based astronomy conducted by the Astronomy and Astrophysics

¹⁴¹ Interview with Chad Kālepa Baybayan. 18 September 2012. Admissions to ‘Imiloa were reported in a 2012 newspaper article on the center’s budgetary history and goals. The figures show that admissions from locals, recorded separately as discounted *kama’aina* (Hawaii residents) tickets, were more than double the admissions of out-of-state visitors. In 2008, ‘Imiloa received 9,458 out-of-state visitors and 25,952 *kama’aina* visitors. In 2011, ‘Imiloa received 8,771 out-of-state visitors and 18,825 *kama’aina* visitors. See John Burnett, “Earmarks keep Imiloa afloat,” *West Hawaii Today*. 07 January 2013. In 2011-2012, the *kama’aina*, educational program, and member tickets constituted 27,131 of the 45,719 visits to ‘Imiloa, indicating that nearly 60% of visitors were locals. Correspondence with Jeff Harman. 25 September 2012.

¹⁴² Ciotti, p. 162.

Survey Committee of the National Academy of Sciences published in 2001, the top ground-based recommendation was for a 30-meter class telescope.¹⁴³ At a projected cost of \$1.2 billion, the proposed Thirty Meter Telescope (TMT) was Big Science at its biggest, funded by the California Institute of Technology, the University of California, and an international consortium of partners, including Canada, India, China, and Japan.¹⁴⁴ If the telescope was constructed, it would occupy a 5-acre site on Mauna Kea's northern plateau within a 180-foot dome.¹⁴⁵

This colossal telescope would clearly dominate views of Mauna Kea's summit, and many Big Island residents worried that it was simply too big. Particularly among some in the Native Hawaiian community, the TMT became a polarizing topic, sparking new debates about sovereignty claims and the role of astronomy in Hawai'i. The TMT proposal effectively weakened the already fragile relationship between astronomers and some members of the Native Hawaiian community, and many of the same litigants from the Keck Outrigger contested case entered into a new contested case to block the TMT's land use permit.¹⁴⁶

However, for the first time, Native Hawaiian support for astronomy was also highly visible through public rallies and sign-waving campaigns in Hilo.¹⁴⁷ An exploration of the first

¹⁴³ At that time, the 30-meter telescope was called the Giant Segmented Mirror Telescope. See *Astronomy and Astrophysics in the New Millennium*. Astronomy and Astrophysics Survey Committee, Commission on Physical Sciences, Mathematics, and Applications, National Research Council (2001), p. 11. Available at www.nap.edu. Accessed 30 November 2012.

¹⁴⁴ The full list of partners is available at www.tmt.org. Accessed 05 December 2012.

¹⁴⁵ *Final Environmental Impact Statement. Thirty Meter Telescope Project. Island of Hawai'i*. 08 May 2010, p. S-1.

¹⁴⁶ OHA, the ROOK I, and the Sierra Club did not participate in the TMT contested case. Although members of the ROOK I and the Sierra Club who had been involved in the Keck contested case also participated in the TMT contested case, they filed as individual petitioners.

¹⁴⁷ "Media release: Community Sign Waving Event in Support of Thirty Meter Telescope," 11 June 2009. <http://www.hawaii247.com/2009/06/11/rally-for-supporters-of-thirty-meter-telescope-on-friday/>. Accessed 04 December 2012. See also Joseph Castro, "Bridging science and culture with the Thirty Meter

few years of the TMT controversy reveals a Native Hawaiian community divided and an astronomy community attempting to learn from the mistakes of the tumultuous past.

Keeping it local

When Sandra Dawson was brought into the TMT project as its Manager of Hawaii Community Affairs in 2008, she took the lessons of the Outrigger telescopes to heart. The EIS process had to be managed locally, and every decision had to be made thoughtfully.¹⁴⁸ This attitude is reflected in the earliest public communication for the TMT. When the notice of the EIS was released in 2008 to announce the beginning of the scoping process, the first section of the report was on the “Significance of Mauna Kea,” which began with the Hawaiian saying “*O Mauna Kea ko kākou kuahiwi la’ā*” (Mauna Kea our sacred mountain).¹⁴⁹ A description of Mauna Kea’s cultural and spiritual value was privileged before a scientific explanation of the purpose of and need for the TMT, imparting the clear message that astronomers had taken notice of the mountain’s significance to Native Hawaiians.¹⁵⁰

To further reinforce the message that the astronomy community was ready to let Native Hawaiian voices be heard, TMT elected to hold seven scoping meetings instead of the typical three. With the addition of seven DEIS meetings, there were a total of fourteen public meetings to solicit community input, and Dawson, heeding the advice of community leaders, brought in a

Telescope: how taking the right steps helped mitigate a 40-year dispute in Hawai’i,” *Scienceline*. 18 January 2011. Available at www.scienceline.org. Accessed 05 December 2012.

¹⁴⁸ Interview with Sandra Dawson. 19 September 2012.

¹⁴⁹ *Environmental Impact Statement Preparation Notice/Environmental Assessment. Thirty Meter Telescope Project. Mauna Kea Northern Plateau and Hale Pohaku, Island of Hawai’i*. 23 September 2008, p. 1.

¹⁵⁰ *Environmental Impact Statement Preparation Notice/Environmental Assessment. Thirty Meter Telescope Project*, p. 1.

local elder to open up each meeting with a traditional greeting.¹⁵¹ In the FEIS for the TMT produced with input from these meetings, there is ample evidence that the astronomers and observatory planners sought to integrate diverse perspectives on the mountain. The FEIS opens with a lengthy account of traditional knowledge about Mauna Kea, referred to for the first time as *Maunakea* to honor the traditional Hawaiian spelling.¹⁵² The FEIS took another unprecedented step by acknowledging that “traditional and customary cultural practices are performed in the summit region,” followed by a list of known Native Hawaiian rituals and practices on the mountain.¹⁵³ The FEIS validated in no uncertain terms that the mountain is ‘still sacred’ to Native Hawaiians. At least on paper, the astronomers’ narratives about the cultural significance of the mountain matched Native Hawaiians’ cultural construction of the mountain. But did this signify a sea change in relations between members of these two estranged communities?

In addition to numerous visits to Hawai’i Island and meetings with local groups by TMT Advisory Board members, Dawson personally conducted over 300 “talk story” sessions with interested members of the community over the course of four years, and in her assessment, the EIS process was a resounding success.¹⁵⁴ Attendees at the public meetings were asked to fill out a comment form that permitted them to indicate whether they were for or against the TMT. Dawson found that when the forms were tallied, they revealed a 50/50 split in public opinion, belying the idea that there was overwhelming community opposition to the project. As Dawson

¹⁵¹ Interview with Sandra Dawson. 19 September 2012.

¹⁵² *Final Environmental Impact Statement. Thirty Meter Telescope Project. Island of Hawai’i.* 08 May 2010. p. P-1.

¹⁵³ *Ibid*, p. S-4.

¹⁵⁴ Interview with Sandra Dawson. 19 September 2012. “Talk story” is a Hawaiian Pidgin expression that means having a casual conversation.

put it, “the simple narrative for us is Native Hawaiians and environmentalists ‘against’ and business leaders ‘for’. That’s way too simple.”¹⁵⁵

Indeed, such a simple dichotomization masked the heterogeneous nature of the current debate over the observatories on Mauna Kea. The TMT proposal and subsequent public hearings had exposed new fractures in the Native Hawaiian community on the Big Island. In June 2009, Big Island residents gathered at the King Kamehameha statue near the busy Hilo bay front displaying ‘TMT Yes!’ buttons, T-shirts, and signs as cars passed by.¹⁵⁶ Several TMT supporters at the sign-waving rally were Native Hawaiians, including college students from UHH. The following month, “in consideration of various cultural and economic factors,” the OHA Board of Trustees unanimously adopted a motion to support the selection of Mauna Kea as the site for the TMT.¹⁵⁷ Why was Hawai’i’s chief agency for protecting the cultural and environmental assets of Native Hawaiians, which had sued NASA over its failure to do an EIS for the Keck Outrigger project seven years earlier, now endorsing the largest telescope ever proposed on the mountain?

In part, the answer lies in the “economic factors” mentioned by the OHA Board of Trustees in making their decision. As outlined in the FEIS, the TMT Observatory Corporation had agreed to provide an annual \$1 million community benefits package for the life of the project (estimated at 50 years) through The Hawai’i Island New Knowledge (THINK) Fund Board of Advisors. The allocation of funding for astronomy, engineering, math, and science-related educational programs and scholarships for Big Island students and teachers was contingent

¹⁵⁵ Interview with Sandra Dawson. 19 September 2012.

¹⁵⁶ “Media release: Community Sign Waving Event in Support of Thirty Meter Telescope,” 11 June 2009.

¹⁵⁷ S. Haunani Apoliona, Chairperson, Board of Trustees, Office of Hawaiian Affairs to the Honorable Governor Linda Lingle. 02 July 2009. Courtesy of Paul Coleman.

upon the start of construction. The guarantee of THINK funding would instantly be invalidated if the land use permit was revoked or stayed by court order.¹⁵⁸ Native Hawaiian children, and the impoverished Big Island educational system as a whole, stood to benefit dramatically from this economic investment in math and science initiatives as soon as construction began.¹⁵⁹ Supporting the TMT project made practical sense to many Native Hawaiians who were excited by the economic and educational boost it promised to bring to the Big Island.¹⁶⁰

The TMT contested case

But other members of the Native Hawaiian community were not persuaded that the TMT's economic and educational incentives compensated for its accompanying alterations to the physical and spiritual landscape. Describing a recent TMT public hearing, a June 2009 KAHEA blog entry dismissed merits of the THINK Fund incentive package by skeptically reporting that "the TMT guys tried to entice the crowd with turkey rolls, brownie bites and promises of community benefit and higher education packages that sound more beneficial to the community than what they really offer."¹⁶¹ Dissatisfied with the cultural and environmental mitigation measures outlined in the TMT's EIS, KAHEA and several other environmental and cultural groups and individuals who had joined forces in the Outrigger case again teamed up to fight the TMT's land use permit through another contested case petition.

¹⁵⁸ *Final Environmental Impact Statement. Thirty Meter Telescope Project*, p. S-9.

¹⁵⁹ Noralyn Pajimola, "Our Education System Is In Dire Need Of Funding," 17 July 2012. *Big Island Chronicle*. Available at www.bigislandchronicle.com. Accessed 05 December 2012.

¹⁶⁰ In addition, TMT committed to a significant workforce pipeline program aimed at educating and training local students and residents for high-tech jobs at TMT, other observatories, and other high-tech industries. Correspondence with Sandra Dawson. 29 March 2013.

¹⁶¹ "TMT on Mauna Kea Pubic Hearing-- You Can't Sell us TMT with turkey rolls," 26 June 2009. Available at www.kahea.org. Accessed 05 December 2012.

At its open meeting in February 2011, the BLNR simultaneously approved the application for the TMT's Conservation District Use Application permit and granted a contested case on the permit.¹⁶² The case hearings began in August and featured testimony from the petitioners as well as astronomers and TMT project managers. Among the previous arguments concerning the spiritually and environmentally damaging effects of telescope construction on Mauna Kea, the petitioners introduced new accusations specific to the TMT's EIS.

E. Kalani Flores, a Native Hawaiian cultural practitioner and educator, challenged the TMT's definition of "cultural consultation." Flores explained that cultural consultation about the mountain was not simply a matter of meeting with Native Hawaiians; it necessitated consulting with the mountain itself. Flores charged that the consultation process was invalid because "this process of consultation with those recognized as the ancestral *akua* and *kupua* of Mauna a Wakea was not done by the Applicant and was also never done by any previous projects."¹⁶³ Flores also indicted the EIS for its numerous references to Mauna Kea's sacred attributes since "it is quite apparent that the University of Hawai'i and proponents of the TMT have either decisively disregarded its significance or do not understand why Mauna a Wakea is sacred. Otherwise, they would not be proposing to build this project of such an immense scale on an area of the summit, still pristine, pure, and in its natural state."¹⁶⁴ Seeking to achieve a culturally sensitive approach, TMT astronomers and administrators had included prolonged

¹⁶² "Press Release: Thirty Meter Telescope Receives Permit in Hawaii." 28 February 2011. Available at www.tmt.org. Accessed 05 December 2012; "Case Against the TMT Begins: Grassroots groups take on million-dollar lawyers to defend the Mauna Kea conservation district Case Against the TMT Begins." 01 July 2011. Available at www.kahea.org. Accessed 05 December 2012.

¹⁶³ Written Direct Testimony of E. Kalani Flores, G-1. Courtesy of E. Kalani Flores. The *akua* and *kupua* are gods and goddesses of the mountain. Flores requested that a guardian spirit of Mauna Kea called *Mo'oinanea* should be included as a petitioner in the contested case, but the hearing officer denied the request.

¹⁶⁴ Written Direct Testimony of E. Kalani Flores, G-1. Courtesy of E. Kalani Flores.

descriptions of Mauna Kea's sacred status in the EIS after extensive consultation with Native Hawaiian cultural practitioners and other cultural experts. It was this very effort that incited condemnation by the petitioners in the contested case. For Flores and the other petitioners, the discussion of the mountain's sacredness in the EIS betrayed an appalling ignorance of what was at stake for Native Hawaiians if the TMT was built.

The contested case hearings concluded at the end of September.¹⁶⁵ Though a decision from the hearing officer was predicted by early 2012, the parties involved would have to wait nearly the entire year for a decision, leaving the \$1.2 billion project in limbo. The wait was equally difficult for the astronomers, university administrators, and local business leaders who supported the TMT as for the coalition of environmentalists and Native Hawaiian activists who opposed the project. President of the Hawaii Island Chamber of Commerce Vaughan Cook anxiously awaited the decision, explaining, "We believe it's in the interest of the community, the entire community, and we're waiting."¹⁶⁶ Cook remained hopeful that the project would move forward, a vote of confidence shared by the TMT Observatory Corporation, which continued with telescope development plans even as the fate of the project was undetermined.¹⁶⁷ In early November 2012, a local reporter commented on the long thirteen-month delay between the BLNR hearing and the yet-to-be-issued decision by wryly observing, "in astronomical terms, the

¹⁶⁵ "Segment News Items: TMT Permit Challenge Hearings Concluded." 24 February 2012. Available at www.tmt.org. Accessed 05 December 2012.

¹⁶⁶ Vaughan Cook, quoted in Peter Sur, "Decision delays further stall Thirty Meter Telescope," *West Hawaii Today*. 09 November 2012.

¹⁶⁷ "Decision delays further stall Thirty Meter Telescope." See also reports on ongoing planning for the TMT such as graphic renderings of the dome and an international workshop on adaptive optics for the TMT highlighted in the *TMT Segments: Quarterly News of the Thirty Meter Telescope Observatory Corporation*, March 2011; July 2011; February 2012, available at www.tmt.org. Accessed 30 December 2012.

photons that left the sun's surface on the day of the BLNR hearing, Feb. 25, 2011, are 40 percent of the way to the nearest star."¹⁶⁸ Just weeks later, however, the agonizing wait was over.

In a hefty 126-page report released on 30 November 2012, hearing officer Paul Aoki recommended the approval of the TMT to the BLNR.¹⁶⁹ The CDUP was to be granted for the project subject to certain environmental and cultural conditions, such as establishing an invasive species control program and a training program to safeguard cultural and natural resources on the mountain.¹⁷⁰ Significantly, Aoki found that the petitioners had not provided sufficient evidence to support their claims that the TMT would interfere with the cultural practices of the community. Aoki also dismissed the petitioners' claims that TMT construction would adversely impact Mauna Kea's environmental resources.¹⁷¹ Though the petitioners in the contested case could offer their final arguments to the BLNR at a meeting held in the Hawai'i County Council chambers on 30 January 2013, no deadline was imposed for the final decision by the DLNR. Because the petitioners reserved the right to appeal a decision in favor of the University of Hawai'i to the 3rd Circuit Court, construction on the TMT would be delayed indefinitely if the litigants continued to fight the project.

For the astronomers and observatory administrators involved, the hearing officer's decision to recommend the TMT marked yet another crossroads in the long journey to build the TMT. Still, the report was overwhelmingly positive for the TMT, and in a statement for the *Hawaii Tribune-Herald*, Sandra Dawson acknowledged that it was indeed a welcome

¹⁶⁸ Peter Sur, "Decision delays further stall Thirty Meter Telescope," *West Hawaii Today*. 09 November 2012.

¹⁶⁹ Peter Sur, "Report backs TMT project," *Hawaii Tribune-Herald*. 30 November 2012.

¹⁷⁰ *Ibid.*

¹⁷¹ *Ibid.*

development.¹⁷² Sensitive to the opposition within the Big Island community, however, the TMT website neutrally disclosed the news of the report with a link to the *Tribune-Herald* newspaper article without further editorialization.¹⁷³

The TMT website may not have celebrated the hearing officer's report as a major victory, but the KAHEA website certainly framed the news as a significant defeat, announcing the report's conclusions with a blog entry titled "Hearings Officer Recommends Further Desecration of Mauna Kea."¹⁷⁴ In the blog, Kealoha Pisciotta expressed her disappointment at the report and affirmed that the petitioners would contest the decision by asserting, "We've been fighting for Wakea for over a decade now, and we won't stop until our constitutional public trust and Native Hawaiian rights are fully protected as the state constitution requires."¹⁷⁵ Flores challenged Aoki's claim that the petitioners had failed to prove that Mauna Kea was the site of ongoing religious practice, declaring, "Despite what was written in the report, the TMT would cause immense physical and spiritual disturbance and imbalance to this venerated mountain and to everyone and everything connected to it. Mauna a Wakea is still sacred."¹⁷⁶

Conclusion

When Gerard Kuiper assessed the value of Mauna Kea as a planetary scientist in the 1960s, he exclaimed that the mountain was "probably the best site in the world – I repeat – in

¹⁷² Peter Sur, "Report backs TMT project," *Hawaii Tribune-Herald*. 30 November 2012.

¹⁷³ www.tmt.org. Accessed 30 December 2012.

¹⁷⁴ "Hearings Officer Recommends Further Desecration of Mauna Kea." Hilo, Hawai'i, Dec 08, 2012. www.kahea.org. Accessed 30 December 2012.

¹⁷⁵ Pisciotta, quoted in "Hearings Officer Recommends Further Desecration of Mauna Kea."

¹⁷⁶ Flores, quoted in "Hearings Officer Recommends Further Desecration of Mauna Kea." Accessed 30 December 2012.

the world - from which to study the moon, the planets, and stars.”¹⁷⁷ Throughout the 1970s and 1980s, Kuiper’s evaluation of Mauna Kea would be echoed in Environmental Assessments and Environmental Impact Statements that made the case for astronomy on the mountain largely in terms of scientific and economic gains. The Mauna Kea astronomy community was made aware of the environmentalist criticism of telescope development beginning in the 1970s, but it appears that the mountain was not known to astronomers as a sacred site until the late 1990s, when Native Hawaiians made an open cultural claim on the mountain for the first time.

Fueled by the political mobilization of the Hawaiian Renaissance and the geothermal victories on the Big Island, an alliance of Native Hawaiians and environmentalists presented a formidable opposition to the observatories by targeting astronomers as culturally and environmentally insensitive. It soon became apparent to the Mauna Kea astronomy community at the IfA that Native Hawaiian narratives about the mountain’s value carried great cultural authority in Hawai’i. Defining the mountain as a sacred site threatened by the observatories was a cultural claim that had the power to profoundly limit future telescope construction. After the 1998 State Audit further condemned the management of the Mauna Kea Science Reserve by the IfA, it was clear that astronomers would be required to justify their professional activities in new ways. While Kuiper’s depiction of the mountain as an ideal observing site was once sufficient to permit new telescope construction, rationalizing the use and significance of the mountain solely in scientific terms was no longer acceptable. Thus as this chapter has shown, astronomers began to renegotiate their narratives about the value of the mountain site and the science of astronomy, a strategy that was first manifested in the 2000 Master Plan.

¹⁷⁷ Kuiper, quoted in “Education and Research,” p. VI-1 in *Mauna Kea Science Reserve Master Plan*.

Without jettisoning previous arguments that astronomy was a scientific and economic boon to Hawai'i, the Master Plan literature revealed a shift toward integrating the values of Native Hawaiian and astronomical exploration. According to this narrative, Polynesian navigation and modern astronomy were dual expressions of the same spirit of exploration and discovery. Within this context, astronomers began to explain their work as a cultural activity. The emphasis on seeking common ties between astronomers and Native Hawaiians later materialized at 'Imiloa, which serves as a unique trading zone for these communities.

As I have argued, reinforcing a common understanding of the ubiquitous themes of 'origins' and 'exploration' at 'Imiloa has obscured the social, political, and cultural struggles of Native Hawaiians to reclaim power and identity after a long period of colonialism. The epistemologically diverse cultural identities of both Native Hawaiian and astronomy communities have been blurred into a single pidgin language of 'origins' and 'exploration' at 'Imiloa, but these cultures have also gained an important forum for communication and collaboration.

'Imiloa, and the NOMISS program that came before it, were part of a new professional mandate among astronomers to perform public outreach, and as the TMT EIS process demonstrates, community engagement has become as essential to observatory-building as mirror grinding or dome construction. Commenting on the role of community engagement in building new observatories on Mauna Kea in 2005, OMKM Director Bill Stormont concluded, "I think that you jump through every hoop the community asks you to."¹⁷⁸

¹⁷⁸ Bill Stormont, "Astronomers And Native Hawaiians Battle Over Sacred Mountain." 29 August 2005. Space & Earth/ http://m.phys.org/mauna-kea-pisciotta_news6076.html. Accessed 30 December 2012.

By tracing the development of observatories on Mauna Kea from the 1960s to the early 2000s, it is evident that in the late twentieth century, astronomers redefined the moral imperatives of their science by broadening its objectives. Astronomers at the IfA came to conceive of their work not strictly as a scientific or cultural activity, but also as a *public* enterprise, and astronomers assumed the responsibility of engaging with the public through astronomy outreach. Still, this shift should not be misconstrued as an abandonment of the scientific ideals that drew many astronomers to the profession in the first place. Gemini North Observatory astronomer Scott Fisher explained the prestigious implications of working at the forefront of astronomy at Mauna Kea by stating, “if you do have a job that brings you here to this place and you get to work at one of these telescopes, in a very real sense, it means that you’ve made it in some way. The people who work here are the best in the field of astronomy, and it’s not very often that you can say that you are working at the pinnacle of your profession.”¹⁷⁹ In Chaffee’s view, “it’s hard to put a value on human knowledge. How do you put a value on something that is exciting, that lights up kids’ faces, that makes them excited about science?”¹⁸⁰

Mauna Kea is obviously still a ‘scientific temple’ for astronomers, and its status as a sacred temple to Native Hawaiians has been formally recognized by the astronomy community. The distinct beliefs and knowledge systems of these communities converged at ‘Imiloa in a pidgin centered on culturally-informed narratives. The ‘Imiloa model revealed that fruitful communication and collaboration was still possible by adopting a shared discourse of concepts such as ‘exploration’ and ‘origins,’ though the broader meanings of such terms held markedly

¹⁷⁹ Dr. Scott Fisher, quoted in *First Light* (PBS Hawaii, 2004).

¹⁸⁰ Frederic Chaffee, quoted in *Ibid.*

different resonances within these communities. In much the same way, the concept of ‘first light’ is important to astronomers and Native Hawaiians.

To astronomers, first light is a technical description of the moment when a new telescope achieves its first successful test run. To Native Hawaiians, first light refers to the moment when dawn is broken by the sun’s light, which shines first on Mauna Kea, the piko of creation. Both expressions of first light are anticipated with excitement and uncertainty, whether that of an untested instrument or the unknown events of the day to come. Astronomers see first light in the dark of night, while Native Hawaiians see first light only when the day has arrived. The meaning of ‘first light’ is literally a difference of night and day to astronomers and Native Hawaiians, but the phrase is identical, and indeed, there are connections that transcend the coincidence of language. Both groups acknowledge the importance of beginnings in their respective interpretations of first light, and forging a common understanding of such concepts has already proven a successful strategy for establishing a cross-cultural dialogue.

In the 2004 PBS Hawai’i documentary *First Light*, partly funded by the observatories on Mauna Kea, the IfA, and the OMKM, the narrator introduces Mauna Kea as “the very first land to be touched by sunlight. Where the first light touches is a place for beginnings.”¹⁸¹ Mauna Kea, the dormant volcano that has long been the site of an explosive conflict between competing stakeholders, may one day be the place for new beginnings.

¹⁸¹*First Light* (PBS Hawai’i, 2004).

Chapter Five

Battle Over Earth and Sky: Environmental Opposition to the Mt. Graham International Observatory

“It’s like a great Pleistocene museum that’s been locked up in a building somewhere, and now we’ve got to find out what’s in there before the building is torn down.”—Tom Waddell, Arizona Game and Fish Department biologist, Scientists for the Preservation of Mount Graham¹

“The saddest feature of the Mt. Graham issue has been the persistent enviro-faking by those who dislike the idea of an observatory on a mountain.”—Neville Woolf, Steward Observatory astronomer²

Squinting up at Mt. Graham from the parking lot of the isolated Visitor Center complex in Safford, Arizona, something shiny catches the eye.³ People are crowding into two 15-passenger vans that stand waiting to transport them to the Mt. Graham International Observatory, and they are curious about the object glinting in the sunlight far above. “Oh, that’s the LBT—the Large Binocular Telescope,” announces one of the docents, noticing the tourists’ curious expressions. “It’s even more impressive up close.”

The trip to the summit of Mt. Graham takes about an hour and a half as the vans make a steep and slow ascent up a winding two-lane road. Narrating through a microphone from the front seat, the docents fill the time with random factoids about the natural history of the mountain and the technical specifications of the observatory’s three telescopes. Halfway into the drive, one of the guides mentions that seven telescopes were originally planned, but that number was later reduced to three, which prompts someone to ask the obvious question: why? The docent explains that the change in plans was due to “red tape” caused by environmentalists who were out to sabotage the observatory by claiming that the red squirrel population at the summit was somehow threatened by construction. Sensing a juicy story, people press for more details. According to the docent, the real problems started with the LBT proposal, which was somewhat ironic because “all of a sudden, there was a huge issue with the LBT when there were already two other telescopes there!” The docent good-naturedly dismisses a question about the stability of the red squirrel population in recent years. “We like to joke about the red squirrel,” she replies. “Probably the only red squirrel we’re going to see is at the submillimeter telescope—it’s on a poster.” Perhaps unsure of what to make of this anecdote, the van is silent. The docent pauses her narration as the van noisily rumbles over a cattle guard. The topic of red squirrels does not come up again.

In the summer of 1993, a small group of Native American and environmentalist leaders chained themselves to a cattle guard on the main road leading up the summit of southern

¹ Waddell, quoted in Linda Ann Fundling, “Science vs. Science,” *The Arizona Daily Star*. 01 June 1986.

² Woolf, Letter to the Editor. *The Phoenix Gazette*. 08 March 1990. Papers of John J. Rhodes III [1993-00696] Arizona State University Libraries: Arizona Collection, box 58, folder 5.

³ These observations are drawn from my visit to the Mt. Graham International Observatory as part of a tour group on 12 June 2012.

Arizona's Mt. Graham to protest the dedication of a new telescope belonging to the Mt. Graham International Observatory (MGIO).⁴ A year earlier, a larger coalition of Native Americans, environmentalists, and students staged an even more dramatic protest by storming the Steward Observatory on the University of Arizona (UA) campus. It was Columbus Day, and the protesters blocked the observatory lobby for hours while chanting and beating drums, accusing the University of participating in a legacy of conquest through its involvement in the MGIO.⁵

To San Carlos Apache traditionalists, Mt. Graham is the sacred home to guardian spirits and the site of important religious rituals. Cultural practitioners feared that erecting metal structures on the summit would impede the flow of prayers through the mountain, but in 1984, UA announced plans to partner with other American institutions, the Italian and German governments, and the Vatican City State to build an observatory on Mt. Graham that included the world's largest telescope. For some Apaches, this scientific collaboration was viewed as the culmination of 500 years of cultural oppression inaugurated by the arrival of Columbus in North America. This unflattering characterization of the observatory was inspired in no small part by the proposed name for its largest telescope: *Columbus*, a moniker that smacked of colonialism for many vocal critics of the project.⁶

⁴ John Dougherty, "Making a Mountain into a Starbase: The Long, Bitter Battle Over Mt. Graham," *High Country News*. 24 July 24 1995; Tim McCarthy, "Protest Delays Debut of Vatican Telescope," *National Catholic Reporter*. 01 October 1993.

⁵ See David L. Tiebel, "Dropped gun ends undercover operation at UA: the Tucson Police Department was asked to monitor the Columbus Day protest," *The Tucson Citizen*. 07 November 1992; Jason Auslander, "KVOA, 'Wildcat' receive subpoenas," *Arizona Daily Wildcat*. 02 November 1992.

⁶ The early name for the Columbus telescope was the Arizona/Ohio State 8-meter Telescope due to a proposed partnership between the Ohio State University and UA. See *Site Development Plan for the Mt. Graham International Observatory, Pinaleno Mountains, Graham County, Arizona*. Prepared by Steward Observatory. 01 May 1986, p. 77. Courtesy of Doug Officer, retired LBT instrument specialist.

The Columbus Day protest of 1992 marked nearly a decade of tense confrontation between activists and astronomers centered on competing claims to the mountain's cultural, environmental, and scientific resources.⁷ Reprising my argument from earlier chapters, this chapter and the one that follows show that the controversy over telescope construction at Mt. Graham is rooted in a spectrum of cultural constructions of the mountain ranging from the scientific to the spiritual. While traditional Apaches viewed Mt. Graham as a sacred temple that would be desecrated by telescope construction, biologists and environmentalists had an entirely different claim on the mountain they recognized as a "sky island."⁸ Glacial recession during the last ice age had left a subspecies called the Mt. Graham Red Squirrel ecologically isolated on the summit, and the impact of telescope construction on prime squirrel habitat was largely unknown. For conservation biologists, the mountain's isolation had rendered Mt. Graham a "Pleistocene museum" full of countless ecological treasures, but astronomers had another reason to covet the mountain's isolation. By the 1980s, dark skies were an increasingly rare commodity in optical astronomy, and Mt. Graham was still relatively shielded from urban light pollution. Astronomers, then, valued Mt. Graham not as the home of squirrels or spirits, but of *scopes*. The Mt. Graham astronomy community originally hoped to build over a dozen telescopes on the summit, but eventually settled for just three: the Columbus telescope (later renamed the Large Binocular Telescope) and two smaller telescopes, including the so-called

⁷ Protests against the observatory continued well beyond the 1992 protest on campus. As recently as 2011, Native American activist and writer Winona LaDuke, who was scheduled to speak at Northern Arizona University in Flagstaff, joined a coalition of Native Americans and student protesters on campus to raise awareness about the university's affiliation with MGI/O. See Rosanda Suetopka Thayer, "Acclaimed activist Winona LaDuke speaks at NAU," *Navajo-Hopi Observer*. 08 February 2011; Sandra Rambler, "Tribal Elders join Winona LaDuke at NAU protest made against Mount Graham telescopes, Oak Flat Resolution Copper Mine," *Apache Moccasin*. 09 February 2011.

⁸ The term "sky island" refers to the interpretation of the Pinaleno range where Mt. Graham is located as an ecological island within the framework of island biogeography.

“Pope Scope,” or the Vatican Advanced Technology Telescope (VATT).⁹ Championing these different spiritual, environmental, and scientific visions of the mountain’s significance, all three communities became enmeshed in a bitter and prolonged dispute over Mt. Graham’s diverse resources.

Apaches and environmentalists boldly challenged the multimillion dollar telescope project by aggressively campaigning against the MGIO throughout the 1990s. Mt. Graham astronomers responded by recruiting powerful political allies to circumvent federal environmental and religious protection acts that jeopardized the observatory project, triggering lawsuits that created costly construction delays. After a Jesuit astronomer invested in the VATT openly denounced the spiritual practices of the Apaches, Apache activists declared a ‘holy war’ between the Apaches and the Vatican. Similar to narrative shifts of indigenous groups described earlier in this dissertation, Apaches soon issued narratives recasting the observatory as a symbol of colonialist acquisition.

Not surprisingly, the local media had a field day with the controversy over the mountain, running sensationalist headlines pitting “science against religion” that created a public relations nightmare for the Mt. Graham astronomy community. Though the historical actors have frequently deployed these same neatly dichotomized narratives of the conflict at Mt. Graham, I suggest that the prolonged controversy over telescope construction is most productively analyzed as a function of the unexpected interplay between *science vs. science, religion vs. religion, and culture vs. culture*. To that end, this chapter and the one that follows will explore

⁹ I will refer to “the Mt. Graham astronomy community” as shorthand for the dispersed network of groups and individuals who saw themselves as observatory supporters. Under this definition, the Mt. Graham astronomy community included Arizona politicians, pro-observatory biologists at UA, astronomers and staff members from UA’s Steward Observatory and the university’s upper administration, astronomers from the Vatican Observatory Foundation and the Max Planck Institute, as well as other observatory partners who worked with UA administrators on various aspects of the MGIO planning process.

what happens when the scientific authority of astronomers intersects with the scientific claims made by conservation biologists and ecologists, when Western religion confronts Native American spiritual beliefs, and when the epistemologies, identities, and values of astronomical culture collide with those of indigenous culture.

Following the approach introduced in chapter one with the founding of Kitt Peak National Observatory (KPNO) and revisited in chapters three and four with the establishment of observatories on Mauna Kea, I begin by considering how the Mt. Graham case highlights the changing moral and political economy of astronomy for American astronomers and observatory administrators during the second half of the twentieth century. As the American environmental and indigenous rights movements gained momentum, establishing new observatories or erecting new telescopes meant demonstrating cultural and environmental sensitivity, even in the absence of preexisting cultural or environmental claims on the landscape. Situating the founding of MGIO within the context of American political and environmental history, it becomes readily apparent that Mt. Graham was transformed into a contested landscape as soon as the observatory proposal was made public due to the emergence of a radical strain of environmentalism in the 1980s.

Members of the environmental extremist group Earth First! formed an uneasy alliance with well-established environmental organizations such as the Sierra Club and the National Audubon Society to declare a 'war' against the observatory project. As the battle lines were drawn, summoning the politically and socially persuasive meanings of 'wilderness' and 'pristine' became important strategies for radical environmentalists and other observatory opponents. Romanticizing the summit as a pristine wilderness, environmental activists alleged that observatory development would subject fragile squirrel habitat to devastating human

encroachment. Taking a more moderate approach by advocating further study prior to telescope construction, many conservation biologists nonetheless championed their own idealized view of the mountain as a ‘priceless biological museum.’ Astronomers rejected the claims of the environmental opposition altogether, steadfastly refusing to accept Mt. Graham as a true wilderness and suggesting that the observatory would greatly benefit the dwindling squirrel population. Even if the mountain had once been ‘pristine,’ astronomers argued, surely an observatory was no more obtrusive or environmentally damaging than the logging and recreational activities that had long been permitted at lower elevations.¹⁰

By showing how these divergent characterizations of the mountain’s natural setting were historically produced by different stakeholders in the Mt. Graham debate, this chapter contributes to existing scholarship that has framed landscape as a human artifact.

Environmental historians and philosophers have effectively challenged conventional conceptions of ‘wilderness’ by establishing that wilderness is, as William Cronon asserts, “a human idea.”¹¹ Drawing from Cronon and others, this chapter contends that different

¹⁰ In a 1994 *Nature* article on the observatory conflict, members of the Mt. Graham astronomy community stated that “Certainly, the areas above 2,700 m could never qualify as wilderness because of roads and other artefacts.” The authors went on to assert that the observatory was a model of “environmental sensitivity” that promoted conservation goals. See Bruce Walsh, Roger Angel, and Peter Strittmatter, “Endangered Telescopes or Species?” *Nature* 372 (17 November 1994): p. 215-216. Walsh is a Professor in the UA Department of Ecology and Evolutionary Biology, and Angel and Strittmatter are UA Professors of Astronomy and Directors of UA’s Mirror Lab and the Steward Observatory, respectively. Other examples of this central narrative are presented later in this chapter.

¹¹ William Cronon, “Forward,” in Cronon, ed., *Uncommon Ground: Rethinking the Human Place in Nature* (New York: W. W. Norton & Co., 1995), p. 20. Cronon, Max Oelsehlaeger, and others have demonstrated that ‘nature’ and ‘wilderness’ are culturally-embedded ideas. Cronon’s seminal essay on changing conceptions of ‘wilderness’ critically examines wilderness as a product of civilization rather than an entity that stands apart from civilization. See Cronon, “The Trouble with Wilderness; or, Getting Back to the Wrong Nature,” in Cronon, ed., *Uncommon Ground*, p. 69-90; see also Cronon, *Changes in the Land: Indians, Colonists, and the Ecology of New England* (New York: Hill & Wang, 1983). For a broad overview of the shifting relationship between humans and nature from the Paleolithic era to the present, see Max Oelsehlaeger, *The Idea of Wilderness: From Prehistory to the Age of Ecology* (New Haven, Connecticut: Yale University Press, 1991). William M. Denevan dismantles the notion that the early sixteenth century

understandings of the mountain were politically mobilized to gain moral or legal standing. Competing narratives about Mt. Graham as a 'pristine' wilderness home to an endangered squirrel, a biological time capsule warranting further study, or a dark sky site for astronomical observation were first deployed in public and scientific discourse before making their way into the halls of Congress and the federal courts. As this chapter will make clear, narratives about the mountain landscape critically restricted observatory development, drove a wedge between communities of scientists and environmentalists, and ultimately, I argue, masked an underlying debate that hinged on controlling a scientifically, economically, and recreationally valuable natural resource.

Arizona ambitions: preserving the last stronghold of continental astronomy

In the late 1970s, the future of American astronomy seemed to rest with a dormant volcano isolated in the Pacific Ocean. Since the founding of KPNO, Arizona had long enjoyed its reputation as a leading center of astronomical research in the United States, but Mauna Kea had recently emerged as the new darling of the American astronomy community. With unparalleled atmospheric quality, dark skies that would never be threatened by urban sprawl, and large telescopes that were producing exceptionally clear images, Mauna Kea was virtually guaranteed to draw the world's best telescopes in the upcoming decades. For Arizona astronomers, Mauna Kea's star status was a major problem.

As earlier chapters have illustrated, competition persisted as one of the key driving forces in the field of astronomy throughout the twentieth century. KPNO was founded to safeguard America's position as a leader in international astronomy and it was also intended to balance out competition between the 'haves' and 'have-nots' (astronomers who had privileged

Native American landscape was a 'pristine' environment in Denevan, "The Pristine Myth: The Landscape of the Americas in 1492," *Annals of the Association of American Geographers* 82 (1992): p. 369-385.

institutional access to large telescopes and those who lacked such access). Historically, this prevailing climate of intense competition has been fostered by the chase of new technological developments. As Patrick McCray has observed, many astronomers seek the ‘Next Big Machine’ because they believe larger and more powerful telescopes facilitate new scientific discoveries and research questions.¹² Simply put: for some astronomers, remaining at the forefront of the field is synonymous with access to ever-larger telescopes employing cutting-edge technology.¹³ Changing environmental conditions also dictate when new observatories are needed, since many observatory sites become obsolete over time due to increasing light pollution. For astronomers at UA’s Steward Observatory, the confluence of these factors more than justified the decision to build a new world-class observatory in Arizona.

Along with other continental U.S. sites, Kitt Peak was swiftly becoming corrupted due to light pollution, and the aging national observatory no longer boasted the world’s most advanced telescopes.¹⁴ The advent of technologies supporting high-resolution imaging in new wavelength regions meant that unless a new observatory was built at a site with darker skies, maintaining Arizona’s competitive advantage in optical astronomy would soon be a lost cause. Building an observatory close to home was the only way to secure state funding and to guarantee the continued relevance and security of Arizona astronomy. There were also benefits exclusive to

¹² Patrick McCray, *Giant Telescopes: Astronomical Ambition and the Promise of Technology* (Cambridge: Harvard University Press, 2004), p. 297. This determinist argument is not well-supported by statistical evidence, as McCray points out. Telescopes with apertures less than 4 meters still dominated the field in the 1980s. See McCray, p. 301.

¹³ The American astronomy community has never adopted a universally accepted referendum on a disciplinary preference for larger instruments, however, and at times, the debate over large telescopes vs. smaller and more accessible ‘workhorse’ instruments became quite heated. See, for example, chapter two of this dissertation for the outspoken reaction to the suggestion to shut down some of KPNO’s smaller instruments in order to fund larger telescopes.

¹⁴ On KPNO’s decline as a leading center of American astronomy beginning in the 1980s, see chapter two of this dissertation.

UA.¹⁵ From an economic standpoint, UA stood to make significant gains from a new observatory project. UA would be able to secure substantial grants from for telescope time, of course, but there was also another lucrative business arrangement in the works. Roger Angel of Steward Observatory's Mirror Lab had recently pioneered a new generation of lightweight honeycombed telescope mirrors.¹⁶ If MGIO was built, the Mirror Lab would cast, grind, and polish the mirrors for both the VATT and the Columbus telescope. With these two telescopes as a showcase for the revolutionary new mirror design, it was expected that the Mirror Lab would attract millions of dollars in contracts for other large telescope mirrors employing the same novel technology.¹⁷ In-house mirror construction was sure to add up to financial solvency for the then-struggling Mirror Lab.¹⁸ Because observing grants would generate a major revenue stream for UA while

¹⁵ New telescopes and detectors were making more of the electromagnetic spectrum available for study, and Mt. Graham was thought to be suitable for millimeter, submillimeter, infrared, optical, and near-ultraviolet wavelengths. As discussed later in this chapter, Mt. Graham would be under consideration for a newly proposed National New Technology Telescope (NNTT), conceived as the largest telescope in the world. If the NNTT failed to materialize, the MGIO's binocular 11.3-meter Columbus telescope would easily secure the title of the largest telescope in the world. Combined with the joint Max Planck-Steward Observatory 10-meter submillimeter telescope, MGIO would make Arizona the world leader in optical, infrared, and submillimeter wavelengths.

¹⁶ Instead of casting a mirror blank in a stationary furnace and subsequently grinding the glass to achieve the desired curvature, Angel pioneered a rotating furnace method of melting the glass, which forced the glass into the necessary parabolic shape. The resulting mirror blank was extremely lightweight and flexible, with a honeycombed interior. For a more detailed description of Angel's mirror casting process, see McCray, p. 123-124.

¹⁷ The University of Arizona had a history of successfully experimenting with unconventional mirror designs. The Multiple Mirror Telescope (MMT), located south of Tucson on Mt. Hopkins, consisted of six lightweight 1.8-meter mirrors arranged in a hexagonal pattern. Each primary mirror had its own secondary mirror, with a common alt-azimuth mount. The unusual design effectively created six small telescopes with light-gathering area equivalent to a single 4.5-meter telescope at a much lower cost

¹⁸ By 1983, Angel's Mirror Lab had received \$500,000 in grants through KPNO's technology development plan, but the Lab lacked a reliable source of patronage and Angel was eager to persuade the American astronomy community that his mirror-casting technique was a superior technology for large telescopes. See McCray, p. 65-69. The original MMT, jointly operated by the Smithsonian Astrophysical Observatory and the University of Arizona, was dedicated in 1979. Between 1998-2000, the telescope was upgraded to a single 6.5-meter telescope, but it is still known as the MMT. See "The Story of the Observatory," Available at mmto.org. Accessed 28 March 2013.

enhancing the prestige of the University as a whole, the upper administration was extremely supportive of the plan to build a new astronomical observatory somewhere in southern Arizona.

As the research institution responsible for managing the proposed observatory, Steward Observatory initiated a search across the southwest for a site in 1980 that would permit high-resolution imaging with the next generation of large telescopes. Mt. Graham, the highest summit in southeastern Arizona's Pinaleno Mountain range, was identified as a viable candidate early on. At 10,720 feet, the summit of Mt. Graham boasts clear skies, a paved road, and a partially de-forested summit due to prior logging activity, so it was deemed a promising location for astronomical observation.¹⁹ Although Mt. Graham was relatively close to the city of Tucson, it had minimal light pollution and was thought to have the stable atmosphere needed for observations at a wide range of the electromagnetic spectrum.²⁰

Once part of the San Carlos Apache reservation, Mt. Graham is now part of the Coronado National Forest, which means it is publicly-owned land managed by the United States Forest Service. The Forest Service granted Steward Observatory a temporary permit to conduct site testing studies in 1983, and early results confirmed that Mt. Graham was a promising observational site.²¹ But was it superior to Mauna Kea? And if Mt. Graham fell short of

¹⁹ As I will discuss in chapter six, the site selection process would eventually be called into question by anti-telescope activists. For more detail on the criteria influencing the decision to locate an observatory on Mt. Graham, see N.J. Woolf and K.M. Merrill, *Preprints of the Steward Observatory* No. 547, "Mt. Graham: A Continental United States Site Operation for the NNTT," 1983. Courtesy of Doug Officer.

²⁰ *Site Development Plan for the Mt. Graham International Observatory*, 01 May 1986, p. 5.

²¹ The Smithsonian Institution expressed interest in exploring the possibility of placing an astronomical observatory on Mt. Graham in 1982 and received a permit from the USFS to conduct site testing using two temporary towers on Mt. Graham in June 1983. See *Site Development Plan for the Mt. Graham International Observatory*, 01 May 1986, p. 6. The National Optical Astronomy Observatories (NOAO) was also overseeing a collaborative site testing study on Mt. Graham and Mauna Kea between the University of Hawai'i and UA to determine how the two sites compared for the proposed National New Technology Telescope. See Carl A. Posey, NOAO Press Release 84-21, "Site evaluation under way for Giant Telescope." 01 August 1984. Courtesy of Doug Officer.

expectations, would Arizona astronomers be willing to sacrifice Mt. Graham's convenience, not to mention the prestige afforded by building the next generation of telescopes in southern Arizona? These questions were actively being investigated by teams of researchers in Hawai'i and Arizona through a collaborative site testing study conducted by the National Optical Astronomy Observatory (NOAO).

NOAO, headquartered in Tucson, was charged with the task of overseeing the development of a giant new telescope that promised to forever alter the landscape of American astronomy. The race was underway to determine the home of a newly proposed 600-inch National New Technology Telescope (NNTT), with site testing for the NNTT taking place on both Mt. Graham and Mauna Kea.²² In their comparison study of the two sites, astronomers Neville Woolf and Kenneth M. Merrill argued, "there is no reason to believe that a continental site necessarily has inferior seeing."²³ The Arizona astronomers also emphasized that Mauna Kea's high altitude might lead to "potentially debilitating physiological problems in both construction and operation" and pointed out that operating costs might be higher in Hawai'i.²⁴

Mauna Kea would easily continue to attract proposals for the world's most advanced new telescopes, and if the declining national observatory at Kitt Peak was not soon supplemented by new astronomical instruments elsewhere in Arizona, the Tucson-based astronomy community would be forced to compete for telescope time at Mauna Kea

²² Acting as the official representative body of the American astronomy community, the Astronomy Survey Committee had recommended the construction of a 15-meter optical/infrared telescope in 1982. See *Astronomy and Astrophysics for the 1980s Vol. 1: Report of the Astronomy Survey Committee*, National Academy Press, Washington, D.C. (1982). See also Phyllis Gillespie, "Arizona peak measuring up for space eye: experts think state has an edge over Hawaii as 'superscope' site," *The Arizona Republic*. 23 July 1984. The NNTT was conceived as a telescope consisting of four large mirrors equal to an aperture of 600 inches.

²³ Woolf and K.M. Merrill, *Preprints of the Steward Observatory* No. 547, p. 4.

²⁴ *Ibid*, p. 2.

observatories. With the hopes of attracting the NNTT and other large telescopes in mind, Steward Observatory astronomers and UA administrators decided that Mt. Graham was the best location for the new observatory, but the onerous task of gaining permission from the Forest Service to build on the summit still lay ahead.

Steward Observatory submitted a proposal to the Coronado National Forest in June 1984 for the development of an astrophysical site on Mt. Graham that allowed for up to fourteen telescopes.²⁵ In early versions of the site development plan, the NNTT was listed in a group of “likely possibilities,” indicating that the Mt. Graham astronomy community was either supremely confident or merely hopeful that their site would be selected over Mauna Kea for the NNTT.²⁶ The astronomy community that was beginning to form around the promise of a major observatory at Mt. Graham was clearly anxious about its chief competition, so it is not surprising that Steward Observatory’s proposal focused almost exclusively on making the scientific case for Mt. Graham as “a magnificent candidate for development as an observatory locale.”²⁷ Even at this early stage of the development process, however, MGIO planners also knew that gaining approval for any major development project necessitated a consideration of environmental impacts. The site development proposal assured readers, “it is mandatory that the forest be

²⁵*Site Development Plan for Mount Graham. MGIO-84-1* (replaces SO-plan-84-1) Rev. 1. Smithsonian Astrophysical Observatory and Steward Observatory. November 1984. Courtesy of Doug Officer. See also Robert Cooke, “World’s largest telescope proposed: astronomers want \$150m instrument using the latest technology,” *The Boston Globe* 25 July 1984; Pete Cowgill and Cindy Hubert, “Astronomers are casting an eye to Mt. Graham as multiproject site,” *The Arizona Daily Star*. 20 August 1984.

²⁶“Most likely possibilities” were the Submillimeter Telescope, the UA 8-meter telescope (soon after named the Columbus telescope), and a 2-meter telescope. “Likely possibilities” included the NNTT and the Italian National 4-meter telescope called the Galileo telescope. The “least likely possibilities” category included two additional 8-meter telescopes, two additional 4-meter telescopes, two additional 2-meter telescopes, one telescope in the National Radio Astronomy Observatory Very Long Baseline Array, the Smithsonian Submillimeter Array, and the Texas 5-meter Submillimeter Telescope. See *Site Development Plan for Mount Graham. MGIO-84-1*, p. 7.

²⁷*Site Development Plan for Mount Graham. MGIO-84-1*, p. 2.

preserved, along with all its supporting life forms. It is the intention of the Smithsonian Institution and the University of Arizona, acting through their astronomical observatories, to ensure this preservation.”²⁸ Still, the perfunctory treatment of environmental impacts suggests that in the earliest planning stages of MGIO, UA astronomers and administrators assumed that building the observatory depended solely on two key factors: securing adequate funding and obtaining the Forest Service’s approval of the site.²⁹ What the Mt. Graham astronomy community had *not* counted on was the magnitude of public opposition to a project that was instantly viewed as a threat to recreational and ecological uses of the mountain.

Green Fists of Fury: the Rise of Radical Environmentalism in the American Southwest

Two months after Steward Observatory sent its initial proposal to the Forest Service, the observatory project seemed to be off to a promising start when Congress passed the 1984 Arizona Wilderness Act designating 3,500 acres in the Pinaleno Mountains as a potential site for astronomical research.³⁰ The next challenge was to secure a favorable Environmental Impact Statement (EIS) that would guide the Forest Service in its decision-making about the potential

²⁸*Site Development Plan for Mount Graham. MGIO-84-1, p. 3.*

²⁹ Later drafts more explicitly described the development plan for MGIO, outlining thirteen telescopes constructed over 30 years in three phases. In the May 1986 draft, Phase I included three telescopes and support structures on Mt. Graham’s High Peak, Phase II included up to six telescopes (including the New Technology Telescope, the NNTT), and Phase III included all additional telescopes. See *Site Development Plan for the Mt. Graham International Observatory*, p. iii-iv. The 1986 site development plan also made more direct comparisons to Mauna Kea, stating that “except for Mauna Kea, no existing US sites remain suitable for future major instruments” and asserting that the High Peak region of Mt. Graham was “of quality comparable to Mauna Kea.” See *Ibid*, p. 9. This draft made brief mention of the potential impact on the cultural and ecological resources of the mountain. A section titled “Environmental Considerations” was less than a page long and made no reference to the Mt. Graham red squirrel. See *Ibid*, p. 11. A “Cultural Resources” section consisted of one short paragraph and indicated that field work was underway to identify areas of archaeological significance. *Ibid*, p. 24.

³⁰*Arizona Wilderness Act of 1984. Public Law 98-406. 28 August 1984. 98 STAT. 1485- 1494, STAT 1489. Available at wilderness.nps.gov. Accessed 13 January 2013.*

environmental consequences of the project.³¹ Under the National Environmental Policy Act, all federal agencies were required to prepare an EIS, so the Forest Service asked UA to conduct an EIS in 1984. Steward Observatory commissioned UA's Office of Arid Lands Studies, a division of its College of Agriculture, to carry out the EIS. UA'S EIS would then be submitted to the Forest Service, which would use the report as the basis of its own Draft Environmental Impact Statement (DEIS). Both UA's EIS and the subsequent Forest Service's DEIS would provide a chance for concerned members of the public to have a voice in the project, which ultimately made the observatory the focus of intense public scrutiny.³²

The announcement that UA wanted to place a new astronomical observatory on Mt. Graham ignited a set of cultural, political, and legal challenges that could scarcely have been imagined by the KPNO founders of the late 1950s. Nearly thirty years after KPNO, the effort to develop Mt. Graham for astronomical purposes took place in a markedly different social, cultural, and political climate. Chapter one situated American astronomers within the reification of science following World War II.³³ As discussed in chapters two and three, by the 1970s, the public image of scientists was somewhat tarnished after antiwar activists and environmentalists began to question the military and environmental consequences of science. Many Americans

³¹ The Arizona Wilderness Act of 1984 also created a 62,000-acre "Mt. Graham Wilderness Study Area." See *Arizona Wilderness Act of 1984*.

³² See "Arid Lands will conduct Graham impact study," *Lo Que Pasa Faculty and Staff News* 8. University of Arizona. 15 October 1984. Courtesy of Doug Officer.

³³ Just after the bombing of Hiroshima and Nagasaki in the summer of 1945, several newspaper and magazine articles condemned the action, but the public reaction to the bomb in the United States was largely positive, and scientists were considered heroes for ending the war. See Lawrence Badash, *Scientists and the Development of Nuclear Weapons: from Fission to the Limited Test Ban Treaty, 1939-1963* (Amherst: Humanity Books, 1995), p. 57-58. Although American scientists were exalted in the public sphere in the immediate post-World War II period, the war also sparked more critical public discussions about the moral behavior of scientists once the magnitude of human experimentation by German and Japanese scientists became widely disseminated. See Ad Maas, "Ordinary scientists in extraordinary circumstances," in Maas, Hans Hooijmaijers, eds., *Scientific Research in World War II: What Scientists Did in the War* (New York: Routledge, 2008), p. 1-12.

continued to criticize the notion of 'progress' through science and technology throughout the decade, and this cynicism showed no signs of abatement as the 1980s dawned. KPNO was founded just before the new critique of the social responsibilities of scientists, or the so-called "war on scientists,"³⁴ while MGIO was proposed in an atmosphere of growing public wariness of the claims of scientific research and in the midst of a flourishing environmental movement.³⁵

The environmental movement of the 1980s looked dramatically different from the grassroots activism inspired by Rachel Carson's influential 1962 book *Silent Spring*.³⁶ Certainly, environmentalists had gained significant federal support through the National Environmental Policy Act (NEPA) of 1969, the Environmental Protection Agency (EPA) in 1970, and the Endangered Species Act (ESA) of 1973.³⁷ But the community of grassroots activists who identified themselves as "environmentalists" had also changed significantly in recent years.³⁸

³⁴ Philip Abelson, "Science and Immediate Social Goals," *Science*. 21 August 1970, p. 1.

³⁵ The association between Western science and environmental degradation was articulated by historian Lynn White, Jr.'s now-classic essay "The Historical Roots of Our Ecologic Crisis," which reached a wide audience in *Science*. White associated exploitation of the natural world with the Industrial Revolution and his arguments were pivotal in guiding public interest and debate about the damaging role of science and technology on the environment. See White, Jr., "The Historical Roots of Our Ecologic Crisis," *Science* 155 (10 March 1967): p. 1203-1207.

³⁶ Rachel Carson, *Silent Spring* (Boston: Houghton Mifflin, 1962). See chapter three for more on the rise of grassroots American environmentalism.

³⁷ National Environmental Policy Act of 1969; EPA Order 1110.2; The Endangered Species Act of 1973, P.L. 93-205.

³⁸ The scholarship on the growth and change of the American environmentalist movement after the 1970s is extensive. On the development of a variegated environmental movement consisting of different factions with often contradictory environmental philosophies, see Samuel Hays, "From Conservation to Environment: Environmental Politics in the United States Since World War II," in Char Miller & Hal Rothman eds., *Out of the Woods: Essays in Environmental History* (Pittsburgh: University of Pittsburgh Press, 1997), p. 102-107; Mark Dowie, *Losing Ground: American Environmentalism at the Close of the Twentieth Century*(Cambridge, MA: MIT Press, 1995); Robert Gottlieb, *Forcing the Spring: The Transformation of the American Environmental Movement* (Washington, D.C.: Island Press, 2005); Christopher Manes, *Green Rage: Radical Environmentalism and the Unmaking of Civilization* (Boston: Little, Brown, 1990); Rik Scarce, *Eco-Warriors: Understanding the Radical Environmental Movement*

Even before the Reagan Administration's anti-environmental policies incited widespread opposition from Congress, the EPA, and national environmental groups, the dispersed network of grassroots environmental groups across the United States was beginning to gravitate toward a more coherent and politicized form of "mainstream environmentalism."³⁹ CEOs from ten major national environmental organizations formed the "Group of Ten," or G-10, to concentrate their preservationist lobbying efforts and legislative initiatives.⁴⁰ The consolidation of power represented by the G-10 was troubling to a growing segment of the American environmentalist community. Mainstream environmental advocacy groups such as the Sierra Club and the Audubon Society largely maneuvered within the legal system to address environmental concerns, and some environmentalists had grown impatient with these 'passive' tactics.

Seeking a more confrontational approach to resolving environmental disputes, Earth First! was co-founded in New Mexico in 1980 by David Foreman.⁴¹ Earth First! adopted a style of resistance called "monkeywrenching" to thwart environmental degradation by directly sabotaging construction projects perceived to have deleterious environmental effects.

(Walnut Creek, Calif.: Left Coast Press, 2006); Susan Zakin, *Coyotes and Town Dogs: Earth First! and the Environmental Movement* (New York, NY: Viking, 1993).

³⁹ Reagan's stance on the environment was perhaps best symbolized in his infamous removal of solar panels from the roof of the White House. At a time when the public was growing alarmed about acid rain and the EPA was recommending a proposal to increase funding to acid rain reduction programs, Reagan openly questioned the scientific validity of acid rain and rejected the acid rain proposal, instead electing to make substantial budget cuts to the EPA. See Dowie, p. 66-67; Stacy J. Silveira, "The American Environmental Movement: Surviving Through Diversity," *Environmental Affairs Law Review* 497 (2001): p. 497-532, p. 509; David Biello, "Where did the Carter White House's Solar Panels Go?" *Scientific American*. 06 August 2010.

⁴⁰ Organizations belonging to the G-10 included the Sierra Club, the Wilderness Society, the National Wildlife Federation, the National Audubon League, the Environmental Defense Fund, the Environmental Policy Center, the Friends of the Earth, the Isaac Walton League, the National Parks and Conservation Association, and the National Resources Defense Council. See Dowie, p. 68.

⁴¹ David Foreman's personal account of the founding and growth of radical environmentalism is chronicled in Foreman, *Ecodefense: A Field Guide to Monkeywrenching* (Tucson: Ned Ludd Books, 1981).

Monkeywrenching was first popularized in Edward Abbey's novel *The Monkey Wrench Gang*, whose protagonists advocated acts of destruction such as burning mining equipment and pulling up survey stakes along roads.⁴² Foreman was inspired by the unorthodox strategies of resistance described in the novel while working as a chief lobbyist for the Wilderness Society in Washington, D.C. in the 1970s. After a falling out with the organization over a change in management, Foreman founded Earth First! with four like-minded friends during a road trip through the Mexican desert en route to New Mexico.⁴³ Rambling across the Southwest in Foreman's old Volkswagen bus, the group conceived of a wilderness conservation organization that would draw from Abbey's toolkit to "break from the stuffy mold of mainstream conservation."⁴⁴ According to co-founder Howie Wolke, Foreman impulsively called out "Earth First!" and another companion quickly sketched a clenched green fist, thereby giving birth to the organization's name, logo, and ideological stance all at once.⁴⁵ Earth First! embraced a fundamentally new method of environmental opposition that triggered the growth of radical environmentalist groups across the United States who considered themselves not merely

⁴² Abbey's novel *The Monkey Wrench Gang* about a group of environmentalist misfits who engage in acts of sabotage in the American southwest to promote the protection of wilderness made him an iconic figure in the radical environmentalist movement. See Abbey, *The Monkey Wrench Gang* (Philadelphia: Lippincott Williams & Wilkin, 1975); Abbey, *The Best of Edward Abbey* (San Francisco: Sierra Club Books, 2005); James M. Cahalan, *Edward Abbey: A Life* (Tucson: University of Arizona Press, 2001); Ann Ronald, *The New West of Edward Abbey* (Albuquerque: University of New Mexico Press, 1982); Garth McCann, *Edward Abbey* (Boise: Boise State University, 1977).

⁴³ In addition to Foreman, Howie Wolke, Mike Roselle, Bart Koehler, and Ron Kezar are credited with co-founding Earth First! See Michael Parfit, "Earth First!ers wield a mean monkey wrench," *Smithsonian* (April 1990): p. 184-205; p. 187.

⁴⁴ See Wolke, "Earth First! A Founder's Story," *Lowbagger: Environmental News, Opinion, and Art*. Available at www.lowbagger.org. Accessed 24 January 2013.

⁴⁵ *Ibid.*

environmentalists, but ‘ecowarriors.’⁴⁶ This new era of environmental extremism with close ties to the Southwest, coupled with the already-demanding process of securing an EIS before embarking on large development projects, meant MGIO planners would face serious challenges at both the federal and local level.

When Steward Observatory’s proposal to place multiple telescopes on the summit of Mt. Graham was first made public, Earth First! co-founder and Tucson resident David Foreman was outraged.⁴⁷ Mainstream environmental groups were equally affronted by the proposal, charging that astronomical development would disrupt the delicate ecosystem of the mountain. Unlike Earth First!, however, the Sierra Club was willing to entertain the possibility that the observatory could coexist with the squirrel population. Before the Arizona Wilderness Act was passed in August 1984, Steward Observatory worked closely with the local chapter of the Sierra Club to ensure that the 62,000-acre wilderness study area created by the act would not interfere with plans to place utility lines on the summit.⁴⁸ Then in October of that year, the Sierra Club proposed an alternative to Steward Observatory’s development plan that would

⁴⁶ By 1983, Earth First! had chapters in nearly every state. See Brandon Mitchener, “Out on a Limb for Mother Earth,” *E Magazine Premier Issue* (1990): p. 42-51; p. 50. On the rise of civil disobedience acts in the United States more generally during the 1970s and 1980s, see Marco Giugni, *Social Protest and Policy Change: Ecology, Antinuclear, and Peace Movements in Comparative Perspective* (Lanham, MD: Rowman & Littlefield, 2004).

⁴⁷ When Steward Observatory’s proposal was first released, it provided for astrophysical development on up to 60 acres. The thirteen telescopes proposed included the 10-meter submillimeter telescope, the Texas 5-meter telescope, the Arizona/Ohio State University Large Optical/Infrared telescope, five small and three large optical/infrared telescopes. Additionally, the National New Technology Telescope (NNTT) and an interferometer could also be developed. See Draft Environmental Impact Statement. Proposed Mt. Graham Astrophysical Area, Pinaleno Mountains. Graham County, Arizona, Coronado National Forest. DEIS #03-05-86-2, p. vii. John J. Rhodes III Papers 1975-1995, Series I, box 4, folder 19. Arizona State University Libraries.

⁴⁸ Interview with Peter Strittmatter. 06 June 2012. According to Peter Strittmatter, the Sierra Club began to oppose MGIO after the Arizona Wilderness Act was passed, following a change in chairmanship of the local chapter. When Steward Observatory contacted the national office of the Sierra Club to inquire about the sudden opposition from the local chapter, Strittmatter recalls that the national office took the stance that it would support the local chapter. Correspondence with Peter Strittmatter. 14 April 2013.

permit telescopes and a power line corridor to electrify the summit if certain conditions were met. Chief among those conditions was assuring public access to the summit.⁴⁹ Certainly, preserving Mt. Graham's ecosystem must have been a priority for the Sierra Club, but fighting on behalf of the squirrels also dovetailed nicely with preserving public access for recreational purposes. Tellingly, the Sierra Club was prepared to accept the observatory if public access to the summit could be guaranteed, suggesting that at least for some telescope opponents, the environmental argument against telescope construction was circumscribed by fears that the observatory would displace recreational activities on the mountain.

Mt. Graham had long been a haven to hikers, hunters, campers, and other outdoor recreationists who wanted to escape the intense heat of the Arizona summers. The mid-elevations contained numerous summer cottages, several campgrounds, and a Bible College, and some concerned citizens feared that access to their beloved mountain would be unduly restricted if the observatory was built. Yet other members of the local community were enthusiastic about a scientific facility that would surely bring jobs and prestige to the region's stagnant economy. In the small town of Safford at the base of Mt. Graham, a local journalist declared, "To say the least it's exciting, and a real chance to achieve a legitimate and lasting prosperity for everyone concerned in the Gila Valley."⁵⁰ Weighing in on the rival site, the journalist predicted, "the world's largest telescope would be perfectly at home on the summit of

⁴⁹ In addition to assuring public access, the Sierra Club requested that no development could occur near cienegas (small wetland areas), visitor services would be located off the mountain, and some cienegas would be designated as natural research areas. See Memorandum Re: Mt. Graham Activity, Mt. Graham Project Internal Distribution List, p. 2. 04 October 1984. Courtesy Doug Officer. The Sierra Club opposition to the observatory came from the local Tucson-based chapter and was not endorsed by the national offices of the Sierra Club, according to Peter Strittmatter, who also pointed out that Steward Observatory successfully worked with the Sierra Club prior to 1989. Interview with Peter Strittmatter. 06 June 2012.

⁵⁰ "Telescope to benefit Graham County: A Profile on "rival" Mauna Kea," *Eastern Arizona Courier*. 01 August 1984.

our beloved Mt. Graham and not Mauna Kea.”⁵¹ City officials and business owners who stood to benefit from potential increase in tourism and job opportunities presented by the project needed no convincing. The environmental opposition to the observatory could not so easily be tamed, however, as the Mt. Graham astronomy community was beginning to find out.

Endangered Squirrels or Endangered Scopes? Astronomers Respond to Early Environmental Opposition

Known as a “sky island,” Mt. Graham was an ecological treasure to environmentalists and conservation biologists because it harbors eighteen species of plants and animals that cannot be found anywhere else in the world due to their genetic isolation.⁵² Most of these species have been trapped on the mountain since the Pleistocene era, including a squirrel subspecies called the Mt. Graham Red Squirrel, *Tamiasciurus hudsonicus grahamensis*.⁵³ The squirrel nests in the cavities of trees and consumes seeds and fungi, playing a significant role in the forest ecosystem by dispersing seeds and spores. Years before the observatory proposal, conservation biologists became aware of a drastic decline in the squirrel population due to extensive logging, and the logging activity that threatened their existence was immediately banned.⁵⁴

⁵¹ “Telescope to benefit Graham County: A Profile on “rival” Mauna Kea.”

⁵² See Paul J. Young, Vicki L. Greer, and Sheri K. Six, “Characteristics of Bolus Nests of Red Squirrels in the Pinaleño and White Mountains of Arizona,” *The Southwestern Naturalist* 47(2002): p. 267-275; H. Reed Sanderson and John L. Koprowski, eds., *The Last Refuge of the Mt. Graham Red Squirrel: Ecology of Endangerment* (Tucson: University of Arizona Press, 2009). Donald F. Hoffmeister classified the red squirrel as a subpopulation instead of a subspecies in 1986. See Hoffmeister, *Mammals of Arizona* (Tucson: University of Arizona Press, 1986), p. 28-29.

⁵³ Other species considered vulnerable to extinction at that time included the Mexican spotted owl, the Apache trout, the Pinaleño pocket gopher, the long-tailed vole, and the northern goshawk. For a discussion of the politicization of the Mt. Graham Red Squirrel from a biologist opposed to telescope development, see Peter Warshall, “The Biopolitics of the Mt. Graham Red Squirrel (*Tamiasciurus hudsonicus grahamensis*),” *Conservation Biology* 8 (1994): p. 977-988.

⁵⁴ Victoria Sherrow, *Endangered Mammals of North America* (Scientific Sourcebooks, 1996).

When UA selected Mt. Graham as the preferred site for a new observatory complex, the spotlight was once again cast on the Mt. Graham Red Squirrel that resided in the old growth conifer forests at the summit. Unfortunately for astronomers, the only known home of an extremely rare squirrel was the *same* location deemed most ideal for the observatory. Acting under the United States Fish and Wildlife Service (USFWS), the Arizona Game and Fish Department began a study of the Mt. Graham Red Squirrel and several other vulnerable mammal subspecies on the mountain that were already under consideration for the federal endangered species list in 1983.⁵⁵ Acquiring biological data on the squirrel population at the summit was undoubtedly going to play a major role in influencing the Forest Service's EIS, but Steward Observatory knew that public comments were also another important factor in the Forest Service's decision about the observatory.

As part of its EIS preparation, Steward Observatory released a three-page synopsis of the proposed observatory that explained the forthcoming public input process.⁵⁶ At this early stage in observatory development, astronomers' narratives about the project do not appear defensive, but decidedly persuasive when describing the project for public audiences. In a section titled "Social and economic impact," the project summary began by asserting, "Astronomy is an important part of our cultural heritage, besides being the oldest of the sciences. It has tremendous public appeal."⁵⁷ The public was informed that UA was seeking approval for development on Mt. Graham's High Peak, to be followed by future development on

⁵⁵ Paul W. Hirt, "Biopolitics: A Case Study of Political Influence on Forest Management Decisions, Coronado National Forest, Arizona, 1980s-1990s," p. 241-286 in Christopher J. Huggard and Arthur R. Gomez, eds. *Forests Under Fire: a Century of Ecosystem Mismanagement in the Southwest* (Tucson: University of Arizona Press, 2001). UA's Office of Arid Lands Studies conducted its own studies of the squirrel population for the EIS.

⁵⁶ "The Mt. Graham Astrophysical Proposal," The University of Arizona. Steward Observatory. 1985. Courtesy of Doug Officer.

⁵⁷ *Ibid*, p. 3.

other regions of the summit. Any expansion of the observatory, it was deferentially noted, would depend on “minimal ecological impact, astronomical quality and public opinion.”⁵⁸ In case there was any doubt that the observatory should be valued by nonscientists, the project summary was careful to draw attention to astronomy’s status as “a ‘basic industry’ in Arizona, employing nearly 1,000 people state-wide.”⁵⁹

As the months ticked by in 1985, the Office of Arid Lands had still not submitted its report to the Forest Service, and the MGIO astronomy community was getting anxious. The Forest Service could not begin its own lengthy DEIS process until UA’s EIS was submitted, and pressure was mounting to secure the Mt. Graham site before a rival site at Mauna Kea could be declared the winning location for the colossal NNTT. The NNTT was in the early stages of development at KPNO, and funding was by no means secure, but Mt. Graham was the preferred Arizona site for NOAO Director John T. Jefferies.⁶⁰ The lag between the time when UA’s EIS was submitted and the Forest Service produced its own DEIS might very well cost the Mt. Graham astronomy community the much-coveted NNTT.

To be sure, Mauna Kea had its own set of environmental challenges to observatory-building. A rare insect called the *Wēkiu* bug was discovered at the summit of Mauna Kea in 1980, and environmentalists belonging to the Big Island chapter of the Sierra Club pushed astronomers to carefully consider the impact of observatory construction on the vulnerable bug

⁵⁸ “The Mt. Graham Astrophysical Proposal,” p. 2.

⁵⁹ Ibid.

⁶⁰ Carl Hodge, “Hawaiian volcano stirs ‘Star Wars’: challenges Arizona for telescope,” *The Arizona Republic*. 06 January 1985; Debbie L. Romano, “Site tests continue on Graham and Mauna Kea: Caltech ‘scope no threat to Mt. Graham.” *The Arizona Courier*. 09 January 1985.

population.⁶¹ Negotiating the EIS process at Mauna Kea was also potentially cumbersome due to the presence of multiple shrines in the summit region identified in a 1982 archaeological survey.⁶² However, the environmental and cultural issues to be addressed at Mauna Kea in the mid-1980s surfaced well before there was a comprehensive management plan to guide astronomical development. When it came to the EIS process, Mauna Kea sites were loosely governed by what environmental critics termed a ‘piecemeal’ style of observatory building, with individual EIS’s prepared for each new telescope. The University of Hawai’i’s Institute for Astronomy, much like UA’s Steward Observatory, would oversee all new telescope proposals, and had already concluded that astronomical development would have “no effect” on Mauna Kea’s historic and cultural properties.⁶³ Though local chapters of the Sierra Club and the Audubon Society had objected to observatory development on Mauna Kea since the 1970s, the environmentalist resistance in Hawai’i was relatively weak when compared with the more aggressive and radical opposition coalescing in Arizona. The Mauna Kea astronomy community had yet to confront any major restrictions on observatory development due to environmental or cultural objections, yet another factor potentially tipping the scales in favor of a Mauna Kea site for the NNTT.

Still waiting for its EIS to be turned over to the Forest Service for review, the Mt.

Graham astronomy community was rocked by the news that the summit was not only home to

⁶¹ F.G. Howarth and S.L. Montgomery, “Notes on the ecology of the high altitude aeolian zone on Mauna Kea,” *‘Elepaio, Journal of the Hawaii Audubon Society* 41(1980): p. 21-22. See also chapter three of this dissertation.

⁶² See *Mauna Kea Science Reserve Complex Development Plan Final Environmental Impact Statement*. Prepared by Group 70 for Research Corporation of the University of Hawaii. January 1983, p. 89. Available at oeqc.doh.hawaii.gov. Accessed 12 November 2012.

⁶³ See *Mauna Kea Science Reserve Complex Development Plan Final Environmental Impact Statement*, p. 184.

squirrels, but shrines. While preparing the DEIS to be submitted to the Forest Service, Office of Arid Lands Research Associate Martin M. Karpiscak learned that archaeologists had identified shrines on Mt. Graham's two highest peaks. In July 1985, Coronado Forest Service archaeologist Patricia Spoerl discovered a rock-walled shrine on Mt. Graham's High Peak, and Arizona State Museum archaeologist Christian Downum found a similar shrine on Hawk Peak later that month.⁶⁴ Both shrines dated to between the fourth and fifteenth centuries and were believed to be constructed by the Mogollon culture, a now-vanished Native American population that was contemporary with the Hohokam.⁶⁵ The shrines had apparently remained undisturbed for centuries, but a report by Downum that was leaked to the media in October disclosed that in his opinion, the observatory would "ultimately result in their destruction."⁶⁶ Downum's report recommended recovering the maximum amount of scientific information through an in-depth study of the shrines before the observatory was constructed and called for consultation with Native American leaders.⁶⁷ University of New Mexico shrine expert Florence Hawley Ellis believed the observatory should be relocated and appealed to astronomers, "Don't dig. Leave the shrines alone. They are holy places."⁶⁸

Since Mt. Graham now had to be considered a culturally significant site containing archaeological artifacts, on 12 August 1985, Karpiscak sent a form letter out to nineteen Arizona Native American tribes and the Zuni tribe of New Mexico asking for their comments on the

⁶⁴ Paul Brinkley-Rogers, "Telescope project threatens Indian shrines' future," *The Albuquerque Journal*. 01 December 1985; Brinkley-Rogers, "Ancient stargazers' Mt. Graham shrines may alter plans for massive observatory," *The Arizona Daily Star* 27 October 1985. The Arizona Historical Society Library and Archives. Astronomical Observatory—Mount Graham.

⁶⁵ Brinkley-Rogers, "Telescope project threatens Indian shrines' future."

⁶⁶ Downum, quoted in Paul Brinkley-Rogers, "Ancient stargazers."

⁶⁷ Brinkley-Rogers, "Ancient stargazers."

⁶⁸ Ellis, quoted in Brinkley-Rogers, "Telescope project threatens Indian shrines' future."

proposed Mt. Graham Astrophysical Area.⁶⁹ The Zuni and Hopi tribes were hundreds of miles away from Mt. Graham, so Karpiscak was evidently making an earnest attempt to notify any tribes that might have an interest in the mountain. Explaining that the EIS process was underway, Karpiscak wrote, “a factor that has to be considered in this process is the potential impacts of the proposal on traditional religious practices and beliefs of Native Americans.”⁷⁰ Noting that an archaeological survey had identified “a prehistoric site and some rock cairns,” Karpiscak requested that the tribe provide a written description of “any impact that the construction of an observatory on Mt. Graham (in the Pinaleno Mountains) would have on the traditional religious practices and beliefs of members of your tribe.”⁷¹ Tribes were provided with one month from the date of the letter to submit a written statement, and the Hopi and Zuni tribes responded quickly. Both tribes regarded Mt. Graham as an important spiritual center, and tribal representatives came forward to express their concerns about the development of the mountain. To safeguard their spiritual connection to the mountain, the Hopi collected ceremonial materials from Mt. Graham and the Zuni made an agreement with the Forest Service that prohibited observatory development from taking place on two regions of Mt. Graham containing shrines. Thus any potential conflict between the Hopis and Zunis and MGIO planners was resolved early on.⁷²

⁶⁹ Martin Karpiscak was project manager for the EIS. See “Arid Lands will conduct Graham impact study.”

⁷⁰ Martin M. Karpiscak to Dr. Ned Anderson, Chairman, San Carlos Apache Tribe. 12 August 1985. John J. Rhodes III Papers, box 51, folder 1.

⁷¹ Ibid.

⁷² See John R. Welch, White Eyes’ Lies and the Battle for dzil nachaa si’an,” *American Indian Quarterly* 21 (1997): p. 75-109; p. 76 and 90-91. Peter Strittmatter recalls that the Zuni tribe sent delegations before and after a change in tribal leadership. An agreement was reached with the delegations on both occasions that prohibited the line of sight from the High Peak cairns from being blocked by telescope construction. Correspondence with Peter Strittmatter. 14 April 2013.

As I will discuss later in the chapter, the receipt of the letter about the proposed observatory would eventually be disputed by the San Carlos Apache tribe.⁷³ Though other tribes had clearly received the letter and responded to Karpiscak's inquiry on the given timetable, the deadline came and went with no written response from the San Carlos Apaches. From Steward Observatory's perspective, the Mt. Graham astronomy community had reached out to numerous tribes, thereby fulfilling its obligation to notify and consult with Native Americans about the cultural significance of the mountain. The demands of the Hopi and Zuni tribes had been amicably addressed, so it seemed that the discovery of shrines at the proposed observatory site was not going to jeopardize the project after all.⁷⁴

In the growing public debate over the observatory, the opposition continued to focus not on shrines, but squirrels. Increasingly, environmentalist rhetoric framing the mountain as an isolated and vulnerable squirrel habitat was handily leveraged to further a campaign for public access and control of Mt. Graham. A group of 24 conservation and hunting clubs had joined the anti-observatory cause by forming the Coalition for the Preservation of Mount Graham earlier in the year. The Coalition's promotional materials claimed Mt. Graham was a "pristine" wilderness area and touted an environmentalist agenda, a reference that would come to dominate activist discourse in the years to come.⁷⁵ Though hunters and wildlife advocates had often been at odds

⁷³A copy of the letter addressed to San Carlos Apache Chairman Ned Anderson is located in the Papers of Congressman John J. Rhodes III at the Arizona State University Libraries. See Karpiscak to Dr. Ned Anderson, Chairman, San Carlos Apache Tribe. 12 August 1985.

⁷⁴ Interview with Peter Strittmatter. 06 June 2012. Further, as noted earlier, the presence of multiple shrines in the summit region of Mauna Kea had not hindered observatory development, establishing a precedent for the astronomical development of a mountain containing archaeologically significant sites.

⁷⁵ Linda Ann Fundling, "Science vs. Science," *The Arizona Daily Star*. 01 June 1986. The Coalition for the Preservation of Mt. Graham included local chapters of the Audubon Society, Rod and Gun clubs, the Sierra Club, Earth First!, the Wilderness Society, the Wildlife Federation, and other local hunting organizations such as the Arizona Muzzleloaders Society, the Desert Whitetailers, and the Arizona Bowhunter's Association. The Scientists for the Preservation of Mt. Graham later joined the group. For a complete list

before the Mt. Graham debate, they now found common cause in their desire to maintain public access to the mountain. As part of the Coalition, the Sierra Club remained adamant that the observatory posed a threat to both wilderness lovers *and* the mountain's unique ecosystem, though the organization had already demonstrated its willingness to meet the astronomers halfway by drafting an observatory proposal emphasizing public access the previous year.

Astronomers initially assumed that communicating the observatory's scientific and economic advantages would be more than sufficient to win over the public, but narratives about the observatory now began to feature both persuasive and defensive rhetorical strategies. The same month that the shrines were found on High Peak and Hawk Peak, Steward Observatory astronomer Neville "Nick" Woolf authored a short tract called "An Observatory for Mount Graham" that was clearly directed at environmentalist objections.⁷⁶ Woolf, who had conducted the early site survey that led to Mt. Graham's selection, began by asserting, "Observatories are an endangered species."⁷⁷ Woolf then suggested, "It would seem possible that two groups who both seek to save the best of a mountain can come together, and explore how to do it. It is in the interest of neither to have a confrontation in which there would be considerable prospect of both losing, and nothing being protected."⁷⁸ The "two groups" Woolf mentioned were clearly astronomers and environmentalists who were beginning to clash over their different cultural constructions of the mountain as either the "pristine" home to the endangered red squirrel or as an ideal observing site. Appropriating the language of environmentalists who criticized astronomers for placing science above the possible extinction of an endangered species, Woolf

of all participating organizations, see "Organizations strongly opposed to the development of an astrophysical complex on Emerald Peak." June 1990. John J. Rhodes III Papers, box 58, folder 3.

⁷⁶ Nick Woolf, "An Observatory for Mt. Graham," unpublished essay. July 1985. Courtesy of Doug Officer.

⁷⁷ Ibid.

⁷⁸ Ibid.

painted *environmentalists* as the group who would contribute to the extinction of an endangered species.

Woolf's attempt to portray astronomers and environmentalists as engaged in a common struggle to save an endangered species, be it squirrels or scopes, did little to quell the environmentalist opposition. Three months later, as astronomers found themselves increasingly forced to sustain a dialogue with concerned members of the public, Steward Observatory Director Peter Strittmatter submitted a departmental memo to UA faculty, staff, and graduate students titled "Mt. Graham—We need your help!"⁷⁹ Strittmatter asked members of the UA community to generate support for MGIO by attending public talks because the volume of public input on the project was simply becoming too overwhelming for Steward Observatory staff to address.⁸⁰

Red Squirrels and Red Tape

By the end of 1985, the environmentalist opposition to MGIO had received wide coverage in local newspapers, and the observatory debate was polarizing communities in southern Arizona. The Office of Arid Lands finally submitted UA's EIS to the Forest Service, but the Mt. Graham astronomy community knew it would be a long wait before the Forest Service's DEIS would be released, delaying construction until sometime in 1986 at the earliest. The fact that the Mt. Graham Red Squirrel was still under consideration for listing as an endangered species only added to the uncertainty of the project. Safford Mayor Carol Macdonald worried that listing the squirrel would signal the death blow to a project that promised to bring much-needed job opportunities to her rural town, which was afflicted with a high unemployment rate. "We don't care about squirrels," Macdonald informed a journalist in December. "It's people

⁷⁹ P.A. Strittmatter to Faculty, Staff, and Graduate Students. 11 October 1985. Courtesy of Doug Officer.

⁸⁰ Ibid.

that we're thinking about."⁸¹ As it turned out, the USFWS did not share Macdonald's priorities, and the agency recommended listing the Mt. Graham Red Squirrel as an endangered species in May 1986.

The USFWS recommendation to list the squirrel was based on the recent results of a census conducted by Forest Service biologists that had revealed a drastically declining population.⁸² UA Vice President for Research Laurel Wilkening admitted that the proposed listing of the squirrel was "the major issue and the one that we're spending most of our time attempting to solve" in an August interview, and a few weeks later, Wilkening made headlines for her surprising solution.⁸³ During a public hearing about MGIO at Tucson City Hall, Wilkening asked USFWS officials to consider halting the listing process for the squirrel altogether and offered a compromise: UA would develop a habitat conservation plan for Mt. Graham "as an alternative to listing the squirrel."⁸⁴ UA President Henry Koffler had urged the USFWS to consider alternatives to listing the Mt. Graham red squirrel in a letter to the agency the previous month, but this was the first time the idea was made public.⁸⁵ Environmental groups were offended at the suggestion. Activists spray-painted the slogan "No Scopes" on the highway leading up Mt. Graham, and "No Scopes" stickers began regularly appearing at the squirrel study

⁸¹ Macdonald, quoted in "Squirrels could affect telescope on Mt. Graham," *The Tucson Citizen*. 19 December 1985.

⁸² Federal Register 21 May 1986, 51 FR 18630-18634. Proposed Determination of End. Status & Crit. Hab. for Mount Graham Red Squirrel . See also Jim Erickson, "It could be a tough nut to crack: rare squirrel nibbling at observatory plans," *The Arizona Daily Star*. 04 August 1986.

⁸³ Wilkening, quoted in Erickson, "It could be a tough nut to crack."

⁸⁴ Wilkening, quoted in Jim Erickson, "UA asks U.S. to drop rare squirrel from endangered list," *The Arizona Daily Star*. 27 August 1986.

⁸⁵ Correspondence, UA President Henry Koffler to USFWS Regional Director Michael Spear. 21 July 1986. Courtesy of Doug Officer. See also Hirt, p. 251 on UA's subsequent plan to use telescope construction as a vehicle for monitoring and preserving the squirrels that still resided on the summit.

site on the summit.⁸⁶ Wilkening later explained that she had consulted with an attorney who recommended instituting a squirrel monitoring and habitat preservation program that would render the listing unnecessary. According to Wilkening, “we really thought we were trying to do the right thing” by building the observatory and protecting the squirrel population at the same time, and she was stunned when newspapers condemned UA’s plan as an underhanded anti-environment maneuver.⁸⁷

For UA administrators and the rest of the Mt. Graham astronomy community, the fate of the observatory seemed to be closely tied to the fate of the squirrel. Whether the squirrel would be listed as an endangered species or not was still to be determined when the Coronado National Forest finally released its long-anticipated DEIS in October 1986.⁸⁸ The DEIS avoided the “pristine” characterization of the 3,500-acre parcel on Mt. Graham, instead referring to it as a “relatively undisturbed site.”⁸⁹ The 3,500-acre astrophysical area was also, according to the DEIS, a popular site for “a variety of recreational pursuits including: hiking, camping, driving for pleasure, hunting, nature study, and berry picking” that might be affected by observatory development.⁹⁰

In a section titled “Cultural Resources and Native American Use,” the DEIS affirmed that “Native Americans have used the Pinaleno [sic] Mountains for hundreds of years,” which raised

⁸⁶ “Hurting their own cause,” *Eastern Arizona Courier* Editorial. 12 November 1986. John J. Rhodes III Papers 1975-1995, Series I, box 4, folder 19.

⁸⁷ Mitchell Waldrop, “The Long, Sad Saga of Mt. Graham,” in *Storm Over a Mountain Island: Conservation Biology and the Mount Graham Affair*, p. 9-18; p. 13-14.

⁸⁸ Draft Environmental Impact Statement. Proposed Mt. Graham Astrophysical Area, Pinaleno Mountains. Graham County, Arizona, Coronado National Forest. DEIS #03-05-86-2.

⁸⁹ *Ibid.*, p. iii.

⁹⁰ *Ibid.*

the question: “what is the most appropriate treatment of the archaeological sites located within the project area and how will Indian Religious practices be affected?”⁹¹ The shrines in question had, in fact, already been disturbed twice after their location was made public through the EIS process.⁹² Though the DEIS acknowledged that “the potential for inadvertent damage to cultural resource sites exists under all alternatives,” the Forest Service nonetheless recommended a limited astrophysical development plan.⁹³ The DEIS was evidently less concerned with the observatory’s impact on cultural resources than the projected “significant environmental effects” of development.⁹⁴

The DEIS noted that members of Earth First! and the Sierra Club expressed their opposition to the project to the Forest Service during the public comment process, which was certainly no surprise to anyone involved.⁹⁵ Taking environmental, cultural, and scientific concerns into account, the real surprise for the Mt. Graham astronomy community was that the DEIS allowed for just five telescopes to be built on seven acres of the summit, primarily because less squirrel habitat would be destroyed.⁹⁶ The NNTT did not make the list. Though NOAO had recently announced that a decision on the much-anticipated NNTT would be delayed

⁹¹ Draft Environmental Impact Statement. Proposed Mt. Graham Astrophysical Area, Pinaleno Mountains. Graham, p. iv.

⁹² At the Hawk Peak site, Coronado National Forest archaeologist Patricia Spoerl noted that pottery shards and a shrine consisting of an oval depression ringed with rocks were moved, and a similar disturbance took place at the shrine site on High Peak in May and August 1986. The disturbances were observed following a visit to the shrines by the Zuni tribe of New Mexico. An anti-observatory group called the Mount Graham Conservation Project disputed Spoerl’s analysis, claiming that pottery shards had been stolen. See Jim Erickson, “Indian shrines closed to the public: ancient shrines on Mount Graham disturbed twice in five months,” *The Arizona Daily Star*. 13 September 1986; “Two Indian Shrines on Peak Closed. U.S. looking into ‘looting’ on Mount Graham.” *Tucson Citizen*. 12 September 1986.

⁹³ Draft Environmental Impact Statement. Proposed Mt. Graham Astrophysical Area, p. viii.

⁹⁴ *Ibid*, p. vii.

⁹⁵ *Ibid*, p. i.

⁹⁶ *Ibid*, p. vi.

indefinitely, Steward Observatory was still hoping to land the giant telescope, so this exclusion was a great disappointment.⁹⁷ The DEIS left no uncertainty about the perceived relationship between the squirrel's risk of extinction and observatory construction, concluding that "chances for survival of the Mt. Graham red squirrel decrease as the level of activity and/or facility development increases."⁹⁸

The Forest Service DEIS confirmed the Mt. Graham astronomy community's fears that the squirrel was going to be a major obstacle to observatory development. UA immediately reached out to the Arizona Congressional delegation, and the politicians were eager to lend their support. In November, a letter signed by Senators Barry Goldwater and Dennis DeConcini, and Representatives Morris K. Udall, Jim Kolbe, John McCain, Eldon Rudd, and Bob Stump reached the desk of Chief Forester R. Max Peterson.⁹⁹ The letter stated that "we are concerned by the limited recommendation contained in the preferred alternative" and "we are troubled that the Forest Service's preferred alternative would eliminate Arizona from consideration for two major national telescopes."¹⁰⁰ The Congressmen then strongly urged the Forest Service to expand upon its original recommendation.¹⁰¹

While Arizona politicians were making a case for the Forest Service to reconsider Steward Observatory's original proposal for thirteen telescopes, public hearings on the DEIS

⁹⁷ Jim Erickson, "Decision on placing new telescope on Mount Graham is postponed," *The Arizona Daily Star*. 24 December 1986.

⁹⁸ Draft Environmental Impact Statement. Proposed Mt. Graham Astrophysical Area, Pinaleno Mountains. Graham, p. vii.

⁹⁹ Arizona Congressional Delegation to Mr. R. Max Peterson, Chief, United States Forest Service. 04 November 1986. John J. Rhodes III Papers 1975-1995, Series I, box 4, folder 19.

¹⁰⁰ *Ibid.* The Congressmen were referring to the proposed NNTT and the Smithsonian Institution's interferometer, which were both formally under consideration for either Mt. Graham or Mauna Kea at that time.

¹⁰¹ *Ibid.*

were held in the cities of Tucson and Thatcher to solicit the community's input before the Final EIS was prepared. Both public hearings drew a sizeable crowd of 300-400 people, indicating the high level of interest in the MGIO among southern Arizona residents.¹⁰² After the Arizona Congressional delegation's supportive letter was read to the Tucson crowd, UA President Henry Koffler joined Representative Kolbe, astronomers, Graham County officials, and other telescope supporters to speak on behalf of the scientific and economic benefits of building MGIO. Members of Earth First!, the Coalition for the Preservation of Mount Graham, the Sierra Club, the UA student chapter of the Wildlife Society, and people identifying themselves as 'concerned citizens' spoke out against the observatory.¹⁰³ One of the concerned citizens who attended the Tucson hearing noted the strong Congressional presence and cynically accused UA of "blatantly attempting to use political pressure" on the Forest Service, a charge that would re-surface repeatedly in the years to come.¹⁰⁴ At another public hearing, Earth First! members dramatically satirized the conflict by donning hats made of white Clorox bottles to represent telescopes and pretending to fire at members dressed as red squirrels.¹⁰⁵

Letters began to trickle into local newspapers from all sides of the debate, including astronomers who wished to directly confront the charge that the observatory would destroy an otherwise "pristine" environment. On behalf of the Ohio State University Department of Astronomy, which had entered into a collaborative agreement with UA on the binocular

¹⁰² The meetings took place on 05 and 06 November 1986 in Tucson and Thatcher, respectively. Debbie Romano, "Over 400 people attend hearings on telescopes," *Eastern Arizona Courier*. 12 November 1986.

¹⁰³ See Romano, *Ibid*; Stella Pena, "Mount Graham compromise opposed," *The Tucson Citizen*. 06 November 1986. John J. Rhodes III Papers box 4, folder 19.

¹⁰⁴ Ralph Wrons, "Politics, Pinalenos," letter to the editor. *The Tucson Citizen*. 20 November 1986.

¹⁰⁵ The Earth First! skit at the 1986 hearing was later reported in Jim Erickson, "Group says scopes will be destroyed: Earth First! decries Mt. Graham plan," *The Arizona Daily Star*. 31 August 1988. John J. Rhodes III Papers, box 59, folder 5.

telescope, Eugene R. Capriotti wrote in to the *Arizona Daily Star* shortly after the public hearings took place. Capriotti explained, “it would be unthinkable to develop an observatory in a truly pristine area” and noted that the mountain did not fall into this category because it was already used for multiple purposes.¹⁰⁶ Steward Observatory astronomer Neville Woolf wrote in to UA’s student newspaper *The Arizona Daily Wildcat* lamenting, “it is sad that nobody but astronomers and ecologists at the University of Arizona have been concerned enough to find ways to help the squirrel rather than use it and let it die.”¹⁰⁷ If the observatory was built, astronomers would provide supplemental food for the squirrels during the lean winter months, so Woolf reasoned that the anti-observatory activists were actually harming the squirrel through their opposition to the project. Woolf’s narrative about the observatory had shifted from metaphorically asserting that astronomers and environmentalists sought to preserve their respective versions of endangered species to boldly claiming that the observatory served the environmentalist agenda better than the environmentalists themselves.¹⁰⁸

The public hearings and often-critical media coverage left no doubt that UA was going to face an uphill battle when it came to swaying public opinion. Chairman of the Mt. Graham Task Force J.T. Williams drafted a form letter directed at ‘interested citizens’ encouraging observatory proponents to write letters of support to the Forest Service. Williams offered suggested phrasing to guide the public in its letter-writing:

¹⁰⁶ Eugene R. Capriotti, “‘Excellent site,’” Letter to the Editor. *The Arizona Daily Star*. 21 November 1986.

¹⁰⁷ Neville Woolf, “Squirrels starve,” *The Arizona Daily Wildcat*. 26 November 1986. John J. Rhodes II Papers, box 4, folder 19.

¹⁰⁸ Other members of the Mt. Graham astronomy community adopted a similar approach in 1994 by claiming that the environmentalist opposition to the observatory was “building an anti-environmental backlash, with greatest risk of damage where the biological priority is highest. If Mount Graham illuminates this problem and brings about a more rational approach, this may well transcend even its importance to astronomy.” See Walsh, Angel, and Strittmatter, “Endangered Telescopes or Species?,” p. 216.

Issues you might wish to address in your letter are: Importance of Astronomy to our culture; Role of southern Arizona in Astronomy (“Astronomy is a significant tourist attraction....”); The Future Size of the Observatory; The Red Squirrel; Visual Impact and Visitors (“most of the structures would not be visible from the valley floor. Interestingly, many people find observatories scenic (even beautiful), and often travel great distances to see giant telescopes...the DEIS overstates the visitor problem...”)¹⁰⁹

Southern Arizona residents heeded the call to participate in the public comment process, and the Forest Service received over 1,000 letters that were roughly divided in opinion, with 50 percent endorsing the observatory and 50 percent opposing development.¹¹⁰

The Mt. Graham astronomy community was still reeling from the severe limitations on the observatory imposed by the Forest Service DEIS when more bad news arrived. In January 1987, Regional Environmental Advisor for the U.S. Department of the Interior Office (DOI) of Environmental Project Review Patricia Sanderson Port determined that the DEIS had not investigated the suitability of other sites for the observatory. The DOI report also found that NEPA and the National American Indian Religious Freedom Act (NAIRFA) had not been properly addressed, and without seeking alternative sites for development, the DEIS was deemed incomplete.¹¹¹

Then the other shoe dropped. MGIO planners received the news in May 1987 that the Mt. Graham red squirrel was to be placed on the endangered species list due to a reduction in

¹⁰⁹ J.T. Williams, Chairman Mt. Graham Task Force, The University of Arizona to “Interested Citizen.” 04 December 1986. John J. Rhodes III Papers, box 4, folder 19.

¹¹⁰ Debbie Romano, “Public comment deadline is Jan. 20 for telescopes,” *The Eastern Arizona Courier*. 14 January 1987. John J. Rhodes III Papers, box 4, folder 19; Jim Erickson, “Survey finds strong support for observatory: but foes of Mt. Graham project say poll questions were slanted,” *The Arizona Daily Star*. 11 December 1987. The Arizona Historical Society Libraries and Archives. Astronomical Observatory—Mt. Graham.

¹¹¹ Correspondence, Patricia Sanderson Port, Regional Environmental Officer, US Department of the Interior Office of Environmental Project Review, to Mr. R.B. Tippeconnic, Forest Supervisor, Coronado National Forest. 16 January 1987. John J. Rhodes III Papers, box 58, folder 3.

its habitat through earlier logging activity on the mountain.¹¹² Publicly, UA Vice President for Research Laurel Wilkening applauded the decision and even stated that “the listing of the Mt. Graham Red Squirrel by itself is not enough.”¹¹³ Less than one year earlier, Wilkening had appealed to the USFWS to reconsider their decision to recommend listing the squirrel, leaving at least one observatory critic skeptical of UA’s sudden change of heart.¹¹⁴

Regardless of UA’S official stance on the listing of the squirrel, the elevation of the squirrel to endangered status was an unwelcome development for observatory planners, to say the least. The Endangered Species Act (ESA) was now part of the picture, and this meant the Forest Service no longer had the authority to approve the observatory because the ESA mandates that any federal action affecting a protected species and its habitat must first be supported by the USFWS.¹¹⁵ The endangered squirrel represented a major obstacle to telescope development that would potentially create ‘endangered astronomers,’ according to some commentators (see Figure 5). UA astronomers were suddenly faced with the daunting prospect of demonstrating that the proposed observatory would pose no threat to the squirrel’s habitat. In August, however, USFWS concluded that placing telescopes on Mt. Graham’s Emerald Peak would, in fact, do just the opposite. The USFWS Biological Opinion (BO) concluded that High

¹¹² Federal Register, 03 June 1987, 52 FR 20994- 20999. Determination of End. Status for Mount Graham Red Squirrel.

¹¹³ According to Wilkening’s statement in 1987, “The University of Arizona endorses the listing of the Mount Graham Red Squirrel as an Endangered Subspecies.” See “UA Supports Listing Red Squirrel as ‘Endangered Species’”. Sharon Kha, The University of Arizona Office of Public Information. 29 May 1987. Bob Stump Papers, 1950-2003, box 1, folder 10. Arizona State University Libraries.

¹¹⁴ Retired biologist for the Coronado National Forest and member of an anti-observatory group of scientists called the Scientists for the Preservation of Mt. Graham Charles Kennedy called the position change “incomprehensible” at a press conference in August 1987. See Kennedy, quoted in Gene Varn, “Scientists join to fight UA bid to build on peak,” *The Arizona Republic*. 25 August 1987.

¹¹⁵ Hirt, p. 250.

Peak would be less detrimental to the red squirrel's habitat, but this recommendation was most unwelcome to UA astronomers because High Peak could not accommodate as many telescopes as Emerald Peak.¹¹⁶



Figure 5. David Fitzsimmons, "The Newest Addition to the List of Endangered Species," *The Arizona Daily Star*. 29 March 1987.

Adding fuel to the fire, thirty scientists from around the country signed a petition opposing the observatory that same month under the banner Scientists for the Preservation of Mt. Graham.¹¹⁷ Calling Mt. Graham a "priceless biological museum," the statement released to

¹¹⁶ U.S. Fish and Wildlife Service draft Mt. Graham Biological Opinion. 31 August 1987. The minimum number of telescopes for the MGIO to remain fiscally viable was seven, but the High Peak location could only accommodate three telescopes. See Gene Varn, "Mount Graham observatory options given - Agency allows 3 telescopes, UA seeking 7," *Arizona Republic*, 16 July 1988.

¹¹⁷ Victor Dricks, "30 scientists sign petition opposing new observatory," *The Phoenix Gazette*. 21 August 1987; Gene Varn, "Scientists join to fight UA bid to build on peak." By 1993, the membership of the

the public by the Scientists for the Preservation of Mt. Graham made it clear that the opposition to the observatory was not limited to recreationists or radical environmentalists.¹¹⁸ However, the Scientists for the Preservation of Mt. Graham later formally joined the Coalition for the Preservation of Mount Graham, a group consisting of allied recreationists and environmentalists.

Gale Monson, a fellow of the Arizona-Nevada Academy of Sciences and retired USFWS biologist who organized the group, remarked “we thought we ought to let the public know that there are scientists opposed to this project, too.”¹¹⁹ Significantly, the coalition of biologists from numerous disciplines included many UA faculty members who believed the observatory represented a conflict between astronomers and biologists.¹²⁰ Until then, the controversy over MGIO had been characterized by conflicting interpretations of the mountain as a recreational haven that provided habitat for an endangered squirrel and a potential scientific haven for advanced scientific instruments. Now the terms of the debate were shifting from a conflict over resources between scientists and nonscientists to a clash between the epistemological claims of two distinct scientific communities.

Facing years of potential delays in construction pending further studies, the observatory’s fate was looking decidedly grim, and the Mt. Graham astronomy community sprang into action. Astronomers began preparing a revised proposal for the Forest Service that

Scientists for the Preservation of Mt. Graham had expanded to 325 scientists. See Steve Yozwiak, “UA’s nightmare began at scope project’s start: fierce resistance couldn’t be foreseen, aid contends,” *The Arizona Republic*. 04 July 1993.

¹¹⁸ Ibid.

¹¹⁹ Monson, quoted in Dricks, “30 scientists sign petition.”

¹²⁰ Monson characterized the conflict as one between astronomers and biologists in which each side believed they were right. Monson, quoted in Varn, “Scientists join to fight UA bid to build on peak.”

called for fewer telescopes, including the NNTT, and UA circulated a survey about the observatory among Tucson-area registered voters to take stock of public opinion.¹²¹ The survey showed overwhelming public support for the observatory, but some critics called the survey questions misleading.¹²² It was time for a more drastic approach.

Putting MGIO on the “fast-track”

UA again solicited the political intervention of the Arizona Congressional delegation, and this time, the University asked for more than a strongly worded letter of support. The new strategy was to develop legislation that would facilitate observatory construction on a faster timetable. The DEIS recommendation of just five telescopes had made the observatory economically unfeasible, and it was clear that the squirrel’s endangered status would lead to years of further delays.¹²³ Steward Observatory Director Peter Strittmatter later explained that according to the Forest Service, it would be another three to five years before the observatory could be built, “and we had three projects lined up that would have gone away. The Forest Service actually suggested that if we wanted to move quickly, we’d have to go to Congress. And so we did.”¹²⁴

UA retained the services of the high-profile Washington, D.C.-based lobbying firm Patton, Boggs, & Blow to aid in the legislative effort, a move that produced rapid results.

¹²¹ Scientific and Economic Viable Observatory (Proposal Re-Submitted 9-20-87). Bob Stump Papers. Box 1, folder 10; Jim Erickson, “Decision on placing new telescopes on Mount Graham is postponed,” *Arizona Daily Star*. 24 December 1986. The number of telescopes was first reduced to ten, and later to seven. See also Public Opinion Survey on Mt. Graham International Observatory Near Safford, Arizona. October-November 1987. Wilson & Associates. John J. Rhodes III Papers, box 58 folder 2.

¹²² Erickson, “Survey finds strong support for observatory.”

¹²³ According to UA Director of Federal Relations Margy McGonagill, expected delays meant “a 95% chance of losing the Germans.” Margy McGonagill to Jim Huska, Memorandum Re: U.S. Fish and Wildlife Biological Opinion. 21 July 1988, p. 2. John J. Rhodes III Papers, box 59, folder 5.

¹²⁴ Interview with Peter Strittmatter. 06 June 2012.

Representing UA, attorney John A. Moag, Jr. of Patton, Boggs, & Blow informed Congressman Rhodes in July 1988 that

it now appears that an effort to legislate a telescopic research site on Mt. Graham is on the fast track...the current strategy for moving the legislation is to amend the provisions on to a bill in a Senate committee or on the floor of the Senate and be accepted in a conference with the House. We continue to monitor the availability of an appropriate vehicle for action in the very near future. Obviously, we are looking at bills which are certain to go on to the White House for signature within the next two months.¹²⁵

Moag remained in frequent contact with the Congressmen, assuring them that “we continue to examine all fast-track, sure-to-be-signed bills moving through Congress.”¹²⁶

At the same time, the firm was also occupied with a critical examination of a second USFWS BO. In order for the observatory to be financially viable, UA needed permission to build seven telescopes, and the first BO had excluded this possibility altogether by allowing for astronomical development only on High Peak, a region of the summit that was simply too small for seven instruments.¹²⁷ After years of study and debate, the American astronomy community had finally decided against the NNTT, so there was no longer any hope of bringing the giant telescope project to Mt. Graham as a major financial partner.¹²⁸ UA had already countered the five-telescope restriction imposed by the DEIS and the BO’s restriction to High Peak with a new

¹²⁵ John A. Moag, Jr. to Jim Huska, Congressman Rhodes’ Office. “Mt. Graham Hotwire.” 28 July 1988. John J. Rhodes III Papers, box 59, folder 5.

¹²⁶ John A. Moag, Jr. to Jim Huska, Congressman Rhodes’ Office. “Mt. Graham Hotwire.” 02 August 1988. John J. Rhodes III Papers, box 59, folder 5.

¹²⁷ Margy McGonagill to Jim Huska, Memorandum Re: U.S. Fish and Wildlife Biological Opinion. 21 July 1988, p. 2. John J. Rhodes III Papers, box 59, folder 5.

¹²⁸ Funding and support for the NNTT steadily dwindled as the American astronomy community debated whether large and costly telescopes for a smaller number of researchers should be prioritized over numerous small telescopes used by a greater number of researchers. The NNTT was no longer a sure thing by the late 1980s, and the project became dead in the water after the AURA Board held a 1987 meeting in Keystone, Colorado to discuss the future of the NOAO and the overall direction of American astronomy in the upcoming decade. See McCray, p. 694-696.

proposal for seven telescopes on both High Peak and the preferred Emerald Peak. The USFWS then produced its second BO in July 1988.¹²⁹ The new BO presented UA with three alternatives, but in UA Director of Federal Relations Margy McGonagill's assessment, all three scenarios presented a "severe risk to the future of astronomy in Arizona and the continental United States."¹³⁰ Corresponding with Arizona Congressman Rhodes, McGonagill reported that MGIO's German partners would most likely move their telescope to another state or country due to the considerable delays in securing the observatory site resulting from the restrictive conditions of the BO.¹³¹ Additionally, the BO called for the closure of the Bible camp and fourteen summer cabins, a condition that sparked new outrage over the observatory's impact on public access to the mountain.¹³²

Astronomers also felt the BO report contained faulty and biased data, and suspected that the BO was a tactic to delay the observatory. Addressing the negative reaction to the camp and cabin closures, Strittmatter sympathized, "There are no real facts in the report concerning the detrimental impact of the telescope or cabins and camp on the squirrels."¹³³ Conrad Istock, a UA biologist who supported the MGIO proposal, analyzed the USFWS report and determined that the BO was not centered on sound biological analysis, but on "stopping or delaying the

¹²⁹ Tom Smylie, "Red Squirrel Biological Opinion Issued." 14 July 1988.

¹³⁰ Margy McGonagill to Jim Huska, Memorandum Re: U.S. Fish and Wildlife Biological Opinion. 21 July 1988, p. 1.

¹³¹ *Ibid*, p. 3.

¹³² Laurel L. Wilkening, Vice President for Research, University of Arizona, "University of Arizona responds to Fish and Wildlife Opinion," *Eastern Arizona Courier*. 10 August 1988.

¹³³ Strittmatter, quoted in "Cabin owners, Forest Service clash," *Eastern Arizona Courier*. 10 August 1988.

observatory.”¹³⁴ Istock proposed creating an observatory complex that included “an ecology research zone” and jokingly concluded that “red squirrels, astronomers, ecologists and recreationists could all live happily ever after.”¹³⁵ Jokes aside, it is important to note that neither Istock’s report nor the voluminous correspondence between Patton, Boggs, & Blow attorneys and Arizona Congressmen made any references to mollifying Native American concerns. Though the San Carlos Apaches would soon become major players in the MGIO controversy, the tribe was silent on the issue through much of the late 1980s. Instead, it was environmentalists and recreationists who remained the most outspoken critics of the observatory, and the restrictions contained in the BO had brought the conflict to a boiling point.

In light of the public backlash over the BO restrictions, the Mt. Graham astronomy community began to make an increasing effort to persuade the public that access to the mountain would not be unduly jeopardized by the observatory project. Addressing the controversy head-on, several key observatory supporters wrote into local newspapers to once again convey the message that UA would not shut out the public or destroy a pristine environment if the observatory was built. On the contrary, the notion of Mt. Graham as a pristine wilderness was a misguided fantasy. John P. Schaefer, a former UA President and President of Research Corp. Technologies, which was to become a major financial partner in MGIO, authored a *Tucson Citizen* editorial titled “Scientific preserve is the right choice for saving Mt. Graham.”¹³⁶ Schaefer puzzled over the “curious alliances” between hunters, recreationists, and environmentalists who had ostensibly come together to fight for the red squirrel, “an

¹³⁴ Conrad Istock, “The Biological Situation of the Mt. Graham Astrophysical Study Area in Light of the Second Biological Opinion Rendered by the USFWS, July 14, 1988, p. 4. John J. Rhodes III Papers, box 59, folder 5.

¹³⁵ Istock, “The Biological Situation of the Mt. Graham Astrophysical Study Area,” p. 6.

¹³⁶ John P. Schaefer, “Scientific preserve is the right choice for saving Mt. Graham.” *Tucson Citizen*. 28 July 1988.

irresistible charmer.”¹³⁷ This allied group who claimed to be fighting for the environment had presented the public with a false choice between ‘habitat or astronomy,’ according to Schaefer. Mt. Graham was already besieged by motorcycles, ATVs, and other recreational activities, so it could hardly be considered pristine. However, if the real issue was securing better access to the mountain’s natural resources while ensuring the squirrel’s survival, Schaefer insisted that the observatory was the clear answer. By dedicating an area of the summit to build “the world’s finest observatory,” a provision could also be made to protect and study the squirrel.¹³⁸ Once again, the Mt. Graham astronomy community was recasting the observatory as a means of aiding the squirrel, and Schaefer further expanded this rationale to encompass the parallel agenda of recreationists.

After news of the planned legislative intervention was leaked by the media in the summer of 1988, the public debate about the observatory’s threat to recreationists and the mountain’s ecosystem only intensified.¹³⁹ Following Schaefer’s lead, UA President Koffler wrote in to the *Eastern Arizona Courier* to emphasize that “we have never proposed closing Mount Graham to recreational uses. We believe that recreation, environmental conservation and astronomical research can co-exist for the benefit of all.”¹⁴⁰ Koffler defended the legislative approach because it “would allow us to build the observatory while respecting the environment and permitting continued recreational uses.”¹⁴¹

¹³⁷ Schaefer, “Scientific preserve is the right choice for saving Mt. Graham.”

¹³⁸ Ibid.

¹³⁹ “Legislation may solve scope problem,” *Eastern Arizona Courier*. 10 August 1988.

¹⁴⁰ Henry Koffler, “Our readers write: Opinion causes controversy for UA,” *Eastern Arizona Courier*. 10 August 1988.

¹⁴¹ Ibid.

UA officials were not the only ones campaigning harder for the observatory after news of the legislative approach was made public. Letters of support for MGIO from local business leaders poured into the Forest Service and Arizona Congressional offices urging the Forest Service to allow seven telescopes and for Congress to pass legislation that would enable the observatory to be built without further delay.¹⁴² The Arizona Association for Industrial Development concluded that it was “vitaly important to Arizona’s economic well-being that the state remains the Astronomy capital of the world” and projected that losing the new observatory would result in the loss of 127 new jobs and a total of \$211.1 million in construction costs over a 16-year period.¹⁴³

On the other side of the debate, the blurred boundaries between environmentalist and recreationist objections to the observatory grew more evident as different groups weighed in on the legislative path to building the observatory. Maricopa Audubon Society leader Bob Witzeman wrote to Arizona Congressman Rhodes to bring his attention to a recent article in the quarterly publication of the Arizona Wildlife Federation. Instead of featuring an environmental argument against observatory construction as one might expect from an environmental advocacy group, the article published in the *Arizona Wildlife News* focused on the recreational

¹⁴² For a representative sampling, see Bill Farris to The Honorable Morris K. Udall. 26 August 1988; Tucson Economic Development Corporation Board of Directors. June 1988; Willcox Chamber of Commerce and Agriculture to Senator John McCain. 26 August 1988; Pima County Sheriff’s Department to The Honorable Jon Kyle. 26 August 1988; E.S. “Steve” Engle, Mayor, Oro Valley to The Honorable John McCain. 26 August 1988; Arizona Association for Industrial Development to The Honorable Dennis DeConcini. 14 September 1988; Arizona Mining Association to The Honorable John McCain. 21 September 1988. John J. Rhodes III Papers, box 58, folder 2.

¹⁴³ Resolution of the Arizona Association for Industrial Development. 09 September 1988. John J. Rhodes II Papers, box 58, folder 2. See also “Telescopes to bring new growth” Editorial. *Eastern Arizona Courier*. 31 August 1988. John J. Rhodes III Papers, box 59, folder 5.

aspects of the conflict over Mt. Graham.¹⁴⁴ In the article, former Arizona Game and Fish biologist Steve Gallizioli predicted, “once the Mount Graham observatory is operational, you’ll have to kiss goodbye [sic] to much of the recreational use of the upper slopes.”¹⁴⁵ Gallizioli concluded by urging Arizona Wildlife Federation members to voice their opposition to special legislation that would circumvent environmental laws because it would set “a dangerous precedent.”¹⁴⁶ In this way, Gallizioli framed the issue of legislation permitting observatory construction as an equal threat to federal laws protecting the endangered squirrel and the public’s freedom to enjoy unrestricted access to Mt. Graham. Both Witzeman’s letter and Gallizioli’s *Arizona Wildlife News* article reveal that environmentalists were making judicious use of the recreationist argument against the observatory, just as recreationists had jumped on the environmentalist bandwagon. Both environmentalist and recreationist agendas boiled down to ensuring the public had input into the decision-making process governing public lands, and the narratives of both parties were tied to the preservation of Mt. Graham as an unspoiled habitat for the red squirrel.

The possibility of a legislative act that would ultimately deny public engagement also struck a nerve among recreationists who did not consider themselves environmentalists. One Graham County resident dramatically warned, “we are at the eleventh hour. Our Gila Valley’s greatest asset is about to be taken away from us.”¹⁴⁷ Disavowing the environmentalist agenda entirely, the concerned citizen explained, “telescopes or NOT, we may have to fight for the right

¹⁴⁴ Bob Witzeman to The Hon. Jay Rhodes III. 13 September 1988. John J. Rhodes III Papers, box 59, folder 5.

¹⁴⁵ Steve Gallizioli, “The issue isn’t squirrels or scopes,” *Arizona Wildlife News*. September 1988. . John J. Rhodes III Papers, box 59, folder 5.

¹⁴⁶ Ibid.

¹⁴⁷ Gene Fowler, “Write for rights,” *Eastern Arizona Courier*. 24 August 1988.

to keep camping with the squirrels we've been camping with for over a hundred years...telescopes are wonderful, but not if they limit what Mount Graham has to offer so many of us. Mount Graham should not be limited to being a 'foundation' for a telescope."¹⁴⁸

Similarly, cabin owners who had just learned that the BO mandated closing their summer retreats on Mt. Graham were outraged about the prospect of a legislative act that would give the green light to the observatory. Though UA officials shared the concern that the BO was unnecessarily restrictive, cabin owners directed their anger at astronomers and the Forest Service during public meetings.¹⁴⁹

The indignation of cabin owners paled in comparison to the wrath of the radical environmental opposition, however. Earth First! co-founder David Foreman threatened, "there are people who are prepared to make them put the scopes up there several times—which means a telescope doesn't see the stars very well if its mirror is broken."¹⁵⁰ Not all environmentalists shared Foreman's belief that civil disobedience was the right approach to blocking the observatory. Coalition for the Preservation of Mount Graham activist Paul Pierce defended the more traditional methods of organized protests and announced that the Coalition would soon seek legal action.¹⁵¹ But Foreman was not content to work within the legal system,

¹⁴⁸ Fowler, "Write for rights."

¹⁴⁹ "Cabin owners, Forest Service clash." However, amidst speculation that special legislation to push the observatory project forward might also render the conditions of the BO moot, local residents remained divided on the observatory issue.

¹⁵⁰ David Foreman, quoted in Jim Erickson, "Group says scopes will be destroyed: Earth First! decries Mt. Graham plan," *The Arizona Daily Star*. 31 August 1988. John J. Rhodes III Papers, box 59, folder 5.

¹⁵¹ Erickson, "Group says scopes will be destroyed." See also Edward Stiles, "Vandalism of telescopes predicted," *Tucson Citizen*. 31 August 1988; Michael Hart, "Terrorism atop Mt. Graham possible: property may be sabotaged," *The Arizona Daily Wildcat*. 01 September 1988. John J. Rhodes III Papers, box 59, folder 5; Margy McGonagill to Jim Huska, Memorandum Re: U.S. Fish and Wildlife Biological Opinion. 21 July 1988, p. 3.

telling reporters that if legislation permitting the observatory was passed, the only alternative left for telescope opponents would be direct sabotage of telescopes.¹⁵² Foreman may have been alone in advocating such an extreme approach to stopping the observatory, but other environmentalists and biologists following the Mt. Graham case certainly shared his distaste for the rumored legislative campaign to secure the site.¹⁵³ In the waning days of the 1988 Congressional session, Arizona newspapers broke the news that the rumors were true: a new act had suddenly cleared the way for observatory construction.

A Legislative Win and an Environmental Loss: the Arizona-Idaho Conservation Act of 1988

Four long years after the observatory plans were first made public, the red tape standing in the way of building an observatory on Mt. Graham had finally been cut through the efforts of Arizona Senators John McCain and Dennis DeConcini, who had secured Congressional approval for a last-minute rider to the 1988 Arizona-Idaho Conservation Act (AICA) that permitted observatory development to proceed immediately.¹⁵⁴ AICA allowed for three telescopes to be constructed by the UA and its partners on nine acres of Emerald Peak, with four additional telescopes subject to approval if an environmental impact study showed no significant impact on the Mt. Graham Red Squirrel. Thirteen acres were allocated for Phase II of the observatory, pending further biological studies. For the first three telescopes, however, no further biological or cultural studies would be required because the conditions of the ESA and the NEPA would automatically be considered fulfilled. Essentially, the instantly controversial

¹⁵² Michael Hart, "Terrorism atop Mt. Graham possible: property may be sabotaged."

¹⁵³ "Legislation may solve scope problem."

¹⁵⁴ S. 2840 (100th): Arizona-Idaho Conservation Act of 1988. 18 November 1988.

rider attached to AICA by Congress allowed UA to build the telescopes *without* further adherence to the conditions of the ESA and the NEPA.¹⁵⁵

Never before had a major public university sought an exemption from federal cultural, religious, and environmental protection laws, and this unprecedented move warranted some explanation on the Senate and House floors. Senator McCain made a case for the rider's exemptions on the grounds that the scientifically and economically valuable project would be lost if UA was not able to move forward quickly. McCain clarified, "Unfortunately, the German participants as well as other participants have signaled their intention of withdrawing from the consortium this fall if the process is not concluded. Their patience has justifiably worn thin."¹⁵⁶ Senator DeConcini affirmed that time was running out to build the observatory before the telescope partners withdrew, and assured the members of the Senate that

this legislation strikes a balance that is rarely possible—it allows man's quest for knowledge to coexist with nature and all its wonders. It allows us to move forward on this critical project and, concurrently, nurse the red squirrel back to a thriving population. It allows this Nation to maintain its leadership in astronomy. And, it sends a signal to the Mount Graham partners—the Vatican, the Italian Government, and the Germans—that we are serious about cooperating in astronomy and that our process does come to conclusion.¹⁵⁷

Both Senators reminded their audience that UA had already demonstrated its willingness to compromise with the Forest Service and the USFWS by reducing the observatory from thirteen telescopes to ten, and later to seven.¹⁵⁸ No further compromises could be made.

¹⁵⁵ S. 2840 (100th): Arizona-Idaho Conservation Act of 1988. 18 November 1988.

¹⁵⁶ McCain, quoted in Congressional Record—Senate. 13 October 1988. S 15740. John J. Rhodes III Papers, box 58, folder 2.

¹⁵⁷ DeConcini, quoted in Congressional Record—Senate. 13 October 1988. S 15741. John J. Rhodes III Papers, box 58, folder 2.

¹⁵⁸ See McCain, Congressional Record—Senate. 13 October 1988. S15740; DeConcini, *Ibid.*

During the discussion in the House of Representatives a week later, Arizona Congressman Morris K. Udall acknowledged

it is hard to think of any recent environmental issue in Arizona that has stirred more genuine emotion and heated controversy than this one...the proposal that has come to us from the Senate troubles me. To short circuit the process Congress has established by law to separate out the good projects from the bad projects and to make all the projects better ones, is something I do not regard warmly. And that is what this amendment does, by confirming the unfinished environmental impact statement as meeting the requirements of the National Environmental Policy Act insofar as the first three telescopes are confirmed.¹⁵⁹

Udall then went on to enthusiastically express his support for the rider because the package offered many benefits to Arizonans and “the University of Arizona’s argument that an overly protracted administrative process would be tantamount to a decision against putting telescopes on the mountain does have merit.”¹⁶⁰ North Carolina Congressman Walter B. Jones, who chaired the Merchant Marine and Fisheries Committee, agreed that “quite frankly, earlier drafts of this measure could have been misinterpreted as waiving parts of the Endangered Species Act as applied to the Mt. Graham observatory project.”¹⁶¹ Though initially concerned that supporting such a rider would undermine the ESA and the NEPA, Jones was eventually persuaded to endorse all of the bill’s provisions. The key factor influencing Jones’ change of mind was the USFWS BO, noting that “the act relies heavily on the biological value judgments and expertise of the U.S. Fish and Wildlife Service.”¹⁶² The credibility of the BO would later be

¹⁵⁹ Udall, quoted in Congressional Record—House. 20 October 1988. H 10546. John J. Rhodes III Papers, box 58, folder 2.

¹⁶⁰ Ibid.

¹⁶¹ Jones, quoted in in Congressional Record—House. 20 October 1988. H 10553. John J. Rhodes III Papers, box 58, folder 2.

¹⁶² Ibid.

called into question during a General Accounting Office investigation, but in late 1988, Jones had no reason to doubt that the BO was prepared according to the normal standards of the USFWS.

The proposed conservation act would permit a major construction project to move forward without further biological study in the only known habitat of an endangered species, yet the Senate and House discussions largely glossed over environmental impacts. Instead, Congress was persuaded to pass the bill based on the scientific and economic value of developing Mt. Graham for astronomy. The jury was still out whether telescope construction would be detrimental to the red squirrel, but the Congressmen had made an impassioned and convincing argument for the urgency of building the observatory. Notably, although the NEPA addressed development projects on culturally significant sites, there was no mention of the mountain's cultural meaning to any Native American tribes. Mt. Graham was by then known to contain several shrine sites, but the mountain's archaeological significance did not warrant discussion. In the final analysis, bypassing the ESA and the NEPA through the AICA rider was whitewashed as removing unnecessary impediments to a scientific project that would otherwise be irretrievably lost.

The AICA rider was passed by the Senate and House of Representatives in October and signed into law in November, and throughout the following year, the act was widely condemned by environmentalist groups and other concerned citizens who charged UA and its telescope partners with relying on special-interest politics to pursue its agenda at any cost (see Figure 6).

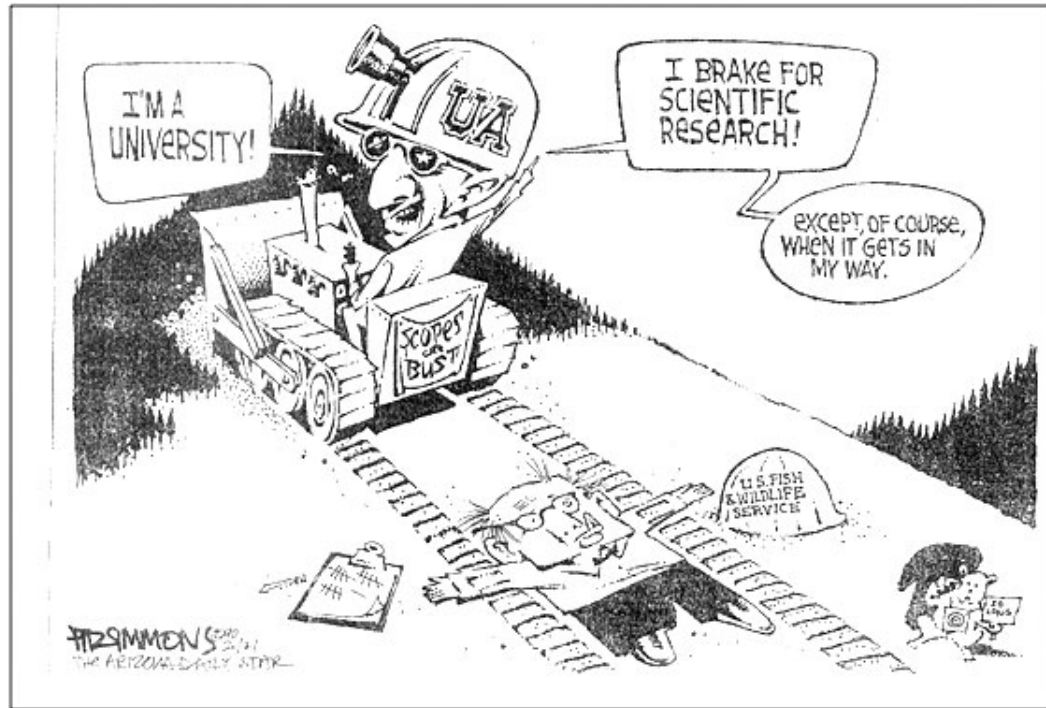


Figure 6. David Fitzsimmons, “I’m a University! I brake for scientific research! except, of course, when it gets in my way,” *The Arizona Daily Star*. 21 February 1990.

In April, Earth First! activists gathered in front of St. Augustine’s Cathedral in Tucson to highlight the Vatican Observatory’s involvement by waving signs reading “Why Tithe for Telescopes? Save Mount Graham! Vatican—Pull Out” and “Question Papal Priorities.”¹⁶³ Angry letters from a group called “Citizens of Mt. Graham” poured into the offices of the Arizona Congressional delegation and UA’s telescope partners.¹⁶⁴ According to its promotional literature, Citizens of Mt. Graham was made up of Graham county residents who strongly objected to the AICA rider’s provision to close existing cabins and the Bible camp on Mt. Graham as part of adhering to the BO for the observatory project. Through picketing and boycotting the pro-observatory newspaper *The Eastern Arizona Courier*, Citizens of Mt. Graham planned to

¹⁶³ Ernie Heltsley, “Activists protest Vatican funding of telescope on Mount Graham,” *The Arizona Daily Star*. 03 April 1989.

¹⁶⁴ The Director of the Max Planck Institut für Radioastronomie, P.G. Mezger, called the letters “threatening.” See P.G. Mezger to Arizona State Senate, Graham County Board of Supervisors, City of Safford, and Publisher, *Eastern Arizona Courier*. 08 May 1989. John J. Rhodes III Papers, box 58, folder 7.

“channel sullen and angry, potentially widespread violent actions due to massive community rage into legal, non-violent political, litigatory, news-media, etc. activities.”¹⁶⁵ John J. Rhodes III had evidently anticipated the negative backlash from the public, since a form letter dated a month before the bill was passed into law regretfully stated, “Unfortunately, the Mt. Graham legislation came to the House of Representatives in a package consisting of a number of bills of importance to Arizona and two other states. The House was not given an opportunity to vote on the individual pieces of the legislative package.”¹⁶⁶ While the Citizens of Mt. Graham was chiefly concerned about the observatory’s impact on restricting recreational access to the mountain, environmental activists continued to denounce the observatory as an ecological threat to the Mt. Graham Red Squirrel.

The Sierra Club Legal Defense Fund (SCLDF) reacted forcefully, filing a lawsuit against the Forest Service and the USFWS in the summer of 1989. Representing the Sierra Club, the National Audubon Society, the Maricopa, Prescott, and Tucson Audubon Society, and the National Wildlife Federation, the SCLDF sought to stop telescope construction on the grounds that AICA was unconstitutional.¹⁶⁷ In its press release, the SCLDF presented the lawsuit as an epic battle between a small endangered subspecies and a powerful scientific institution—would the federal government truly be willing to sacrifice an entire species in order to build a few

¹⁶⁵ Citizens of Mt. Graham. 23 February 1989. John J. Rhodes III Papers, box 58, folder 7. *The Eastern Arizona Courier* later ran an editorial refuting the Citizens of Mt. Graham’s claim that the group represented 90 percent of the county by opposing the observatory. See “Telescope dealings,” Editorial. *Eastern Arizona Courier*. 19 April 1989. John J. Rhodes III Papers, box 58, folder 7.

¹⁶⁶ Letter Draft for Approval. Subject: Mt. Graham/Phoenix Indian School bill vote. 18 October 1988, p. 1. John J. Rhodes III Paper, box 59, folder 5.

¹⁶⁷ Mt. Graham Red Squirrel (*Tamiasciurus hudsonicus grahamensis*), an endangered species; et al, Plaintiffs v. Clayton Yeutter, in his official capacity as Secretary of Agriculture, et al, Defendants. 26 July 1989. John J. Rhodes III Papers, box 58, folder 6.

telescopes?¹⁶⁸ The UA subsequently became involved in the lawsuit as a co-defendant in order to have its interests represented as a major stakeholder in the observatory, and the entire project was brought to a standstill while the lawsuit was reviewed by a federal judge.

Science “Facts” and Science Friction

It had taken an act of Congress to move the observatory project forward after four years of delays, and now the objections of environmental groups had produced yet another significant delay. MGIO was once again in jeopardy, and the lawsuit and ongoing public backlash over the observatory project in the wake of the AICA rider was creating a public relations crisis for the University. UA issued a “Myths and Facts” statement in the fall of 1989 to counter some of the damaging accusations hurled at the University in recent months.¹⁶⁹ The first “myth” to be overturned was the allegation that UA “will destroy a pristine, unspoiled mountaintop with its observatory.”¹⁷⁰ Environmentalists had characterized Mt. Graham as a ‘pristine’ environment for years, and UA once again pointed to the numerous summer homes, the Bible camp, and the influx of recreationists during the summer months to dismiss the notion that the mountain was in any way pristine.¹⁷¹

The terms of the ‘pristine’ vs. ‘built’ environment debate were by now well-trod territory for all parties invested in the observatory’s fate, owing to competing ideological constructions of the mountain. While observatory advocates saw the mountain as an ideal

¹⁶⁸ SCLDF press release, quoted in John P. Schaefer, “Environmentalists needn’t be combative enemies,” *Tucson Citizen*. 22 August 1989. John J. Rhodes III Papers, box 58, folder 3.

¹⁶⁹ “Myths and Facts About Mount Graham.” The University of Arizona. Fall 1989. John J. Rhodes III Papers, box 58, folder 7.

¹⁷⁰ *Ibid*, p. 1.

¹⁷¹ *Ibid*. UA also denied that it was a “bully” that had spent a million dollars lobbying Congress to ignore the NEPA.

platform for astronomy, environmental advocates subscribed to what William Cronon has called the myth of wilderness as a “pristine sanctuary where the last remnant of an untouched, endangered, but still transcendent nature can for at least a little while longer be encountered without the contaminating taint of civilization.”¹⁷² Cronon has argued that since the 1970s, environmentalists have embraced the defense of biological diversity as a powerful ideological tool within American wilderness preservation movement. Within the framework of biological diversity, endangered species frequently “serve as vulnerable symbols of biological diversity while at the same time standing as surrogates for wilderness itself.”¹⁷³ Narratives issued by the environmentalist opposition to MGIO typified this conflation of biological diversity with a ‘pristine’ wilderness. In other words, the endangered squirrel came to embody a mythical and politically charged conception of wilderness itself.

Activist literature clearly suggests that the squirrel served as a convenient proxy for the ‘pristine’ wilderness of Mt. Graham’s upper elevations. When the Coalition for the Preservation of Mount Graham produced its own “Mt. Graham Factsheet” in 1990, nine of the twelve “facts” listed concerned UA’s destruction of the squirrel’s habitat.¹⁷⁴ Though fourteen of the groups in the Coalition were hunting organizations and earlier statements by the Coalition had well established its opposition to the observatory on recreationist terms, the fact sheet adopted a decidedly environmentalist stance. Former UA President Schaefer had once sarcastically referred to the squirrel as “an irresistible charmer,” and it seemed that there was some validity

¹⁷² Cronon, “The Trouble with Wilderness; or, Getting back to the wrong nature,” in Cronon, *Uncommon Ground*, p. 69.

¹⁷³ *Ibid.*

¹⁷⁴ “Mt. Graham Factsheet.” Coalition for the Preservation of Mt. Graham. June 1990. John J. Rhodes III Papers, box 58, folder 3.

to the notion that protecting the squirrel served as a powerful rallying cry for both an environmentalist and recreationist agenda.¹⁷⁵

Whether motivated by protecting the squirrel or safeguarding recreational access, individuals who identified themselves as environmentalists showed up to protest the first major construction activity at the observatory site in October 1989. The environmentalist presence was by this time predictable, but the construction site also saw the quiet emergence of a new stakeholder in the fight for Mt. Graham. According to a press release, even before the first trees were felled to make way for a two-mile access road leading to the summit, “an American Indian woman from Tucson asked the U.S. Forest Service to delay construction because she said the mountain is sacred to the San Carlos Apache Tribe.”¹⁷⁶ MGIO project supervisor John Ratje stated that UA was willing to meet with the woman and Apache elders to discuss the religious significance of the mountain, but construction moved forward on schedule, despite frequent interruptions by Earth First! protesters.¹⁷⁷

One of the more dramatic protests came during a two-day scientific conference on Mt. Graham’s ecology co-sponsored by UA and the Smithsonian Institution. Fifty scientists from across the country descended on UA to discuss the biological diversity of Mt. Graham as well as its value as an astronomical site.¹⁷⁸ After learning more about the mountain’s Pleistocene-era

¹⁷⁵ Schaefer, “Scientific preserve is the right choice for saving Mt. Graham.”

¹⁷⁶ News Release: Mount Graham Update, Oct. 1-7. Jeff Harrison, Lori Stiles. Sent 09 October 1989. John J. Rhodes III Papers, box 58, folder 7.

¹⁷⁷ Earth First! member Scotty Johnson was present at the construction site to protest the first day of logging activity on 04 October 1989. On 07 October, 15-20 protesters joined Johnson at the site. See News Release: Mount Graham Update, Oct. 1-7. Two Earth First! members were arrested on 23 October after obstructing work at the site by laying in the road and refusing to move. See Douglas Kreutz, “2 arrested in protest at Mount Graham,” *The Arizona Daily Star*. 24 October 1989.

relic ecosystem, many conference participants regretted the passage of the AICA rider to expedite progress on the observatory. In Assistant Secretary for Research at the Smithsonian Institution Robert Hoffmann's view, "we were simply asleep at the switch...we did not anticipate the actions of the congressional delegation."¹⁷⁹ Deputy Assistant Secretary for Research at the Smithsonian Ross Simons agreed that the act had been premature, a view shared by other scientists quoted in the article, including Kansas State Professor of Biology Chris C. Smith.¹⁸⁰

Smith, an expert on red squirrels, also believed UA should have held the conference before seeking the congressional rider. Though he acknowledged that the observatory had scientific value, Smith noted, "this symposium was done after the fact. So they had lost some of their credibility as an educational thing."¹⁸¹ University of Washington anthropologist Don Grayson was deeply upset by UA's actions, stating, "I went there totally neutral. I came back horrified with what the university had done."¹⁸² Conference attendees may have left with unsettling questions about the conservation decisions that were made during observatory planning, but some members of the Mt. Graham astronomy community left the conference under police investigation.

¹⁷⁸ The conference was an invitation-only event called "The Biology of Mount Graham Workshop." See Elizabeth Pennisi, "Workshop weighs peak's biological and astronomical value," *The Scientist*. 22 January 1990. John J. Rhodes III Papers, box 58, folder 6. Proceedings from the conference were later published as a book. See C.A. Istock, R.S. Hoffmann, eds., *Storm Over a Mountain Island: Conservation Biology and the Mount Graham Affair* (Tucson: The University of Arizona Press, 1995).

¹⁷⁹ Hoffman, quoted in Pennisi, "Workshop weighs peak's biological and astronomical value."

¹⁸⁰ Pennisi, "Workshop weighs peak's biological and astronomical value."

¹⁸¹ Smith, quoted in Norma Coile, "Prof blasts, others defend Mt. Graham talks," *Tucson Citizen*. 04 December 1989.

¹⁸² Grayson, quoted in Pennisi, "Workshop weighs peak's biological and astronomical value;" Coile, "Prof blasts, others defend Mt. Graham talks." Istock responded directly to Grayson's accusations that the conference was intended to "whitewash" UA's role in building the observatory without properly studying the mountain's ecosystem as a "sort of silly" argument. Istock pointed out that the workshop would broaden knowledge of environmental needs. See Istock, quoted in Coile.

In an incident that was later dubbed “l’affaire bear” by the press, Earth First! member Scotty Johnson interrupted the conference by donning a bear mask and reading from a prepared script that began, “Hi, my name’s Billy Bear and the animals on Mount Graham elected me to represent them here. We were going to bring some red squirrels but the little rascals are so stressed out they couldn’t make the trip.”¹⁸³ In the police report that was later filed, Johnson alleged that he was pushed to the back of the room by Conrad Istock, head of UA’s department of Ecology and Environmental Biology, and that Strittmatter then roughly jerked his bear mask, causing injury to Johnson’s neck. Istock claimed that he simply escorted Johnson to the back of the room, though he acknowledged that he was able to move Johnson because “I was bigger than he was.”¹⁸⁴ An *Arizona Daily Star* column made light of the assault charges by posing the question “What is the world coming to when radical saboteurs are being pushed around by science nerds?”¹⁸⁵ The humor was probably lost on both sides of the conflict, as it further represented how significantly the relationship between the Mt. Graham astronomy community and the environmentalists had deteriorated.

One month after “l’affaire bear,” District Judge Alfredo Marquez heard the SCLDF case, with conflicting testimony from biologists on the observatory’s impact on the endangered squirrel population.¹⁸⁶ Marquez decided to postpone a decision on an injunction barring further

¹⁸³ Tom Beal, “Investigating ‘l’affaire bear,’” *The Arizona Daily Star*. 24 October 1989. Johnson’s interruption came during a talk by UA biologist Paul Young. Young was overseeing two teams of biologists in the required squirrel monitoring program, which involved establishing a restricted squirrel “refugium” and collecting data from squirrel middens. See News Release: Mount Graham Update, 8-14. Lori Stiles, Jeff Harrison. Sent 16 October 1989. John J. Rhodes III Papers, box 58, folder 7.

¹⁸⁴ Istock, quoted in Gene Varn, “UA officials shove activists from room: environmentalist alleges assault in claim to police,” *The Arizona Republic*. 21 October 1989. See also Douglas Kreutz, “2 arrested in protest at Mount Graham,” *The Arizona Daily Star*. 24 October 1989; Beal, “Investigating ‘l’affaire bear.’”

¹⁸⁵ Beal, “Investigating ‘l’affaire bear.’”

construction while lawyers sought depositions from witnesses, ensuring that the legal drama would spill over into the next year.

A Harbinger of Native Dissent

Over a hundred miles away from the Tucson District court where the Sierra Club case was being heard, many tribal members on the San Carlos reservation were following the courtroom proceedings with great interest. In December, the San Carlos Apache newspaper *The Moccasin* ran a column entitled “Should observatory be built?”¹⁸⁷ After providing a synopsis of the unfolding courtroom debate, the article continued, “But while politicians, biologists, and astronomers argue about the red squirrel habitat there is something that is as important, if not more important, to a number of Apache elders. These Apaches believe Mt. Graham to be a sacred mountain.”¹⁸⁸ According to former San Carlos Apache Tribal Council member and tribal elder Lucille Shorten, Mt. Graham was home to spirit dancers who also assumed human form. Shorten explained, “people have seen them and heard them...they are real.”¹⁸⁹ Shorten stated, “elders talk about stopping the construction because they want to protect the mountain because of tradition...the sacred water, the sacred herbs and the burial grounds.”¹⁹⁰ San Carlos

¹⁸⁶ Sierra Club attorneys called biologist Peter Warshall from UA’s Office of Arid Lands Studies and Tom Waddell of the Arizona Game and Fish Department and UA attorneys called head of UA’s Department of Ecology and Evolutionary Biology Conrad Istock. See “Background information: federal court litigation involving Mount Graham International Observatory.” 23 March 1990. Steve Emerine. Courtesy of Doug Officer. Other biologists were also called to provide depositions for the case, including Stanford University Department of Biological Sciences Bing Professor of Population Studies Paul R. Ehrlich, who testified that the Mt. Graham Red Squirrel would soon become extinct and that destroying more squirrel habitat would increase the likelihood of extinction. See Declaration of Paul R. Ehrlich, Mt. Graham Red Squirrel (*Tamiasciurus hudsonicus grahamensis*), an endangered species; et al, Plaintiffs v. Clayton Yeutter, in his official capacity as Secretary of Agriculture, et al., Defendants. John J. Rhodes III Papers, box 58, folder 6.

¹⁸⁷ “Should observatory be built?” *The Moccasin*. 12 December 1989. Arizona State University Libraries. MSM-512.

¹⁸⁸ Ibid.

¹⁸⁹ Shorten, quoted in “Should observatory be built?”

Apache elder Ola Cassadore Davis affirmed, “the medicine men sing about that mountain when they pray, generation to generation. They say there is holy water on top of that mountain and sacred herbs and a burial site. To us Apaches, it is a very sacred place. It’s really important to my people not to have those things built up there.”¹⁹¹

Acknowledging that the San Carlos Apache Tribe had thus far been silent on the issue of the observatory, Cassadore stated that she had been reluctant to speak out against the observatory, but was later inspired to take up the cause to honor the memory of her brother, a prominent tribal medicine man. Cassadore started a petition against telescope construction and informed *The Moccasin* reporter that she had gathered 74 signatures within two weeks, indicating that the opposition to the observatory was not limited to only a few individuals.

For Cassadore, the Vatican’s involvement in the observatory was particularly troubling: “Although many Apaches are Catholics, the pope is one of the UA’s several collaborators on the Mt. Graham observatory. He should understand about religion...and that mountain is important to the traditional religion of my people.”¹⁹² Cassadore’s confusion over the Vatican Observatory’s partnership in the MGIO may have stemmed in part from Pope John Paul II’s recent visit to Phoenix. Just two years earlier, the Pope addressed 14,000 Native Americans at the national Catholic Indian Tekakwitha Conference and told the audience that the Church attempted to protect Native American rights.¹⁹³ The Pope admitted that when it came to early European missionary contact with native peoples, “unfortunately, not all the members of the

¹⁹⁰ Shorten, quoted in “Should observatory be built?”

¹⁹¹ Cassadore Davis, quoted in *Ibid.*

¹⁹² *Ibid.*

¹⁹³ Pope John Paul II, quoted in Teresa Schuelke, “Pope visits Phoenix: Indians told to keep culture,” *The Catholic Sun*. 24 September 1987.

Church lived up to their Christian responsibilities,” but he implored the audience to move beyond the mistakes of the past in order to “work together for reconciliation and healing, as brothers and sisters in Christ.”¹⁹⁴ Yet while urging the conference attendees to continue their embrace of Christianity, the Pope also offered a message that plainly spoke to the Church’s acknowledgement of a unique Native American religious identity: “I encourage you, as native people belonging to the different tribes and nations in the East, South, West, and North, to preserve and keep alive your cultures, your languages, the values and customs which have served you well in the past and which provide a solid foundation for the future.”¹⁹⁵

Though the Pope made it clear later on that he was a firm supporter of the proposed MGIO, his 1987 address centered largely on promoting Catholicism among Native Americans, and the San Carlos Apaches who were beginning to voice an objection to MGIO in the late 1980s found more fault with UA than the Vatican.¹⁹⁶ In the 1989 *Moccasin* article, Tribal Councilman Ernest Victor, Jr. summarized, “we need to maintain our traditions, our culture, our language. We must fight to protect our rights...and our elders tell us that Mt. Graham is a sacred mountain.”¹⁹⁷ Victor, Jr.’s rallying cry and Cassadore Davis’ anti-observatory petition on file in the Tribal Council office marked the first tentative steps toward publicly challenging UA and its

¹⁹⁴ Pope John Paul II, quoted in Schuelke, “Pope visits Phoenix.”

¹⁹⁵ Ibid.

¹⁹⁶ In a 1989 address, Pope John Paul II stated, “I know that, as scientists, you cherish and respect nature. Hence, while striving to fathom the ultimate frontiers of the Universe, you have sought to interfere as little as possible in the natural processes of the earth, that small but precious part of the Universe from which you observe.” See Address of Pope John Paul II to the Founders of the Vatican Observatory Foundation. 19 June 1989, quoted in George V. Coyne, S.J., “Statement of the Vatican Observatory on the Mt. Graham International Observatory (MGIO), the Ecology of the Pinaleno Mountains, and Related Political Issues.” 22 April 1992, p. 1-6; p. 6. John J. Rhodes III Papers, box 58, folder 1.

¹⁹⁷ Victor, Jr., quoted in “Should observatory be built?”

scientific partners, but the Western Apache opposition did not truly become an obstacle for MGIO planners until the following year.

The “war over Mt. Graham”

When the SCLDF case resumed in early 1990, Arizona newspapers gleefully reported on a shocking new twist in the Mt. Graham controversy: two wildlife biologists for the USFWS had testified that they were pressured by a superior to conclude that the observatory project would not cause undue harm to the squirrel population. Biologists Sam Spiller and Leslie Fitzpatrick claimed that they were ordered by Regional Director of the USFWS Michael Spear to tailor their BO to show that the squirrel population would incur no significant damage from the observatory.¹⁹⁸ As a subsequent Congressional investigation would confirm, Spear had met with UA and learned that the university needed to include an Emerald Peak option, so Spear directed his biologists to change their original conclusions. Against their professional judgment, Spiller and Fitzpatrick agreed to alter their original BO, which stated that an observatory on Mt. Graham’s Emerald Peak would pose an unacceptable jeopardy to the squirrel. The modified BO provided for an Emerald Peak option, and this report was then touted as the biological basis for the Congressional vote approving the AICA rider.¹⁹⁹

Shortly after the story first broke that the biologists had “fudged the data,” local newspaper editorials and letters to the editor widely condemned both the USFWS and UA (see

¹⁹⁸ Deposition of Sam F. Spiller. Mt. Graham Red Squirrel (*Tamiasciurus hudsonicus grahamensis*), an endangered species; Sierra Club, a non-profit corporation; National Wildlife Federation, a non-profit association, et al., Plaintiffs vs. Clayton Yeutter, et al., Defendants. 11 January 1990. John J. Rhodes III Papers, box 58, folder 7. See also Sam Negri, “Red-squirrel study fudged, biologists say,” *The Arizona Republic*. 07 February 1990.

¹⁹⁹ See Tom Beal, “The battle over Mount Graham continues on,” 01 April 1990. *The Arizona Daily Star*. Courtesy of Doug Officer.

Figures 3 and 4).²⁰⁰ The Mt. Graham astronomy community decried the local media coverage as biased and misleading. UA Vice President for Research Michael Cusanovich dismissed the claims because they were derived from “leaked snippets of unsigned depositions.”²⁰¹ Steward Observatory astronomer Neville Woolf wrote into the *Phoenix Gazette* charging that reporters had failed to read the BO and sarcastically offering, “our University also offers a course in remedial reading.”²⁰² Astronomer Christopher Corbally of the Vatican Observatory wrote into *The Arizona Daily Star* to challenge its editorial on Mt. Graham. Corbally first apologized for the tone of his letter written “in the heat of the moment,” then bashed the *Star’s* editorial as “quite unscientific, merely rhetorical in a pejorative sense.”²⁰³

But the modification of the BO did not just incite a public uproar over UA’s management of the observatory project; it deepened existing fault lines on campus between the Mt. Graham astronomy community and biologists opposed to the observatory. A letter signed by eleven UA Department of Ecology and Evolutionary Biology faculty members and 41 graduate students was sent to *The Arizona Republic* denouncing the project that had long been endorsed by the head of the department, Conrad Istock.²⁰⁴ The letter asserted, “by scorning the few laws that do exist

²⁰⁰ See “Mount Graham scandal,” Editorial. *The Phoenix Gazette*. 08 February 1990; “Mountain of lies? Truth or consequences tie on Mount Graham,” Editorial. *The Arizona Daily Star*. 09 February 1990; “Mount Graham: science is not a matter of convenience,” Editorial. *The Arizona Daily Star*. 21 February 1990; Silvia Rouzaud, “Dark days of conservation,” *The Arizona Republic*. 24 March 1990; Gene Ann Parker, “Telescope deception,” *The Phoenix Gazette*. 29 March 1990; James Achenbach, “Mount Graham red squirrels,” Mesa, Tempe, Chandler *Tribunes*. 23 April 1990. John J. Rhodes III Papers, box 58, folder 3. Only one newspaper reserved judgment, the Safford-based *Eastern Arizona Courier*, which ran an editorial stating, “we would like to see this case settled once and for all in the courts, not in the newspapers or television.” See Editorial. *Eastern Arizona Courier*. 14 February 1990. Courtesy of Doug Officer.

²⁰¹ Michael Cusanovich to Ms. Elizabeth Raisbeck. 06 March 1990, p. 3. Courtesy of Doug Officer.

²⁰² Neville Woolf, Letter to the Editor. *Phoenix Gazette*. 08 March 1990. Courtesy of Doug Officer.

²⁰³ Christopher J. Corbally, S.J., “Scientific method,” Letter to the Editor. *The Arizona Daily Star*. 11 March 1990. Courtesy of Doug Officer.

to protect our environment, the U. of A. administration has sent a message to the world that institutional prestige and economics are more important.”²⁰⁵ Istock responded to the letter by explaining that he had never claimed to represent the department and predicted, “I’m sure you could drum me out on a vote—on this issue, at least.”²⁰⁶

Istock’s views may have been unpopular to biologists within his department, but his colleagues rallied around him just a few weeks later after the Mt. Graham controversy took an unexpectedly dark turn. Though not represented in the courtroom, the radical environmentalist strain of the MGIO opposition had continued to make its presence known by staging protests and other acts of civil disobedience. Protesters spray-painted “Stop UofA Mountain Rapers” on the road leading up the mountain on numerous occasions, and far more threatening acts against observatory supporters soon followed.²⁰⁷

In February 1990, Istock received a death threat from an anonymous observatory opponent.²⁰⁸ Strittmatter had also been subjected to a disturbing personal attack the previous

²⁰⁴ Rosemary J. Smith, Mark Fishbein, and David Carey to Editor, *The Arizona Republic*. 08 February 1990. John J. Rhodes III Papers, box 58, folder 6. The letter likely reached a large readership because it was printed in the Sunday edition of *The Arizona Republic*, the newspaper with the largest circulation in the state. See Rosemary J. Smith, Mark Fishbein, and David Carey, Department of Ecology and Evolutionary Biology, “Issue more than ‘scopes vs. squirrels’” *The Arizona Republic*. 18 February 1990. John J. Rhodes III Papers, box 58, folder 3.

²⁰⁵ Smith, Fishbein, and Carey to Editor, *The Arizona Republic*.

²⁰⁶ Istock, quoted in “Douglas Kreutz, “UA ‘scorned laws’ for scope OK, letter says,” *The Arizona Daily Star*. 13 February 1990. John J. Rhodes III Papers, box 58, folder 3.

²⁰⁷ Doug Frerichs, “Mount Graham foes plan ‘holy war’ to block telescope,” *The Phoenix Gazette*. 24 January 1990. John J. Rhodes III Papers, box 58, folder 5.

²⁰⁸ Norma Coile, “UA department head receives death threat,” *Tucson Citizen*. 22 February 1990. The Arizona Historical Society Library and Archives. Astronomical Observatories; Roger Angel to The Honorable Morris K. Udall. 19 March 1990, p. 1. Courtesy of Doug Officer; Steve Emerine, UA Office of Public Information, “Letter in error,” *Tucson Citizen*. 31 March 1990. Courtesy of Doug Officer. Istock’s colleagues and students in the Department of Ecology and Evolutionary Biology signed a statement making it clear that while their opinions on the observatory varied, they were unanimous in their outrage

year when a dead ground squirrel was mailed to his home.²⁰⁹ Alarmed by the death threat and the recent escalation of the ‘ecoterrorist’ threat against the Mt. Graham astronomy community, Roger Angel of UA’s Mirror Lab wrote to Congressman Morris (Mo) Udall pleading with him to “do something to stop the war over Mt. Graham.”²¹⁰ Angel explained that biologists who endorsed the observatory were targets for radical environmentalists because “in this war, collaboration with astronomers is treason.”²¹¹ Angel wrote, “the placement of these mirrors on a few acres of Arizona land where there is the clearest view of the heavens is being portrayed as an environmental apocalypse” by members of Earth First! and the local chapter of the Audubon Society.²¹² In Angel’s view, the cause of the “war” against the observatory was a mistrust of scientific advance.²¹³ Not wishing to be associated with anti-science environmental extremists, Angel reported that some of his scientific colleagues had withdrawn their membership in leading environmental organizations. Angel concluded, “Mo, this is crazy, but it is also deadly serious. Astronomers’ equipment has already been smashed, power lines to Kitt Peak and Tohono O’odham Villages cut down, and scarcely veiled threats have been made to damage telescopes on Mt. Graham...is this country to be run as a democracy, or by terrorists?”²¹⁴

over the death threat. See Coile, “UA department head receives death threat.” At the time, there were 28 faculty members and 58 graduate students in the department, so the letter was signed by a majority of the faculty and graduate students. See Arthur H. Rotstein, “Court ruling near, environmentalists pulling for squirrel,” *Sierra Vista Herald*. 25 March 1990. Courtesy of Doug Officer.

²⁰⁹ Waldrop, “The Long, Sad Saga of Mt. Graham,” in *Storm Over a Mountain Island: Conservation Biology and the Mount Graham Affair*, p. 9.

²¹⁰ Roger Angel to The Honorable Morris K. Udall. 19 March 1990, p. 1. Courtesy of Doug Officer.

²¹¹ Ibid.

²¹² According to Angel, Dr. Bob Witzeman’s leadership of the local chapter of the Audubon Society was more aligned with the Earth First! movement and did not fairly represent the views of the National Audubon Society, then headed by Peter Berle. See Angel to The Honorable Morris K. Udall, p. 1.

²¹³ Ibid, p. 2.

Angel's letter to Udall sheds light on the shifting parameters of the Mt. Graham controversy. Angel repeatedly referred to the anti-observatory campaign as a "war," echoing the language recently employed by telescope opponents. Back in January, three members of the Audubon Society declared the clash between astronomers and environmentalists a holy war.²¹⁵ Audubon Society leader Bob Witzeman described the Mt. Graham conflict as a sacred matter because in his view, protecting the squirrel from the observatory was akin to fighting for the integrity of the Endangered Species Act.²¹⁶ But if the debate had turned into a war, the battleground looked very different to the respective communities of environmentalists and astronomers who drew from a mismatched arsenal of guerilla and conventional methods.

In the early years of the conflict, much of the power to shape the outcome of the observatory seemed to rest with grassroots environmental activists and concerned citizens who flooded the Forest Service with critical comments about the project during the DEIS process. Whether or not the squirrel was a convenient vehicle for disguising concerns about access restrictions within an environmentalist agenda, the environmentalist objections were heard loud and clear by the USFWS. Taking public comments into account, protecting the squirrel population became the key obstacle to building the observatory, which translated into years of further studies before construction could possibly begin. In the war for Mt. Graham, the environmentalists employed the weapons of protests and letter-writing to a near-victory, but then the Mt. Graham community called in the big guns by enlisting the support of a powerful lobbying group and Arizona Congressmen. Environmentalists retaliated against a conservation act that bypassed federal conservation laws with protests, 'ecosabotage', and a lawsuit that

²¹⁴ Angel to The Honorable Morris K. Udall, p. 2.

²¹⁵ Doug Frerichs, "Mount Graham foes plan 'holy war' to block telescope, *The Phoenix Gazette*. 24 January 1990. John J. Rhodes III Papers, box 58, folder 5.

²¹⁶ *Ibid.*

effectively halted construction, and Angel was once again appealing to one of the politicians that had been so instrumental in pushing forward the legislation. Observing the back-and-forth between the environmentalists' attempts to thwart the observatory and UA's legal and political interventions, a *Tucson Citizen* editorial framed the conflict as a "David and Goliath battle," with UA standing in for Goliath.²¹⁷

Angel's letter also clearly delineated opposing factions within the community of American environmentalists. The divide between mainstream and radical environmentalists was already well established, though the philosophically opposed groups of environmentalists had managed to form an uneasy alliance in their fight against the observatory. Through the Mt. Graham controversy, however, a different sort of schism was developing within the environmentalist community. A certain contingent of scientists and science supporters who also considered themselves environmentalists now felt it was important to distance themselves from the increasingly militant strain of environmentalism that was attempting to halt observatory construction. Former UA President Schaefer had previously employed a similar rhetorical strategy in a 1989 op-ed defending MGIO when he referred to himself as "a scientist in addition to being an environmentalist" who was "increasingly alienated" from the environmental opposition.²¹⁸ Similarly, UA Vice President for Research Michael Cusanovich responded to an anti-observatory letter from the Vice President of the National Audubon Society by first identifying himself as "a scientist and as an environmentalist."²¹⁹ Cusanovich then continued, "the question for the Audubon Society is whether it wishes to support fact or fanaticism," again

²¹⁷ "A pebble strikes but Goliath university still stands. Editorial. 30 March 1990. *Tucson Citizen*. Courtesy of Doug Officer.

²¹⁸ Schaefer, "Environmentalists needn't be combative enemies," Perspective. *Tucson Citizen*. 22 August 1989. John J. Rhodes III Papers, box 58, folder 3.

²¹⁹ Michael Cusanovich to Ms. Elizabeth Raisbeck. 06 March 1990, p. 1.

communicating the idea that environmentalists who opposed the observatory were fundamentally opposed to science.²²⁰

Members of the Mt. Graham astronomy community were increasingly walking the tightrope between presenting themselves as concerned environmental advocates while rejecting the kind of environmentalism that threatened the observatory. Since many astronomers also see themselves as environmentalists who must fight the city lights and polluted skies that threaten to interfere with clear viewing, the anti-environment characterization was a difficult pill to swallow, and it was important for these astronomers to establish that astrophysical development of the mountain did not automatically render them environmentally insensitive.²²¹ Peter Boyce, Executive Director of the American Astronomical Society from 1979-1995, firmly believed that environmentalists and astronomers “ought to be walking arm in arm with respect to protecting darkness, the night sky, and remoteness.”²²² As Vatican Observatory astronomer Corbally summarized when he wrote in to the *Tucson Citizen*,

²²⁰ Cusanovich to Raisbeck, p. 1. Though the Audubon Society is not generally considered a radical group, as Angel’s letter pointed out, under Bob Witzeman, the Maricopa Audubon Society assumed more of a radical environmentalist stance than the National Audubon Society. See Angel to The Honorable Morris K. Udall, p. 1. Still, the Audubon Society took a firm stance against the ecoterrorism sanctioned by Earth First!

²²¹ Astronomers in the Tucson area were known to be strong advocates of reducing air pollution and other environmentally unfriendly activities that diminished the viewing of the night sky. In 1988, the nonprofit International Dark Sky Association (IDA) was founded by two Tucson-based astronomers to specifically address the problem of light pollution due to urban sprawl. The IDA website draws upon environmentalist rhetoric to frame the problem of light pollution as one that is “threatening astronomical facilities, ecologically sensitive habitats, our energy consumption, and our human heritage.” See “The International Dark Sky Association.” www.darksky.org. Accessed 12 September 2010.

²²² Boyce, quoted in Waldrop, “The Long, Sad Saga of Mt. Graham,” in *Storm Over a Mountain Island: Conservation Biology and the Mount Graham Affair*, p. 10.

“many people must be finding it odd that Tucson astronomers are being cast in the role of anti-environmental ogres.”²²³

Between Earth and Sky: the Dueling Epistemologies of Biologists and Astronomers

To frame the war as one between champions of scientific progress and environmentalist Luddites was to deny the authority of professional biologists who were opposed to the observatory. The Scientists for the Preservation of Mount Graham was composed of biologists who had devoted their lives to the pursuit of science. Member Peter Warshall, the UA biologist who first compiled the data on the squirrel population for UA's EIS, put it plainly in an interview for *USA Today*: “I never thought I'd have to choose between the earth and sky.”²²⁴

The Mt. Graham controversy ran deeper than pitting rational scientific judgment against irrational anti-science extremism; it was a conflict that pitted scientists against scientists: astronomers against biologists, and biologists against biologists. This tension between scientific authority was not missed by journalists, who sensationalized the debate by running headlines such as “Science vs. Science,” “Astronomers, Biologists Clash over observatory plans,” “Biology versus Astronomy: The Battle for Mount Graham,” and “Squaring off over squirrels: ecosystem caught in scientific feud.”²²⁵ Even an article in *The Scientist* focused on capturing the unusually adversarial relationship between scientific disciplines surrounding the observatory. The article emphasized that “the debate pits one discipline against another” in “a turf war between biology

²²³ Christopher J. Corbally, “Balanced assessment,” *Tucson Citizen*. 12 March 1990. Courtesy of Doug Officer.

²²⁴ Peter Warshall, quoted in Norma Coile, “Squaring off over squirrels: ecosystem caught in scientific feud,” *USA Today*. 13 March 1990.

²²⁵ Fundling, “Science vs. Science,” *The Arizona Daily Star*; John Lancaster, “Astronomers, Biologists Clash over observatory plans,” *The Washington Post*. 08 March 1990; Elizabeth Pennisi, “Biology versus Astronomy: The Battle for Mount Graham,” *BioScience* 39 (1989): p. 10-13; Coile, “Squaring off over squirrels: ecosystem caught in scientific feud.”

and astronomy,” a theme repeated throughout the discussion of the recent scientific conference on the mountain’s biological diversity.²²⁶

The observatory was not only creating a rift in the American scientific community; it was also alienating astronomers and biologists overseas. The German weekly news magazine *Stern* published an article in November 1989 revealing that the anti-observatory campaign waged by environmentalists was troubling to Max Planck Institute Director Peter Mezger. Referring to the Earth First! protests, Mezger contended, “The University of Arizona underestimated the gravity of these concerns.”²²⁷ The Max Planck Institute had already heavily invested in the construction of the 10-meter radio telescope jointly funded by UA, but Mezger admitted, “if somebody would offer us a better site, we would certainly reconsider this.”²²⁸ After the *Stern* article was published, Max Planck biologist Gerhard Thielcke spoke out against his astronomer colleagues by declaring, “Telescopes can be built elsewhere, without the consequences that would occur on Mount Graham. I ask (astronomers) to give up the plans for Mount Graham. Certainly there are other sites just as suitable for this project.”²²⁹ Thielcke’s objection to MGIO placed him squarely within the same scientific debate between astronomers and biologists that was then playing out in the courts back in Arizona.

²²⁶ Elizabeth Pennisi, “Workshop weighs peak’s biological and astronomical value.”

²²⁷ Mezger, quoted in “Sterngucker gegen Eichhörnchen,” *Stern Magazin*. 30 November 1989, p. 3. Translation by author. John J. Rhodes III Papers, box 58, folder 3.

²²⁸ Mezger, quoted in “Sterngucker gegen Eichhörnchen.” Mezger further stated that Mauna Kea would be the ideal site for the radio telescope, but the cost of locating the telescope in Hawai’i was too prohibitive.

²²⁹ Thielcke, quoted in “Stop the Mount Graham telescopes,” Editorial. *The Phoenix Gazette*. 30 January 1990. John J. Rhodes III Papers, box 58, folder 3.

A Decision and a Delay

In March 1990, the long-anticipated judgment in the SCLDF lawsuit against the U.S. Forest Service, the USFWS, and UA was made by the District Court in Tucson. On the day of closing remarks, U.S. District Judge Alfredo C. Marquez asked UA attorney David C. Todd of Patton, Boggs, & Blow if it would be possible to stop construction if the monitoring program ultimately revealed that the observatory would lead to the squirrel's extinction. Todd's reply was that if it was later determined that construction "was going to kill every squirrel," nothing could be done about it because Congress had already approved the project.²³⁰ In a move that was widely viewed as an environmentalist win, Marquez then granted a 120-day injunction against telescope construction due to the questions that had been raised during the case about the USFWS BO and the AICA exemption from the ESA (see Figure 7).



Figure 7. Elwood Watson, Jr., "Judge delays construction of Arizona Observatory," *The Scientist*. 30 April 1990.

²³⁰ Mt. Graham Red Squirrel, Plaintiff, vs. Clayton Yeutter, et al., Defendants. 26 March 1990. John J. Rhodes III Papers, box 58, folder 6.

Marquez reasoned, “I suppose it could be argued Congress didn’t have a true picture.”²³¹ Weighing in on the ruling, a *Tucson Citizen* editorial asserted that environmentalists would eventually lose the war, but UA had lost its reputation: “There’s nothing the university can do now to erase the public relations blunder of using its political muscle—pumped up by a powerful and well-paid Washington lobbying firm—to circumvent the law.”²³²

In a press conference held the day after the judge’s ruling, UA Vice President for Research Michael Cusanovich vowed that the University would appeal the ruling because “we feel strongly that the decision was not made based on the facts...we feel that the recent events have demonstrated clearly that the Sierra Club’s involvement is concerned with stopping the project, not with addressing the squirrel’s plight.”²³³ Based on the news that USFWS had possibly falsified biological conclusions to move the observatory forward, Senator John McCain suggested that a congressional oversight hearing might be a necessary follow-up to the judge’s ruling.²³⁴ The news of yet another delay in observatory construction did not sit well with some of MGIO’s proposed partners. Considering the fate of the Columbus telescope, Chair of Ohio

²³¹ Marquez, quoted in “A pebble strikes but Goliath university still stands. Editorial. 30 March 1990. *Tucson Citizen*. Courtesy of Doug Officer.

²³² “A pebble strikes but Goliath university still stands. Editorial. 30 March 1990. *Tucson Citizen*. Courtesy of Doug Officer. Other editorials reached similar conclusions. See “Ring of truth: Mount Graham gets a sprinkling of justice,” *The Arizona Daily Star*. 30 March 1990.

²³³ Cusanovich, “Press conference.” 27 March 1990. See also Douglas Kreutz, “UA appealing injunction on telescope work,” *The Arizona Daily Star*. See also Norma Coile, “UA to appeal court-ordered telescope delay,” *Tucson Citizen*. 27 March 1990; Chris McGuire, “UA will appeal federal decision to halt Mt. Graham telescopes,” *The Arizona Daily Wildcat*. 28 March 1990. Courtesy of Doug Officer.

²³⁴ Norma Coile, “McCain ponders U.S. hearings on Mount Graham scope OK,” *Tucson Citizen*. 30 March 1990. Courtesy of Doug Officer. Senators McCain and DeConcini signed a letter written to the Comptroller General of the United States Charles A. Bowsher requesting a General Accounting Office hearing two weeks later. See Dennis DeConcini and John McCain to The Honorable Charles A. Bowsher. 12 April 1990. John J. Rhodes III Papers, box 58, folder 3.

State University's department of astronomy Eugene Capriotti admitted, "if it were to become a permanent thing and not just a four-month delay, you could kiss it goodbye."²³⁵

In May, the Mt. Graham astronomy community took one step forward and two steps back. First, UA received the welcome news that its appeal of Marquez's injunction against telescope construction had resulted in a reversal of the decision.²³⁶ A significant legal obstacle to telescope construction had been removed, but this positive development was quickly overshadowed by the untimely faux pas of a high-ranking government official that brought national scrutiny to the MGIO.

"Do we have to save every subspecies?"

Interior Secretary Manuel Lujan, responsible for overseeing the enforcement of the ESA, declared in a May 1990 interview for the *Denver Post* that the law should be changed because it was "just too tough."²³⁷ According to Lujan, the ESA was frequently abused to block important development projects such as the proposed \$200 million observatory in Arizona, which had been held up for years due to the endangered red squirrel subspecies.²³⁸ Lujan stated, "Nobody's told me the difference between a red squirrel, a black one, or a brown one" and then

²³⁵Capriotti, quoted in Mark Holman Turner, "Judge delays construction of Arizona Observatory," *The Scientist*. 30 April 1990. John J. Rhodes III Papers, box 58, folder 2.

²³⁶ United States Court of Appeals for the Ninth Circuit. Mt. Graham Red Squirrel et al., Plaintiffs vs. Clayton Yeutter, et al., Defendants, and State of Arizona Board of Regents, University of Arizona, Defendant-Intervenor/Appellant. 15 May 1990. John J. Rhodes III Papers, box 58, folder 6.

²³⁷Kit Miniclier, "Rare-species act 'just too tough': Interior boss Lujan suggests weakening law," *The Denver Post*. 11 May 1990.

²³⁸ Lujan's commentary on the endangered squirrel's role in stalling the observatory project was also prompted by other environmental disputes. Controversies over protecting the northern spotted owl of the Pacific Northwest and the squawfish in Colorado were also playing out during this period. See, for example, John Lancaster, "Endangered Squawfish halts Colorado project," *The Washington Post*. 10 May 1990.

wondered, “do we have to save every subspecies?”²³⁹ Lujan’s direct reference to the Mt. Graham Red Squirrel in the context of weakening the ESA was immediately ridiculed by the press (see Figure 8).



Figure 8. David Fitzsimmons, “Red squirrels, black squirrels, brown squirrels...I can’t tell the difference,” *The Arizona Daily Star*. 13 May 1990.

Suddenly, the Mt. Graham debate was under a national spotlight as Lujan’s remarks became the catalyst for a public dialogue on the merits and drawbacks of the ESA in general, and the observatory project in particular.²⁴⁰ Clippings from major newspapers across the country lambasting Lujan’s comments as well as copies of letters to the editor from local

²³⁹ Lujan, quoted in Norma Coile, “Criticism, empathy for Lujan’s remarks,” *Tucson Citizen*. 12 May 1990.

²⁴⁰ See Bob Kowalski, “Fur flies over rare-species act: Lujan’s remarks anger activists,” *The Denver Post*. 12 May 1990; Rudy Abramson, “Do we have to save every subspecies?” *The Los Angeles Times*. 12 May 1990. “Species need a strong act,” *The Oregonian*. Editorial. 15 May 1990; “Interior secretary needs to find more enthusiasm for job,” *The Idaho Statesman*. 15 May 1990; “Lujan’s ignorance,” *The Arizona Daily Star*. 15 May 1990; “Wildlife needs vigorous protection,” *The Atlanta Constitution*. 16 May 1990; “Listen up, Lujan,” *Mesa Tribune*. 16 May 1990; “Protect endangered species act,” *Dallas Times Herald*. 20 May 1990; “Red squirrels are different,” *San Francisco Examiner*. 21 May 1990. John J. Rhodes III Papers, box 58, folder 2.

newspapers were sent out to the MGIO weekly internal distribution list, so UA was closely following the debacle.²⁴¹ Strittmatter wrote a letter to the *Sierra Vista Herald* acknowledging that “Interior Secretary Lujan has indeed stirred a furor over the Mount Graham Red Squirrel,” but charged that Lujan’s inflammatory comments were nonetheless instrumental in highlighting the “flagrant misuse” of the ESA to stop the observatory.²⁴² In Strittmatter’s view, “opponents are not really interested in the squirrel but are using it as a tool to kill the project.”²⁴³ Strittmatter’s message was likely lost in the storm of negative publicity, since every article on Lujan’s statement mentioned the conflict between scientists and environmentalists over the MGIO. Making matters worse, a *New York Times* piece on Lujan’s complaint about the ESA pointed the finger directly at UA with the headline “Stars or Squirrels: University’s choice.”²⁴⁴ Lumping the observatory project in with the weakening of the ESA was exactly the kind of bad press the Mt. Graham astronomy community didn’t need if the observatory was ever to win enduring public approval.

Since the AICA rider was first passed back in 1988, environmentalists had depicted the observatory project as a threat to the ESA, and now Lujan had inadvertently given fuel to these

²⁴¹ See Mt. Graham Routing Slip 16 May 1990; 21 May 1990. Courtesy of Doug Officer.

²⁴² Strittmatter, “Lujan posed wrong question about Mount Graham,” letter to the editor. *Sierra Vista Herald*. 20 May 1990.

²⁴³ Ibid. Leaving no doubt that the astronomer vs. biologist conflict was alive and well, Julie Stromberg of the Arizona State University Center for Environmental Studies wrote a scathing follow-up to Strittmatter’s letter that was published in the state’s largest newspaper, *The Arizona Republic*. Stromberg stated that Strittmatter’s argument “revealed the ecologic ignorance of those who believe that money can buy anything.” See Stromberg, “Extinction of squirrels a high price to pay,” *The Arizona Republic*. 26 May 1990.

²⁴⁴ Seth Mydans, “Stars or squirrels: University’s choice,” *New York Times*. 21 May 1990. Courtesy of Doug Officer. Steve Emerine of the Mt. Graham Steering Committee complained that the article “completely misses the point” of the issue in a letter to the editor. Emerine protested the article’s depiction of the conflict as squirrels or telescopes, asserting, “the reality is that the observatory and the squirrels can co-exist.” See Steve Emerine to Letters to the editor, *The New York Times* (original copy). The University of Arizona Office of Public Information. 21 May 1990. Courtesy of Doug Officer.

arguments by using the Mt. Graham Red Squirrel as an example of how the act blocked beneficial development. Bob Witzeman of the Maricopa Audubon Society sent a letter to the Arizona Congressional delegation asking, “Will Lujan’s ideology prevail? Will our environmental laws be circumvented at the expense of an irreplaceable sky island ecological treasure?”²⁴⁵ The Presidents and Executive Directors of a coalition of ten major environmental groups also wrote the Arizona Congressional delegation to express their concern over Lujan’s comments and the possibility of weakening the ESA.²⁴⁶

Declaring the Sacred

While the national environmental discussion about Mt. Graham and the ESA continued to rage on in the media, the San Carlos Apaches added another voice to the debate by asserting that the observatory represented a profound cultural violation. Cassadore Davis, the San Carlos Apache elder who had first voiced her objections to the observatory in the 1989 tribal newspaper, formed a nonprofit group called the Apache Survival Coalition (ASC) in 1990 to oppose the MGIO on the grounds that the mountain was sacred to the San Carlos Apaches. “If the telescope project goes on, it will change the area,” asserted ASC Vice-Chairman and San Carlos Apache Tribal Council member Ernest Victor, Jr., maintaining that the mountain was valued as the home to spirit dancers, herbs, and holy water.²⁴⁷ The ASC did not have the formal authority to speak for either the San Carlos Apache Tribe or its Tribal Council, but with three

²⁴⁵Bob Witzeman to Arizona Congressional Delegation, John J. Rhodes III Papers, box 58, folder 2.

²⁴⁶ The letter was sent jointly by the Wilderness Society, the Environmental Defense Fund, the Defenders of Wildlife, the Center for Marine Conservation, the National Audubon Society, the Sierra Club, the Humane Society of the United States, the Izaak Walton League of America, the Friends of the Earth, and the Sierra Club Legal Defense Fund. See letter from above listed to The Honorable John J. Rhodes, III. 07 June 1990. John J. Rhodes III Papers, box 58, folder 2.

²⁴⁷Douglas Kreutz, “Apache group opposes Mt. Graham telescopes,” *The Arizona Daily Star*. 30 May 1990.

Tribal Council members participating in the nine-member organization, the ASC would likely have some influence on the Tribal Council.

In a two-page tract, the ASC explained its origins and mission. The group was made up of followers of traditional Apache religious practices and its primary goal was the preservation of Mt. Graham, referred to as *dzit ncha si an* (Big Seated Mountain).²⁴⁸ Big Seated Mountain was described as “the core of our cultural and religious traditions” because it had historical and current value as a sacred site.²⁴⁹ Anthropologist Keith Basso has observed that Western Apache culture is marked by a profoundly entrenched tendency toward silence when encountering tribal outsiders, and tribal knowledge of sacred sites is closely guarded even within the San Carlos Apache tribe.²⁵⁰ Yet remarkably, the ASC was willing to divulge privileged tribal information in order to produce a detailed narrative on the cultural significance of Mt. Graham for public consumption:

Today, Medicine Men and traditional Apache elders continue to visit the summit of Big Seated Mountain (Mount Graham) for religious activities. Traditional Apache people believe that the Mountain Spirit was sent by the Great Spirit from Big Seated Mountain (Mount Graham) to give instructions to the Apache people. He came to teach the Apache people special spiritual words and songs which would give them power to become medicine men and women...Big Seated Mountain (Mount Graham) is currently threatened by the proposed construction of an astrophysical development, the Mount Graham International Observatory, by the University of Arizona’s Telescope Consortium. If completed the telescope complex will be located on the summit of the sacred mountain. The telescope complex with its associated roads, parking lots and tour buses

²⁴⁸ The Apache name for Mt. Graham is also written as *dzil ncha si an*.

²⁴⁹ “Apache Survival Coalition.” June 1990. John J. Rhodes III Papers, box 58, folder 3. The ASC officers listed were Chairperson Ola Cassadore Davis, Vice-chairman Ernest Victor, Jr., Secretary-Treasurer Wendsler Nosie, Sr.

²⁵⁰ Keith H. Basso, “To Give up on Words:” Silence in Western Apache Culture,” *Southwestern Journal of Anthropology* 26 (1970): p. 213-230. I will discuss this characteristic of Western Apache culture in more detail in chapter six.

will desecrate traditional Apache religious sites and burial grounds and will significantly diminish the religious nature of the mountain's summit.²⁵¹

Blaming the federal government, UA, and UA's collaborators for ignoring Apache religious rights, the ASC claimed its agenda to resist the observatory had received "strong popular support among the Apache people" and asked the public for donations to support its impending legal action.²⁵²

During the six years since the plans for the observatory were first announced to the public, UA had fended off environmentalists and biologists charging that telescope construction would devastate the mountain's fragile ecosystem. The San Carlos Apaches' claim of Mt. Graham's sacred status seemed to come out of nowhere.²⁵³ As discussed throughout this chapter, the observatory had been the subject of widespread media coverage since the mid-1980s. Though no public hearings were held on the San Carlos Apache reservation and it is unclear whether the Tribal Council was informed about the meetings 60 miles away in the town of Thatcher, UA and the Forest Service publicized the DEIS hearings in local newspapers. There was also the matter of the form letter sent to the San Carlos Apache Tribe in 1985 after shrines were discovered on two of Mt. Graham's highest peaks. The letter had informed the tribe of the proposed observatory and allowed for one month to submit written comments, but UA's Office of Arid Lands never received a written response from the San Carlos Apaches. Why were Apaches suddenly coming forward in 1990 with the threat of legal action?

In the following chapter, I offer an explanation for the San Carlos Apaches' late entry into the legal and political battle for Mt. Graham by placing the history of the San Carlos

²⁵¹ "Apache Survival Coalition." June 1990.

²⁵² Ibid.

²⁵³ Interview with Peter Strittmatter. 06 June 2012.

Apaches' relationship to Mt. Graham within the broader trajectory of sacred sites struggles established in earlier chapters. I also examine the scientific, professional, and public fallout from the controversial AICA rider as the Mt. Graham astronomy community grew increasingly desperate to build the observatory that had been thwarted by activists again and again.

Conclusion

This chapter has situated the environmental opposition to MGIO within the ongoing fragmentation of the American environmental movement in the 1980s after mainstream environmentalism was boldly challenged by the radical Earth First! style of ecological resistance. In the 'war' for Mt. Graham, mainstream environmental groups relied strictly on legal action, letter-writing, and traditional protests, leaving ecosabotage to the radical environmentalists. Despite their philosophical differences, however, mainstream and radical environmentalists were in agreement when it came to framing the mountain as a 'pristine' wilderness environment.

Under the banner of the Coalition for the Preservation of Mount Graham, environmentalists of all persuasions joined forces with hunting clubs and other outdoor recreationist groups to voice their opposition to the observatory. After the group of biologists known as the Scientists for the Preservation of Mt. Graham joined the Coalition, Coalition activist literature came to represent a diverse group of stakeholders in the environmental resources of the mountain.

I have argued that environmentalists and recreationists attempted to socially and politically mobilize narratives about Mt. Graham as a pristine mountain hosting an endangered squirrel in order to serve the parallel agendas of safeguarding the squirrel *and* public access to the mountain. Campaigning against the observatory on the grounds that telescopes might

restrict recreational activities carried far less political authority than invoking the ESA, so piggybacking the needs of recreationists onto the environmentalist agenda was a pragmatic rhetorical strategy. Further, as I have shown, environmentalists also attempted to leverage recreationist concerns about access restrictions to influence public opinion on the observatory, so the alliance between recreationists and environmentalists was mutually beneficial. This is not to suggest that environmentalists were duplicitous, but rather, that the battle was far more nuanced than the simple 'squirrels or stars' dichotomy frequently invoked by both the environmental opposition and the media. Biologists, too, issued their own romanticized narratives about the mountain. Biologists opposed to the observatory project often characterized Mt. Graham as a "priceless biological museum" in order to stress that further study of the red squirrel and other unique species on the mountain was warranted before construction was permitted.

As a critically endangered species, the Mt. Graham Red Squirrel embodied the new politics of wilderness animating the American environmental movement in the 1980s. My examination of narratives centered on robbing a priceless biological museum, desecrating a 'pristine' mountaintop, or destroying an endangered species reveals that in the war over Mt. Graham, the squirrel was clearly the weapon of choice for the environmental opposition. For this varied assemblage of anti-observatory groups and individuals, the squirrel simply offered the best hope of controlling a prized natural resource.

Chapter six expands upon my analysis of anti-observatory alliances as the war for Mt. Graham continued throughout the 1990s and into the first decade of the twenty-first century. The endangered status of the Mt. Graham Red Squirrel and the preservation of a sacred site would bind conservationists and the Western Apaches to the same cause, marking the

beginning of a venomous battle for the use and control of Mt. Graham that would play out between the allied environmentalists and San Carlos Apaches, UA, and the U.S. Forest Service. As I will show, narratives produced about the mountain's significance by all of the major stakeholders would ultimately constrain both scientific and spiritual activities at Mt. Graham.

Chapter Six

Squirrels, Spirits, Scopes, and the Pope: Defining the Sacred at Mt. Graham

"If you desecrate Mt. Graham it is like cutting off an arm or a leg of the Apache slaughtered even as they were drumming our sacred songs and prayers. Building the telescopes on Mt. Graham is like ripping off the arms of the singers. But we thought those times were over." -- Franklin Stanley, Sr., San Carlos Apache spiritual leader¹

"We are not convinced by any of the arguments thus far presented that Mt. Graham possesses a sacred character which precludes responsible and legitimate use of the land...In fact, we believe that responsible and legitimate use of the land enhances its sacred character." -- Father George V. Coyne, S.J., University of Arizona Astronomy Professor and Vatican Observatory Director²

Just outside the rural desert town of Safford, Arizona, a nondescript beige building perched on an isolated mesa virtually disappears into an uninterrupted landscape of scrub and mesquite trees.³ Two white vans bearing the *Eastern Arizona Discovery Park* logo occupy an otherwise empty parking lot. Before funding dried up several years ago, a miniature train called the "Discovery Park Express" gave visitors a scenic tour of the 200 acres surrounding the main building, and the painstakingly detailed propane-hydraulic locomotive now sits idly behind the parking lot's chain-link fence. Located 40 miles below the summit, the Discovery Park literally stands in the shadow of Mt. Graham International Observatory, and was originally conceived as a visitor center that would accommodate hundreds of thousands of tourists annually. The center was finished in 1995, but people never flocked to this tucked-away part of southeastern Arizona, and the facility soon began to experience financial troubles. In 2006, the sprawling property was acquired by Eastern Arizona College, and a small wooden sign badly in need of a paint job reveals that the center now bills itself as a scientific, historical, and cultural center.

Though there are displays showcasing Graham County's early history as an agricultural and mining hub, it is clear that the real focus of the Discovery Park is its 'space science center,' which boasts exhibits on the history of astronomy and the solar system. In the 'Origin of the Universe' gallery, the Apache story of the lazy coyote is featured alongside other small dioramas depicting the creation myths of different cultures, including the ancient Greeks and the Biblical story of creation.

¹ Declaration of Franklin Stanley, Sr. in Support of Preliminary Injunction. Apache Survival Coalition, et al. v. USA, CIV. No. 91-1350 PHX WPC. 31 March 31 1992. Arizona State University Libraries: Arizona Collection.

² George V. Coyne, S.J., Director, Vatican Observatory, University of Arizona, "Statement of the Vatican Observatory on the Mt. Graham International Observatory and American Indian Peoples." 05 March 1992. Arizona State University Libraries: Arizona Collection. John J. Rhodes III Papers, box 58, folder 1.

³ This description is drawn from my personal observations during a visit to the Eastern Arizona Discovery Park in Safford, Arizona on 02 June 2012. I made previous arrangements with the docent prior to my visit for a tour of the facilities, and I returned to the Discovery Park for a tour of Mt. Graham International Observatory on 12 June 2012.

In a wide corridor, three teenage Apache girls are waiting to enter the Discovery Park's crown jewel: a space shuttle simulator ride called the "Shuttlecraft Polaris."⁴ They are discussing a popular boy band concert coming to Phoenix in a few weeks, wondering if there are any tickets left and how they will convince their parents to let them drive to the city. The doors of the simulator open abruptly, and the girls file inside, still chattering about the upcoming concert. Over the next ten minutes, the custom-designed ride "lifts off" from the summit of Mt. Graham for a tour of the solar system and a bumpy jaunt through the asteroid belt before returning to Earth. Though the flight motion technology is somewhat dated, the simulated flight is nonetheless dizzying and, apparently, exhilarating. When the ride comes to an end, the girls seem to have momentarily forgotten about the concert. "Did you see how it took off from our mountain, that was so cool!" gushes a girl whose long black hair is dyed with a thin streak of green, and her companions excitedly agree. The trio then departs, perhaps to make the 70-mile drive back to the reservation in San Carlos or one of the other small towns scattered across this remote corner of southern Arizona.

In 2012, Apache youth may casually refer to Mt. Graham as "our mountain" in the presence of non-Apaches with no more discretion than a conversation about plans for the weekend, but such a nonchalant claim on the mountain was unheard of thirty years ago. When members of the San Carlos Apache tribe came forward to voice their objections to the Mt. Graham International Observatory (MGIO) in 1990, the Mt. Graham astronomy community was caught off guard by the claim that the mountain had been sacred to the Apaches "since time immemorial."⁵ Through nearly a decade of well-publicized environmental opposition, the Apaches had been silent. This chapter seeks to explain that silence by providing a discussion of the key historical, political, and cultural factors that shaped the tribal members' decision to make their concerns public for the first time.

⁴ I confirmed that the teenagers were San Carlos Apaches after overhearing their comments, but regrettably, I did not have the opportunity to question them further about the reason for their visit or their thoughts about the observatory.

⁵ The phrase "since time immemorial" surfaces repeatedly in descriptions of Mt. Graham's significance to Apaches. See, for example, Kitcheyan to Jolly, 1990; Ola Cassadore Davis, *Testimony to the United Nations' Sub-Commission on Prevention of Discrimination and Protection of Minorities, Working Group on Indigenous Peoples*. 28 July 1999.

I begin by briefly tracing the history of the Western Apaches' relationship to Mt. Graham from pre-colonial times to the late nineteenth century to show how the Apaches were forcibly displaced from a mountain that had been central to their traditional way of life.⁶ Reprising my previous arguments about the timing of Native opposition at Kitt Peak and Mauna Kea, I suggest that the San Carlos Apaches did not immediately oppose the observatory when it was first proposed in 1984 due to tribal proscriptions against sharing sensitive religious knowledge with outsiders born of a long history of cultural subjugation. Overcoming this culturally-embedded reluctance to openly discuss religious information, I show that the Apaches eventually drew upon the growing Native rights movement in the United States to make their concerns public and asserted a federally protected claim on the mountain as a sacred site in the early 1990s.

I then delve into the ensuing legal battles over access and control of Mt. Graham as the Apaches formed an alliance with environmentalists who shared their desire to stop telescope construction. The Apache-environmentalist partnership raised eyebrows among the Mt.

⁶ The historiography on the Western Apache has been produced by non-Apache scholars, and important Apache records relating to early Apache history are retained by medicine men and tribal elders. For these reasons, it is difficult to construct a full account of the relationship between the Apaches and their historical relationship to the land that honors Apache voices through Native perspectives on Apache history. This chapter acknowledges these historical lacunae and makes use of published oral histories while also drawing from contemporary and early ethnographers and military records to establish a chronology for the Apache occupation and use of Mt. Graham and other areas representing their traditional homeland. Despite repeated attempts, I was unable to establish communication with San Carlos Apache tribal members after contacting them about my research and requesting information about the annual San Carlos Apache "Mt. Graham Sacred Run," held each summer in protest of the MGIO. To cite two telling examples, I inquired about the Sacred Run by email from a Native news website and was told by a reporter that there was no information on that year's run, and the same reporter covered the story the following week. On another occasion, I approached a San Carlos Apache dancer at a Pow Wow after recognizing his name from Apache Survival Coalition documents, and he acknowledged that his aunt, had been a leader in the observatory opposition, but professed to know nothing about the conflict himself. I believe this reluctance to return my correspondence or to discuss the Apache resistance to MGIO stems in part from the importance of maintaining secrecy about tribal affairs from outsiders in Western Apache culture, which will be discussed in this chapter. However, it also became clear to me as I continued my research that my efforts to interview San Carlos Apaches might have been better rewarded if I had first introduced myself in person and established trust over time, which is precluded by email contact or a brief introduction at a public event such as a Pow Wow. In a future expansion of this study, I hope to spend more time on the San Carlos Apache reservation, where I may be able to present my research goals face-to-face, thereby honoring the norms of the San Carlos Apaches.

Graham astronomy community, and accusations surfaced that the Apaches were being manipulated by environmentalists to further the anti-observatory campaign. In turn, some Apaches charged the University of Arizona and its scientific partners with manipulating Apaches into supporting a pro-telescope agenda. Both interpretations of the Apaches' alliances rely on the paternalistic notion that tribal members were merely willing pawns to be used by either environmentalists or the Mt. Graham astronomy community at a critical checkmate. I challenge this assumption by closely interrogating the motivations and outcomes of these alliances. In my analysis of the strengths and weaknesses of the Apache-environmentalist partnership, I establish that while the Apaches benefited from the organizational and legal resources of the ecological resistance movement, environmental groups bolstered their well-worn crusade for the endangered red squirrel by issuing new narratives framing Mt. Graham as both a sacred mountain *and* a sacred ecosystem.

Throughout the chapter, I focus on the negative public reaction to the Mt. Graham astronomy community's continuing efforts to secure the observatory site. Chapter five showed how Arizona newspapers fueled the Mt. Graham controversy by printing critical cartoons and editorials about the observatory project. As this chapter will make clear, once the Apaches entered the debate, racialized narratives depicting UA as a colonialist power surfaced not only in activist literature, but in newspaper articles and letters to the editor printed in the local media. The public thus shaped and consumed a new representation of the uneven dynamics of power in the struggle for Mt. Graham: it was no longer a 'David and Goliath' battle between environmentalists and astronomers, but a cultural genocide of Native Americans subjected to a white colonialist agenda.

My examination of the shifting cultural significance of astronomy to the allied groups of environmentalists and Apaches establishes a productive dialogue with Joseph Masco's ethnography of scientific and nonscientific communities at the Los Alamos National Laboratory (LANL) in northern New Mexico.⁷ Masco explores competing representations of the landscape and the LANL produced by white residents, Hispanics, Native American Pueblos, anti-nuclear activists, and the nuclear weapons community of scientists and engineers. Masco's study underscores that an environmentalist-indigenous alliance against a common 'enemy' was far from inevitable, since the indigenous groups with a stake in the sacred New Mexico landscape consider themselves to be fundamentally at odds with the activists who also oppose the LANL. As I have already pointed out, environmental activists and Apaches united against MGIO, but like Masco's Pueblos and anti-nuclear activists, this alliance was at times troubled by conflicting interpretations of the landscape. Significantly, some of Masco's cultural groups view the lab as a colonizing power that stands apart from the local community, much like members of the Apache Survival Coalition framed the University of Arizona and the MGIO as perpetrators of a colonialist agenda. Building upon Masco's observations, my analysis of the Mt. Graham controversy shows that when scientific communities intersect with Native communities, the colonialist past of historically marginalized groups often emerges as a barrier to cross-cultural communication and collaboration. For the San Carlos Apaches opposed to the observatory, the colonialist past became the colonialist present with scientists standing in for conquistadores, and I consider the ramifications of such racially-charged rhetoric for the astronomy community.

To repair their tarnished public image, astronomers repeatedly attempted to speak out against their critics in newspapers and through a public relations firm retained by UA. This

⁷ Joseph Masco, *The Nuclear Borderlands: The Manhattan Project in Post-Cold War New Mexico* (Princeton: Princeton University Press, 2006).

dissertation has continually sought to evaluate important shifts in the values and practices of American astronomy, and thus I examine astronomers' responses to the public backlash against MGIO to analyze how the whims of public opinion have increasingly come to bear on American astronomy. As I will argue in the conclusion to this dissertation, the controversies over observatories located on mountains considered sacred to Native communities have fundamentally transformed the professional identities and practices of American astronomers. While the pursuit of astronomical knowledge was once unflinchingly supported by the American public, astronomers must now defend their science and perform regular public outreach to maintain a positive image of their discipline.

In later sections of this chapter, I address the consequences of the Mt. Graham controversy for all of the principal stakeholders, highlighting the role of narrative in influencing these outcomes. Previous chapters have shown that astronomers involved in the telescope controversies occasionally invoked spiritually-imbued language when describing their relationship to the mountain. In my examination of dominant narratives about the definition of sacred space at Mt. Graham, I show that *all* of the key stakeholders in this ongoing debate have repeatedly invoked "the sacred" when describing Mt. Graham's significance. Radical environmentalists who aimed to wage ecoterrorism in the name of protecting Mother Earth claimed Mt. Graham as a sacred site, but the principal religious conflict was between Jesuit astronomers and Apaches. MGIO's Vatican Advanced Technology Telescope is operated by the Vatican Observatory Research Group, leading some Apaches to declare a "holy war" on the Vatican.

By focusing in particular on how the cultural claims of the Apaches were pitted against the cultural claims of Jesuit astronomers, I complicate the notion that the controversy could

tidily be described as a battle between science and religion. Instead, I argue that after 1990, the Mt. Graham controversy must be understood as a conflict between competing religious constructions of the mountain. In the absence of physical evidence of the ceremonial use of the mountain, Jesuit astronomers dismissed the spiritual value of the mountain itself, yet argued for its significance as an essential platform for instruments that would aid in the spiritual quest to probe the mysteries of God's creation. Apaches freely acknowledged that they could not produce physical evidence of the mountain's religious purposes but insisted that Mt. Graham was a living being that hosted spirits and sacred waters and plants. I argue that these divergent narratives about the mountain's sacred geography were leveraged to gain legal and moral standing, profoundly limiting both scientific and spiritual uses of Mt. Graham.

Finally, I revisit the trading zone framework detailed in previous chapters. Unlike the other two sites studied in this dissertation, the indigenous and scientific communities at Mt. Graham failed miserably when it came to developing meaningful networks of accommodation and communication. I suggest that the absence of trading zones at MGIO reveals much about how trading zones between scientific and nonscientific cultural groups form in the first place, and I argue again for the centrality of narrative in determining how and why these regions of local coordination develop between disparate communities.

Mt. Graham, Big Seated Mountain

Mt. Graham, the highest mountain in the Pinaleño mountain range, sits roughly 70 miles beyond the border of the modern San Carlos Apache reservation in southeastern Arizona and is recognized as *Dzil nchaá si an*, or Big-Seated Mountain, by the Western Apaches.⁸ The Western Apache are a culturally and linguistically distinct group that includes five major sub-tribes: the

⁸ The Apache spelling of Mt. Graham is also sometimes written as *dzit nchaá si an*. For the sake of consistency throughout chapters five and six, I refer to the mountain as Mt. Graham unless quoting directly from Apache sources adopting an alternate spelling.

White Mountain Apache to the east, the San Carlos Apache to the southwest, the Northern and Southern Tonto Apache to the northwest, and the Cibicue between the White Mountain and Tonto groups.⁹ By some estimates, the ancestral lands of the Western Apaches encompassed 90,000 square miles of present-day southern Arizona.¹⁰ Tellingly, though much of this land is composed of vast stretches of arid desert, the Apaches called themselves *Shis Inday*, People of the Woods.¹¹ In the late nineteenth century, Major John Carey Cremony speculated that the Apaches had chosen this name because they made a seasonal retreat to lands “always located amidst the forests which grow upon the sierras, far above the plains.”¹² Cremony was not the first visitor to observe that the Apaches took refuge in the forested slopes of the mountains. Though members of the Mt. Graham astronomy community contested the Apache’s historical ties to Mt. Graham, the mountain’s use by Apaches was first documented by Spanish explorers in the 17th century.

The archaeological record establishing the antiquity of the Western Apaches in southern Arizona is scant because Apaches lived in wooden structures and used baskets, and this ephemeral material culture has made it difficult for archaeologists to conclusively establish

⁹ See Trudy Griffin Pierce, *Native Peoples of the Southwest* (Albuquerque: University of New Mexico Press, 2000), p. 388. The White Mountain Apaches are also known as *Coyotéros* and the San Carlos Apaches are also known as *Aravaipa* or *Arivaipa*.

¹⁰ Keith H. Basso, ed., *Western Apache Raiding & Warfare: From the Notes of Grenville Goodwin* (Tucson: The University of Arizona Press, 1998); Keith H. Basso, *Western Apache Witchcraft. Anthropological Papers of the University of Arizona* 15 (Tucson: University of Arizona Press, 1969), p. 11. See also Jack D. Forbes, “The Early Western Apache, 1300-1700,” *Journal of the West* 5(1966): p. 336-354, p. 337.

¹¹ The Apaches’ name for themselves has also been translated as “Men of the Woods.” See Jacob Piatt Dunn, *Massacres of the Mountains: A History of the Indian Wars of the Far West* (Harper & Brothers, 1886), 357-358; John Carey Cremony, *Life Among the Apaches* (A. Roman, 1868), p. 243.

¹² Cremony, p. 243.

settlement patterns of early Apaches.¹³ However, it is possible to trace the Western Apache presence in the southwest through the written accounts of Europeans who passed through the region beginning in the sixteenth century. Spanish explorer and conquistador Francisco Vásquez de Coronado traveled through the southwest searching for the fabled City of Gold in the 1540s, and Spaniards who followed in Coronado's footsteps described encounters with mountain-dwelling people they named "Apache."¹⁴ Spanish rule and a heavy missionary presence followed, introducing new diseases and geographical and cultural displacement from the late seventeenth century until Mexico gained its independence from Spain in 1821. The territory of the Western Apaches then became part of the Mexican Republic, but Apaches rebelled against Mexican authority.¹⁵

After the Treaty of Guadalupe Hidalgo ended the Mexican-American War in 1848, Mt. Graham and the entire Pinaleno mountain range belonged to Mexico until 1853, when it became part of the United States through the Gadsden Purchase.¹⁶ The United States had

¹³ See David R. Wilcox, "The Entry of Athapaskans into the American Southwest: The Problem Today" in *The Protohistoric Period in the North American Southwest, A.D. 1450-1700*, David R. Wilcox and W. Bruce Masse, eds., *Anthropological Research Papers* 24 (Tempe: Arizona State University, 1981): p. 213-256. Archaeologist Deni J. Seymour found evidence of other early Apache groups, the ancestral Chiricahua and Mescalero, dating back to the fifteenth century. See Seymour, "Before the Spanish Chronicles: Early Apache in the Southern Southwest in Ancient and Historic Lifeways in North America's Rocky Mountains," *Proceedings of the 2003 Rocky Mountain Anthropological Conference, Estes Park, Colorado*, edited by Robert H. Brunswig and William B. Butler. Department of Anthropology, University of Northern Colorado, Greeley (2004): p. 120-142.

¹⁴ Coronado was searching for the rumored Seven Cities of Cibola. See Jack D. Forbes, *Apache, Navaho, and Spaniard* (Norman: University of Oklahoma Press, 1960), p. 9; Forbes, "The Early Western Apache, 1300-1700," p. 337. The Coronado National Forest that encompasses Mt. Graham today was named after Coronado. See "Coronado National Forest: History and Culture," available at <http://www.fs.fed.us/r3/coronado/forest/heritage/heritage.shtml>. Accessed 11 December 2012.

¹⁵ Forbes, *Apache, Navajo, and Spaniard*, p. 284-285; Donald E. Worcester, *The Apaches: Eagles of the Southwest* (Norman: University of Oklahoma Press, 1979).

¹⁶ Treaty of Guadalupe-Hidalgo [Exchange copy], February 2, 1848; Perfected Treaties, 1778-1945; Record Group 11; General Records of the United States Government, 1778-1992; National Archives; William L. Marcy, "The Avalon Project: Gadsden Purchase Treaty: December 30, 1853," The Avalon Project:

formally gained control of Western Apache territories, but the Apaches forcefully resisted U.S. military incursion just as they had fought against the Mexican government.¹⁷ The California Gold Rush brought a new influx of American settlers to the Apache homeland in the years that followed, and Apache warriors such as Geronimo attacked wagon trains and fought the United States military in a series of conflicts known as the Apache Wars.¹⁸ In 1871, the Apache Wars were further fueled by the brutality of the Camp Grant Massacre in which an estimated 86-150 Apache women and children were killed by members of the U.S. military, the Tohono O'odham (then Papago) tribe, Mexican-Americans, and citizens of Tucson.¹⁹

The origins and key details of the Camp Grant Massacre have been the source of much scholarly debate, but many accounts suggest that it was a terrible misunderstanding between Apaches and a rancher that led to the mass murder of Apaches. In this version of events, a rancher named John Ward accused Chiricahua Apache chief Cochise of stealing cattle and kidnapping his children, and Lieutenant Bascom of the Fort Buchanan military base outside of Tucson set off to arrest Cochise. Cochise vehemently denied the charges and made his escape, and a coalition of American military, local residents, and Native Americans from warring tribes

Documents in Law, History and Diplomacy. Yale Law School Lillian Goldman Law Library, available at http://avalon.law.yale.edu/19th_century/mx1853.asp. Accessed 13 December 2011.

¹⁷ Winona LaDuke, "God, Squirrels, and the Universe: the Mount Graham International Observatory and the University of Arizona," in LaDuke, ed., *Recovering the Sacred: the Power of Naming and Claiming* (Cambridge, MA: South End Press, 2005): p. 19-32; p. 23.

¹⁸ See Robert M. Utley, *Geronimo* (New Haven: Yale University Press, 2012); Angie Debo, *Geronimo: the Man, His Time, His Place* (Norman: University of Oklahoma Press, 1976); Stephen Melvil Barrett, *Geronimo's Story of His Life; as told to Stephen Melvil Barrett* (New York: Duffield & Company, 1906); David Roberts, *Once They Moved Like the Wind* (New York: Simon and Schuster, 1993).

¹⁹ LaDuke, p. 23.

raped, killed, and mutilated the bodies of mostly women and children during the night of 30 April 1871.²⁰

Until recently, the historiography on the massacre was dominated by non-Apache sources that did not reflect the Apache's own perspective on this pivotal event in their history. Anthropologist Chip Colwell-Chanthaphonh has drawn from six different Western Apache oral traditions to present a fuller account of these events, which have taken on a mythical status in Apache culture. Colwell-Chanthaphonh argues that considering this history from the perspective of Apache tribal elders does not necessarily provide a more "factual" historical record, but "empowers those voices that have previously been quieted and offers a much more intricate knowledge of the event because it spins another strand in the web of histories."²¹ The narratives of Apache elders who survived the massacre privilege certain details not found in non-Apache sources, generally emphasizing a completely unprovoked attack on Apaches who were resting and preparing for a feast after a celebration the previous night.²²

²⁰ For an overview of the scholarship on the Camp Grant Massacre relying on non-Apache sources, see George P. Hammond, *The Camp Grant Massacre: A Chapter in Apache History* (Berkeley CA: Proceedings of the Pacific Coast Branch of the American Historical Association, 1929); James E. Hastings, "The Tragedy at Camp Grant in 1871," *Arizona and the West* 1 (1959): p. 146–160; Elliott Arnold, *The Camp Grant Massacre* (New York: Simon and Schuster, 1976); J. Phillip Langellier, "Camp Grant Affair, 1871: Milestone in Federal Indian Policy?" *Military History of Texas and the Southwest* 15(1979): p. 17–30; Peter Vokac, "The Camp Grant Massacre as Tucson Residents Saw it in 1871," *The Arizona Daily Star*. 24 June 1996; Richard T. Waterfall, "Vengeance at Sunrise: The camp Grant Massacre, 30 April 1871," *Journal of the West* 21 (1992): p. 110–118; LaDuke, p. 23-24; Ian Record, *Big Sycamore Stands Alone: The Western Apaches, Aravaipa, and the Struggle for Place* (Norman: University of Oklahoma Press, 2008).

²¹ See Colwell-Chanthaphonh, "Western Apache Oral Histories and Traditions of the Camp Grant Massacre," *The American Indian Quarterly* 27 (2003): p. 639-666, p. 641. See also Colwell-Chanthaphonh, *Massacre at Camp Grant: Forgetting and Remembering Apache History* (Tucson: The University of Arizona Press, 2007); Colwell-Chanthaphonh, "The Camp Grant Massacre in the Historical Imagination," *Journal of the Southwest* 45 (2003): p. 349–369.

²² See Colwell-Chanthaphonh, "Western Apache Oral Histories and Traditions of the Camp Grant Massacre," p. 644. Notably, several Apache oral traditions mention that Apache survivors fled into the mountains after the attack. See *Ibid*, p. 658-660.

The veracity of these different historical constructions is far less important in the context of the Mt. Graham conflict than the overall significance of the Camp Grant Massacre in the historical memory of the Apaches. Though other Native Americans and Mexican-Americans were involved, the massacre is commonly remembered by Apaches as a confrontation with white “Men from Tucson,”²³ and it was this conception of the massacre that fueled ongoing retaliation against white occupation for over a decade until the Apache Wars drew to a close with the surrender of Geronimo to U.S. authorities in 1886.²⁴

The Camp Grant Massacre also led indirectly to the establishment of reservations for Apaches. Alarmed by the massacre, President Ulysses S. Grant established four reservations for the Apaches by Executive Order in 1871 with the stated goal of providing them with greater protection.²⁵ Scholars have taken a more critical view of Grant’s motivations for creating the reservations, noting that the federal government’s “Apache problem” had shifted from a military to a social and economic issue, and cultural assimilation through the reservation system was deemed the best solution.²⁶ The San Carlos and White Mountain Apache were consigned to the Camp Grant reservation, which was consolidated into one reservation at San Carlos for all Arizona Apaches in 1872.²⁷ According to the San Carlos Apache’s official website, the

²³ Sally Ewing Dosela, quoted in Colwell-Chanthaphonh, “Western Apache Oral Histories and Traditions of the Camp Grant Massacre,” p. 657. Dosela was a tribal elder who recounted her family’s experience of the massacre to a researcher in 1996.

²⁴ See “Surrender of Geronimo,” in *Geronimo’s Story of His Life*, p. 148-176. See also Senate Executive Documents, Second Session, 49th Congress, 1886-87. Volume II, Nos. 111-125.

²⁵ Ulysses S. Grant Executive Order. 09 Nov 1871.

²⁶ William Y. Adams and Gordon V. Krutz, “Authors’ Note, ‘Wage Labor and the San Carlos Apache,’ in Keith H. Basso and Morris E. Opler, eds., *Apachean Culture History and Ethnology, Anthropological Papers of the University of Arizona* 21 (Tucson: University of Arizona Press, 1971), p. 115-116, p. 115.

²⁷ Griffin-Pierce, 389.

reservation is “the worlds [sic] first concentration camp still existing to this day.”²⁸ In a retrospective article on the Camp Grant massacre published in the *Arizona Daily Star* in 2009, San Carlos Tribal Chairman Wendsler Nosie, Sr. explained that the relocation of the Apaches to reservations following the horrific incident had severed an important link to Apache identity. Nosie, who by then had been involved in the campaign against the MGIO for nearly two decades, asserted, “Being victims of our past, being displaced, has played a big part of our identity.”²⁹

Indeed, the displacement of the Western Apache to reservations marked the beginning of a new detachment from their ancestral lands and traditional patterns of migration. Arizona had become a Territory of the United States in 1863, and the natural resources of Apache lands soon became a coveted commodity for the Territorial legislature.³⁰ Mining companies were established to exploit the rich mineral deposits located in the southeastern part of the Territory, and Mt. Graham was identified as a prime source of lumber.³¹ When the San Carlos Apache Reservation was first established, Mt. Graham was located along its southern border, but the

²⁸ “Ndeh--San Carlos Apache.” http://www.sancarlosapache.com/San_Carlos_Culture_Center.htm. Accessed 12 March 2013.

²⁹ Nosie, quoted in Tom Beal, “Curing ‘amnesia’ about state’s most blood-soaked day,” *The Arizona Daily Star*. 03 May 2009. The article mentioned that tribal elders had recently made it clear that they were opposed to marking the actual grave site where the United States Army buried the Apaches, revealing the Apaches’ continuing desire to safeguard sensitive tribal information from outsiders.

³⁰ Winston P. Erickson, *Sharing the Desert: The Tohono O’odham in History* (Tucson: The University of Arizona Press, 1994), p. 77-78.

³¹ See Major-General Irvin McDowell, *Outline Descriptions of Military Posts in the Military Division of the Pacific* (San Francisco: Presidio of San Francisco, 1879); Patrick Hamilton, *The Resources of Arizona: Its Mineral, Farming, Grazing and Timber Lands* (A. L. Bancroft & Company, Printers, 1884).

mountain was removed from the Apache reservation through an Executive Order in 1873 because it was considered a commercially valuable natural resource.³²

In 1902, Mt. Graham became part of the Mount Graham Forest Reserve, and the mountain was subsequently added to the Crook National Forest in 1908. Finally, in 1953, the Crook National Forest containing Mt. Graham was merged with the Coronado National Forest, and it has remained under the jurisdiction of the United States Forest Service within the Coronado National Forest since that time.³³ Even before the Mt. Graham Forest Reserve was created, the mountain had long been the site of summer recreation because it provided a welcome refuge from the heat for neighboring desert communities. Today, tourists continue to flock to Mt. Graham to participate in outdoor recreation ranging from hunting and fishing to swimming, hiking, and camping.³⁴ Visitors are welcomed to Mt. Graham after passing a sign that reads “Coronado National Forest—Land of Many Uses,” because unlike Kitt Peak and Mauna Kea, Mt. Graham is located on publicly owned land managed by the Forest Service’s ‘multiple-use’ policy. Due to this key distinction, MGIO planners did not have to submit to formal negotiations with the San Carlos Apaches when the observatory was first proposed in the 1980s.

³² Edward Everett Dale, *The Indians of the Southwest: A Century of Development Under the United States* (Norman: University of Oklahoma Press, 1988), p. 98.

³³ See “Coronado National Forest: History and Culture,” Accessed 11 December 2012; Dale, p. 98.

³⁴ As discussed in chapter five, recreational tourism has played an important role in this debate. Many Apaches have objected to the crowds of recreationists that threaten the integrity of private religious ceremonies, though most tourist activity occurs at the lower elevations of Mt. Graham and not at the summit, which is regarded as the most sacred region of the mountain. Further, astronomers have pointed to the long history of seasonal recreation on the mountain as evidence that Mt. Graham has never been a pristine environment. Similar debates about the impact of recreation on sacred sites are ongoing at Baboquivari Peak, sacred to the Tohono O’odham (see chapter one), the San Francisco Peaks, Black Hills, and Bear Butte. For a listing of other Native American sacred peaks considered jeopardized by recreation or development, see “Save the Peaks.” savethepeaks.org. Accessed 12 December 2010.

The displacement of Apaches to reservations and the multiple shifts in ownership and control of Mt. Graham had far-reaching effects on the cultural identity of the Western Apache. Anthropologist Charles R. Taut observed that between 1850 and 1875, the Apaches still adhered to a seasonal pattern of migration befitting their chosen name 'People of the Woods.'³⁵ During this period, the Apaches occupied the cool forests of Mt. Graham and other peaks during the summer and descended to the desert valleys below during the winter months, but the creation of the San Carlos Apache Reservation in 1872 and the formal removal of Mt. Graham from Apache territory in 1873 soon created a disruption in this traditional way of life.

The leading contemporary ethnographer of the Western Apache, Keith Basso, has established that the Apache's sense of a tribal past and cultural identity is intimately connected to the landscape.³⁶ Narratives concerned with promoting beneficial changes in an individual's behavior often correspond to particular environmental features. Since story and site are so closely intertwined, the geographical landscape effectively invokes the moral landscape of the community. As Basso explains, "mountains and arroyos step in symbolically for grandmothers and uncles."³⁷ An article jointly authored by archaeologist and White Mountain Apache Tribe Historic Preservation Officer John R. Welch and White Mountain Apache Tribal Consultant

³⁵ Kaut based his conclusions on an analysis of early Western Apache ethnographer Grenville Goodwin's unpublished research and Kaut's ten months of fieldwork among the Western Apache from 1953-1954. See Charles R. Kaut, "Western Apache Clan and Phratry Organization," *American Anthropologist* 58 (1956): p. 140-146; p. 141.

³⁶ Keith H. Basso, *Wisdom Sits in Places: Landscape and Language Among the Western Apache* (Albuquerque: University of New Mexico Press, 1996), p. 35. See also Basso, *Western Apache Language and Culture: Essays in Linguistic Anthropology* (Tucson: University of Arizona Press, 1990); Basso, "Western Apache," in *Handbook of North American Indians*, ed. Alfonso Ortiz (Washington DC: Smithsonian Institution, 1983): p. 462-488; Basso, *Western Apache Witchcraft*.

³⁷ Keith H. Basso, "'Stalking with Stories': Names, Places, and Moral Narratives among the Western Apache," in *Text, Play and Story: The Construction and Reconstruction of Self and Society, 1983 Proceedings of The American Ethnological Society*, Stuart Plattner, ed. (The American Ethnological Society, 1984): p. 19-55; p. 43.

Ramon Riley provides linguistic support for this relationship between land and cultural identity. Welch and Riley note that “in the Apache language *ni’* means both land and mind,” which illustrates “the inseparability of land and thought, of geography and memory, and of place and wisdom” for the Western Apaches.³⁸

As the original homeland of the Western Apaches was successively reduced by the federal government to less than four million acres of reservation lands in order to accommodate American mining, logging, ranching, and irrigation interests, Apaches experienced a profound cultural disruption tied to the loss of land. One Apache elder described the seizure of Apache lands as “an unanesthetized amputation.”³⁹ Important insights into how the cultural and political effects of land redistribution were experienced by the Western Apaches in the early twentieth century are contained in the field notes of Grenville Goodwin, an anthropologist who lived among the Apaches for thirteen years.⁴⁰

Goodwin’s studies convinced him that the establishment of Apache reservations by the federal government initiated a process of cultural disruption by confining Apaches to a

³⁸John R. Welch and Ramon Riley, “Reclaiming Land and Spirit in the Western Apache Homeland,” *American Indian Quarterly* 25 (2001): p. 5–12; p. 5.

³⁹Elder Raymond Kane quoting his grandfather’s description of the loss of Apache lands in Welch and Riley, “Reclaiming Land and Spirit in the Western Apache Homeland,” p. 7.

⁴⁰ Goodwin conducted fieldwork among the Western Apaches from 1927-1940, and a rich repository of his unpublished research notes is housed at the Arizona State Museum on the UA campus. As I will discuss later in this chapter, Goodwin’s academic credentials would be called into question in reference to his observations on the sacredness of Mt. Graham, so it is important to note here that Goodwin’s work is still highly regarded among anthropologists of the indigenous groups of the American southwest as a trusted source of knowledge about the Western Apache. See Goodwin, “The Social Divisions and Economic Life of the Western Apache,” *American Anthropologist* 37 (1935): p. 55-64; Goodwin, “The Characteristics and Function of Clan in a Southern Athapascan Culture,” *American Anthropologist* 39 (1937): p. 394-407; Goodwin, “White Mountain Apache Religion,” *American Anthropologist* 40 (1938): 24-37. See also Goodwin, *The Social Organization of the Western Apache* (Tucson: University of Arizona Press, 1969); Basso, ed., *Western Apache Raiding and Warfare*, (Tucson: University of Arizona Press, 1971); Morris E. Opler, *Grenville Goodwin Among the Western Apache: Letters from the Field* (Tucson: University of Arizona Press, 1973); Alan Ferg, ed., *Western Apache Material Culture: The Goodwin and Guenther Collections* (Tucson: The University of Arizona Press, 1996).

centralized location.⁴¹ The transition to reservation life generated a disintegration of the traditional local group order consisting of a chief who led his people within a designated region of the Apache territory.⁴² During his fieldwork in 1930-1933, Goodwin noted, “the local group is no longer the close knit unit that it once was. The chiefs are gone, and their power, in great part, is now in the hands of the white agent and his employees.”⁴³

The Western Apache cultural identity and sense of place was fragmented by the dissociation from their physical geography, but the reduction of their ancestral territory also signaled a sea change in the economic conditions of the Apaches. Before the reservations were established, the Western Apaches maintained semi-permanent homes and roamed freely across their geographically vast historical territory from mountain elevations to valley lowlands. According to the season, food was produced for each local group by farming, hunting, and gathering plants.⁴⁴ On the reservation, participation in the cash economy meant seeking out wage work, which gradually supplanted subsistence practices as Apaches earned income from federally subsidized construction programs.⁴⁵ Government-issued allotments of food and clothing were issued to each Apache family on the reservation until 1903, ushering in a new dependence on federal aid for a formerly self-sufficient people.⁴⁶

⁴¹ Goodwin, “Social Divisions of the Western Apache,” p. 59.

⁴² Ibid, p. 57; 59.

⁴³ Ibid, p. 59.

⁴⁴ Ibid, p. 63.

⁴⁵ William Y. Adams, “Wage Labor and the San Carlos Apache, Part 1: The Development of San Carlos Wage Labor to 1954,” in Basso and Opler, eds., *Apachean Culture History and Ethnology*, p. 118-121.

⁴⁶ Adams and Krutz, “Authors’ Note,” p. 115.

The Bureau of Indian Affairs (BIA) encouraged Apaches to pursue wage labor throughout the first half of the twentieth century as a means of promoting assimilation into mainstream American culture, but this policy backfired disastrously when job opportunities evaporated in the 1930s during the Great Depression.⁴⁷ The dismal job market for Apaches continued during World War II, and the postwar boom in the American labor market did not extend to the reservation.⁴⁸ Economic self-sufficiency seemed well out of reach for Apaches living on the reservation by the 1950s, and a reliance on federal assistance to combat rampant poverty became a deeply entrenched part of reservation life.⁴⁹

In their respective studies on the introduction and consequences of wage labor on the San Carlos Apache Reservation in 1954 and 1970, William Y. Adams and Gordon V. Krutz present different interpretations of the stagnant economic conditions on the reservation.⁵⁰ Assessing the development of wage labor in 1954, Adams found that the BIA's efforts to force cultural assimilation through wage work represented a failure of federal Indian policy, while Krutz later argued that Apache wage labor had not developed as an economic reality by 1970 due to the Apache's successful resistance to assimilation.⁵¹ Though he asserted that the BIA's failed economic programs were largely responsible for the high unemployment rate on the reservation, Adams also identified "cultural withdrawal" as a key factor influencing Apache wage labor in the 1950s because "the average Apache would undoubtedly prefer to make his living

⁴⁷ Adams and Krutz, "Authors' Note," p. 115.

⁴⁸ Ibid.

⁴⁹ Ibid.

⁵⁰ Adams, "Wage Labor and the San Carlos Apache, Part 1," p. 116-128; Gordon V. Krutz, "Wage Labor and the San Carlos Apache, Part 2: San Carlos Apache Wage Labor in 1970," in Basso and Opler, eds., *Apachean Culture History and Ethnology*, p. 129-132.

⁵¹ Ibid.

with as little dependence on, and contact with, Anglos as possible.”⁵² In the 1970s, the Western Apaches were still grappling with a fractured cultural identity and the poorly administered transition to reservation life. Krutz asserted, “clearly, the fact that Apaches chose on-reservation employment in order to remain near their families indicates a strong and basic desire to remain Apache. It is not that Apaches refuse to utilize the material advantages of the modern world. This they do like other Americans. What they refuse to do is to prostrate their own values in the process.”⁵³

This brief history of the Western Apaches and their relationship to the territory that once encompassed Mt. Graham has shown that the Apaches experienced the loss of their ancestral lands as a significant threat to their cultural identity and traditional way of life. Spanish, Mexican, and American occupation of the Apache homeland introduced a geographical and cultural displacement that ultimately led to systemic poverty and disenfranchisement. In the latter part of the twentieth century, the historical memory among the San Carlos Apaches of violent encounters with white intruders and the forcible relocation of Apaches to reservations would cast a dark shadow on interactions with the Mt. Graham astronomy community.

Secrecy and Sacred Sites: Evaluating the Role of Silence and Politics in Western Apache Culture

When Tribal Chairman Ned Anderson stepped into office in 1978, he inherited a long legacy of tribal poverty exacerbated by federal paternalism and the tribe’s own financial mismanagement. The tribe had come close to filing for bankruptcy in 1972 after elected Apache officials ran up debt by making numerous unauthorized loans using tribal funds. By the early 1980s, the San Carlos Apache tribe’s economic situation had only worsened, with numerous

⁵² Adams, p. 128.

⁵³ Krutz, p. 131.

unpaid debts stacking up and an unemployment rate of over 50 percent.⁵⁴ Anderson was in the midst of a bitterly polarizing debate on the reservation over the state of tribal finances when the University of Arizona's (UA) Office of Arid Lands sent out letters to area tribes informing them of the proposed observatory project in 1985. A copy of the letter addressed to Anderson is located in the Papers of Congressman John J. Rhodes III at the Arizona State University Libraries, but when questioned five years later, Anderson denied receiving the letter altogether, and the San Carlos Apache Tribal Council formally dismissed the notion that the letter constituted proper consultation in a 1991 letter to the Forest Service's Regional Forester David Jolly.⁵⁵

Whether the letter indeed reached Chairman Anderson or not, cultural consultation did not necessarily begin and end with the Tribal Council. Just as some members of the Tohono O'odham Nation later contested their Tribal Council's authority to lease Kitt Peak in 1958, the leadership of the San Carlos Apache tribe was repeatedly called into question by many San Carlos Apaches in the 1980s. Though Chairman Anderson was popular enough to secure re-election in 1982, a vocal group of Apaches accused Anderson of political corruption just a year later over the tribe's persistent financial problems. Over 200 tribal members signed a petition asking the BIA to audit the tribe's funds, and fliers posted across the reservation targeted the

⁵⁴ Joseph R. LaPlante, "Apaches again battling financial, tribal turmoil: debts spur charges of poor management," *The Arizona Republic*. 06 February 1983. The Arizona Historical Society. Indians of North America-- Apache.

⁵⁵ The Tribal Council declared that the form letter did "not constitute an investigation or a consultation." See Raleigh Thompson, Acting Tribal Chairman, The San Carlos Apache Tribe to Mr. David Jolly. 04 June 1991. Betsy Brandt Papers. Arizona State University Labriola Indian Data Center. MSM-838. In his sworn testimony during a 1992 case against the Forest Service and UA, San Carlos Apache Ernest Victor, Jr., stated that there was no record of the letter. See Patricia J. Cummings, "Reply, Memorandum of Points and Authorities in support of Plaintiffs' motion for Preliminary Injunction." 09 April 1992, p. 14. John J. Rhodes III Papers, box 58, folder 1. During the case, attorney for the Apache Survival Coalition Patricia Cummings argued that "the obligation on the part of the agency is to act affirmatively and to pursue information in good faith. A non-response is cause for follow-up...not permission to disregard the interest after one meager attempt to contact was fruitless." See Cummings, "Reply, Memorandum of Points," p. 14.

entire Tribal Council by stating, “The San Carlos Tribal Council is easily forgetting the people who voted for them.”⁵⁶ The petition made it clear that at least some of the San Carlos Apache votership found fault with the leadership of Anderson and the Tribal Council. Even if Anderson had received the letter, then, and the observatory proposal had been embraced by the Tribal Council, such an endorsement may not have reflected the interests of San Carlos Apaches outside of tribal government.

But the real issue was not how well elected tribal officials represented their constituents, or even whether Anderson received the letter. In many ways, the question of whether the letter was sent to the San Carlos Apache tribe is less meaningful than the epistemological quandary represented by the letter itself. Associate Professor of Anthropology at Arizona State University Elizabeth Brandt, who had previously conducted fieldwork with the San Carlos Apaches, later asserted that both the content of the letter and the written approach to tribal consultation had missed the mark entirely.⁵⁷ The letter referred to the recently-discovered shrines and cairns on Mt. Graham and asked for specific comment on those artifacts in written form with a one-month deadline, but did not query about other spiritual valuations of the mountain. By sending a letter only to the Tribal Chairman, UA recognized only one source of tribal authority. Head of UA’s Office of Indian Programs Robert A. Williams, Jr., who was later asked to investigate the Apaches’ claim that Mt. Graham was sacred, offers a valuable insight into the troublesome issue of notification in a 1993 *West Virginia Law Review* article. Williams asks, “Who do you contact if you are the University of Arizona or the United States Forest Service? Why, the tribal government, of course; but who is the tribal government, and where

⁵⁶ LaPlante, “Apaches again battling financial, tribal turmoil.”

⁵⁷ Elizabeth A. Brandt, Executive Summary of the Preliminary Investigation of Apache Use and Occupancy and Review of Cultural Resource Surveys of the Proposed Mt. Graham Astrophysical Area, Pinaleno Mountains, Arizona. Prepared for the Apache Survival Coalition. 28 May 1991. Betsy Brandt Papers.

does tribal sovereignty reside?”⁵⁸ There are no easy answers to such questions, since the political entity known as the San Carlos Apache Tribal Council represents a decision-making body that is not universally recognized throughout the reservation. Williams points out that tribal governments were created and formally recognized by the United States federal government, so “from the perspective of the white man’s law, these ‘chiefs’ and these ‘governments’ represented the Indians. In truth, these processes had little to do with how Indians actually governed themselves.”⁵⁹ Williams further asserts that for the Western Apache, “the idea that a BIA-created ‘tribal government’ represents their interests generally, or particularly on issues of religious belief, is offensive and resisted in the extreme.”⁶⁰ Given that the Environmental Impact Statement (EIS) was not administered by anthropologists or other researchers accustomed to working with Native American groups, however, UA’s Office of Arid Lands was likely unaware of the importance of reaching out to tribal elders and medicine men on issues requiring cultural consultation.

Submitting a written letter seeking a written response, UA’s approach was similarly rooted in a Western model of communication. When astronomers first approached the Tohono O’odham about placing an observatory on the tribe’s sacred mountain in the 1950s, anthropologists had intervened to set expectations for communication standards and protocols that would guide discussions with tribal members. UA’s method of notifying local tribes about the proposed observatory was not informed by anthropological training, and since Mt. Graham was no longer formally part of the San Carlos Apache reservation, the University was never

⁵⁸ Robert A. Williams, Jr. “Large Binocular Telescopes, Red Squirrel Piñatas, and Apache Sacred Mountains: Decolonizing Environmental Law in a Multicultural World,” *West Virginia Law Review* 96 (1993-1994): p. 1133-1164; p. 1161-1162.

⁵⁹ *Ibid*, p. 1162.

⁶⁰ *Ibid*, p. 1160.

required to initiate the kind of face-to-face interaction valued in Apache culture. Brandt contended that the letter “fails to ask the right questions to the right people in the right format. There is no indication that any followup [sic] was conducted or that when no response was received from the Apache that any attempt was made to follow the provisions of the law.”⁶¹

The letter was only the first of several missed opportunities to establish a channel of communication between the astronomy and Apache communities invested in Mt. Graham. Speculation abounds: would the relationship between the Apaches and UA astronomers and administrators have played out differently if UA representatives had visited the reservation back in 1985? If Anderson had received the letter or if a follow-up letter was sent, how might he have responded to the observatory proposal, and how would UA have addressed any opposition by the tribe at that time? What is certain is that five years elapsed before members of the San Carlos Apache tribe publicly declared their opposition to the observatory by forming the Apache Survival Coalition (ASC). Why did the Apaches wait so long to come forward? Members of the Mt. Graham astronomy community would eventually charge that the “enviros” were manipulating the Apaches into campaigning against the observatory, but this assumption not only belittles the Apaches’ ability to think for themselves, it overlooks the historical and cultural factors that influenced the Apaches’ decision to make their concerns public. The relatively late entry of the Apaches into the Mt. Graham debate is better understood as a function of the strict observance of secrecy in Western Apache culture, the Apaches’ historical memory of encounters with white society, and the still-evolving campaign to preserve sacred sites within the Native American rights movement in the 1980s.

⁶¹ Brandt, Executive Summary of the Preliminary Investigation of Apache Use and Occupancy, p. 5.

Anthropologist Keith Basso, the leading scholar of the Western Apache, has studied the predilection for silence in Apache culture in various social contexts ranging from remaining silent as an act of deference to authority to refraining from speaking when meeting strangers for the first time.⁶² Establishing a social distance through silence is important to the Western Apaches on certain occasions when “it is right to give up on words,” including the reunion of parents with children returning home from boarding schools.⁶³ Conducting fieldwork between 1964-1969, Basso noticed that when children returned to the reservation, Western Apache parents often allowed several days to pass before engaging in sustained conversation in order to assess how the children might have been influenced by outsiders.⁶⁴ As Basso explains, “Uppermost is the fear that, as a result of protracted exposure to Anglo attitudes and values, the children have come to view their parents as ignorant, old-fashioned, and no longer deserving of respect.”⁶⁵ One of Basso’s informants further elaborated: “You just can’t tell about those children after they’ve been with White men for a long time. They get their minds turned around sometimes ... they forget where they come from and get ashamed when they come home because their parents and relatives are poor.”⁶⁶ Expanding his analysis further, Basso argued that regardless of the specific social setting, maintaining silence in Western Apache culture “is a response to uncertainty and unpredictability in social relations.”⁶⁷

⁶² Keith H. Basso, “To Give up on Words:” Silence in Western Apache Culture,” *Southwestern Journal of Anthropology* 26 (1970): p. 213-230.

⁶³ Quoted by unnamed source in Basso, “To Give up on Words,” p. 217.

⁶⁴ *Ibid*, p. 220.

⁶⁵ *Ibid*, p. 220.

⁶⁶ *Ibid*, p. 220.

⁶⁷ *Ibid*, p. 227.

For Western Apaches fearful that experiencing white cultural influences beyond the reservation would cause their children to judge them as inferior, withholding communication was a widely accepted practice. This understanding of silence behavior among the Western Apache provides an important clue to the delay in Apache's public opposition to MGIO. Apache activist literature and courtroom testimony would later assert that a confrontation with UA was akin to engaging in an all-too-familiar power struggle with white men. Western Apaches withheld speech from their own children out of fear that they had assumed the judgmental attitudes of white society; for traditional San Carlos Apaches, the Mt. Graham astronomy community *was* white society.

But the reluctance to speak out against the observatory proposal immediately after the project was announced was also tied to more concrete tribal customs governing the sharing of religious knowledge with outsiders. Lt. John G. Bourke, who traveled with an Apache guide in the Pinaleno mountains in the late nineteenth century, observed that the "taciturnity of the Apaches in regard to all that concerns their religious ideas is a very marked feature of their character."⁶⁸ This reluctance to communicate religious knowledge was evident a century later when tribal members asked anthropologists to provide evidence of the Apache's religious use of Mt. Graham that would be admissible in court. Elizabeth Brandt explained that although she had been trusted to assist the Apaches in their fight against the observatory, tribal members were unwilling to divulge certain information that was accessible only to tribal elders and medicine men.⁶⁹ Similarly, at a 1990 conference of Native Americans and sympathetic non-

⁶⁸John G. Bourke, "The Medicine-Men of the Apache," in *Smithsonian, Ninth Annual Report of the Bureau of Ethnography, 1887-1888* (Washington, D.C.: U.S. Government Printing Office, 1892), p. 499. See also Bourke, *On the Border with Crook*, 2nd ed. (New York: Charles Scribner's Sons, 1896).

⁶⁹ See Brandt, Executive Summary of the Preliminary Investigation of Apache Use and Occupancy; Brandt, "The Fight for Dzil Nchaa Si An, Mt. Graham: Apaches and Astrophysical Development in Arizona," *Cultural Survival Quarterly* 19 (1996): p. 50-57.

Natives held to entertain the possibility of amending the American Indian Religious Freedom Act, there were some aspects of Mt. Graham's sacredness that could not be freely discussed. When San Carlos Apache Ola Cassadore Davis listed the sacred attributes of the mountain, she asked non-Native conference attendees to leave during her presentation.⁷⁰

The desire to safeguard religious knowledge from outsiders was certainly of great concern to Apaches practicing traditional Apache religion, but as Brandt noted, the reservation was composed of many faiths:

The Apache were heavily 'missionized' as part of the policy of cultural assimilation and there are a number of religious faiths on the reservation. As in many communities, there is a diversity of spiritual understanding and practices at San Carlos. Some Apache practice Apache religion exclusively; some are exclusively Christians; and some practice both. Those who practice Apache religion are naturally the most concerned with the preservation of Mt. Graham.⁷¹

This view of a multifaceted Apache religious identity is echoed by Williams, who notes that "The San Carlos Apache Community is not a 'community' at all, at least in the way that a non-Indian would normally understand that concept," and religious factionalism is just one expression of the reservation's broader divisions in social, political, and spiritual beliefs and customs.⁷² Given the broad spectrum of religious beliefs and practices on the reservation today, is the protection of sacred knowledge only important to "traditional" Apaches? Anthropologist David W. Samuels, who explored the cultural practices of the communities of the contemporary San Carlos Apache Reservation in his 2005 book *Putting a Song on Top of It: Expression and Identity*

⁷⁰ "Victor, Nosie, Davis attend sacred site conference," *The Moccasin*. 04 December 1990. John J. Rhodes III Papers, box 58, folder 6.

⁷¹ Brandt, "The Fight for Dzil Nchaa Si An, p. 50.

⁷² Williams, Jr., "Large Binocular Telescopes, Red Squirrel Piñata,"

on the San Carlos Apache Reservation, argues that the cultural manifestations of the San Carlos Apaches cannot be neatly inscribed by religion or language; instead, cultural practices and identity are ambiguous and contradictory.⁷³ Samuels' ethnographic observation over the course of seventeen months playing in a band on the reservation revealed that attempting to isolate the cultural markers of "traditional" San Carlos Apaches was less meaningful than accepting a multidimensional tribal identity that is continually renegotiated on the reservation. However, Samuels pointed out that "there is no denying the moral authority of tradition on the reservation," as he learned early on when he was permitted to conduct research by a unanimous Tribal Council vote only if he agreed to certain conditions, including a prohibition against researching or divulging traditional religious beliefs.⁷⁴ Whether they practiced traditional religion or not, the San Carlos Apache tribe had a long-honored history of silence when it came to disclosing religious matters to outsiders.

When seeking a temporal explanation for the Apache's entrance into the Mt. Graham debate, it is also essential to recall that for Apaches in the 1980s, the response to UA's efforts to place an observatory on Mt. Graham was filtered through the historical and lived experience of cultural, social, and political dispossession. Outraged by the notion that the Apaches should have presented their concerns earlier, one Apache directed his anger at the Vatican in a letter to the editor of the *Fort Apache Scout* newspaper: "Well, your Holiness, Indians didn't become citizens in the U.S. until 1924 and couldn't vote in Arizona until 1948. Why, your Holiness, did Rosa Parks wait until 1955 to object to riding in the back of a bus? Why did Martin Luther King

⁷³ David W. Samuels, *Putting a Song on Top of It: Expression and Identity on the San Carlos Apache Reservation* (Tucson: The University of Arizona Press, 2005), p. 8.

⁷⁴ *Ibid.*, p. 23. Samuels was also asked by the Tribal Council to share profits from publications resulting from his research and to work with elders and the local school district.

wait until the 50s to object to segregated schools and restaurants?"⁷⁵ By drawing parallels between the Apache's denial of citizenship and the civil rights movement of the 1960s, the letter underscored a key factor influencing the delay between the observatory proposal and the formation of the ASC. Native American groups had only recently begun to establish a political agenda through the American Indian Movement of the 1970s, and the reclamation of sacred sites lacked coherence when the observatory was first proposed in 1984. However, the six-year period between the observatory proposal and the founding of the ASC was punctuated by significant new developments on both fronts.

The American Indian Religious Freedom Coalition formed in late 1988 with the endorsement of the National Congress of American Indians, the Association on American Indian Affairs, the Native American Rights Fund, and nearly one hundred other tribes and organizations.⁷⁶ Then in 1990, the Native American Graves Protection and Repatriation Act (NAGPRA) was signed into law after years of protests, litigation, and political lobbying by Native Americans who objected to the display of their relatives' remains in museums and over the wishes of the president of the American Association of Museums and many university presidents, archaeologists, and physical anthropologists.⁷⁷ Under NAGPRA, as discussed in chapter two, museum "specimens" consisting of Native American skeletons and other Native objects would be repatriated to Native American communities. Karen Coody Cooper, former curator of the National Museum of the American Indian, observed that NAGPRA was viewed as a

⁷⁵ Christian Becker, "Respect the sanctity of sacred Mt. Graham," *Fort Apache Scout*. 03 April 1992.

⁷⁶ Karen Coody Cooper, *Spirited Encounters: American Indians Protest Museum Policies and Practices* (Lanham, MD: AltaMira Press, 2008), p. 63.

⁷⁷ Native American Graves Protection and Repatriation Act, 25 U.S.C. 3001 et seq. Nov. 16, 1990. Available at nps.gov/nagpra. Accessed 25 March 2013; Cooper, p. 63; Chip Colwell-Chanthaphonh, "Opening America's skeleton closets," *The Denver Post*. 09 May 2010; William L. Merrill, Edmund J. Ladd, et al, "The return of the *Ahayu:da*: Lessons for repatriation from Zuni Pueblo and the Smithsonian Institution," *Current Anthropology* 34 (1993): p. 523-567. For a more extensive discussion of NAGPRA, see chapter two.

marker of cultural and political empowerment for Native Americans. In addition to securing federal legislation recognizing the cultural authority of tribes, Coody found that the repatriation of materials stimulated new interest in traditional ceremonial practices.⁷⁸ Though traditional religious knowledge had always been closely guarded from outsiders, the American Indian Religious Freedom Coalition and NAGPRA paved the way for San Carlos Apaches to finally voice their opposition to the observatory on their sacred mountain by forming the ASC.

When the ASC was founded in May 1990, the environmentalist opposition was losing its legal battle to secure an injunction against telescope construction, and an observatory on Mt. Graham appeared certain. Overcoming any lingering reluctance to make the sacredness of Mt. Graham public knowledge, the ASC issued literature declaring that Mt. Graham was “the place which is the core of our cultural and religious traditions.”⁷⁹ The founding members of the ASC were San Carlos Apaches who identified themselves as “followers of traditional Apache religious practices,” but the group soon expanded to include environmentalist membership.⁸⁰ Though the partnership had not yet been formalized, ASC Apaches and environmentalists were in attendance during a pivotal General Accounting Office investigation in Washington, D.C., marking the tentative beginnings of this unconventional alliance.

A “nonbiological” Biological Opinion

In the summer of 1990, the Mt. Graham astronomy community was anxiously awaiting a General Accounting Office (GAO) investigation set for June to probe the allegations that the United States Fish and Wildlife Service (USFWS) Biological Opinion (BO) had been compromised in favor of UA. A few days before the GAO hearing, Steward Observatory Director Peter

⁷⁸ Cooper, p. 84.

⁷⁹ “Apache Survival Coalition.” June 1990. John J. Rhodes III Papers, box 58, folder 3.

⁸⁰ Ibid.

Strittmatter wrote to Congressman John J. Rhodes III citing a recently-passed Resolution of the American Astronomical Society in support of the project.⁸¹ Strittmatter urged Rhodes “to do all you can to protect the project from further uncertainty and delay, which will otherwise surely destroy it. Without the Mt. Graham Observatory, Arizona’s standing as the astronomy center of the world will simply evaporate.”⁸² Similarly, astronomer Peter B. Boyce urged the American astronomy community to write to the chairmen of the GAO subcommittees in support of MGIO in the June *American Astronomical Society Newsletter*, stressing that “What is happening in Arizona has grown beyond a local environmental battle; it has national implications for the future of astronomy. If we lose the fight for Mt. Graham, astronomers may not easily get the chance again to develop a new high-mountain site in the United States, and the pressure to limit development of existing sites will increase.”⁸³

The Mt. Graham astronomy community, and indeed, the American astronomy community, had much at stake in the hearing. During the Sierra Club Legal Defense Fund trial against the Forest Service and UA to stop telescope construction, USFWS biologists testified that they had been pressured by superiors to generate a report that permitted observatory construction in the summit habitat of the endangered Mt. Graham Red Squirrel.⁸⁴ As discussed in chapter five, Congress based its decision to approve the rider to the 1988 Arizona-Idaho

⁸¹ “Resolution Passed Unanimously By the Council of the American Astronomical Society, June 9, 1990.” John J. Rhodes III Papers, box 58, folder 3.

⁸² Peter A. Strittmatter to The Honorable John J. Rhodes, III. 20 June 1990. Papers of John J. Rhodes III, box 58, folder 3.

⁸³ Peter B. Boyce, “Editorial: Astronomy is not a threat to the environment,” *American Astronomical Society Newsletter* 50. June 1990. Courtesy of Doug Officer.

⁸⁴ Deposition of Sam F. Spiller. Mt. Graham Red Squirrel (*Tamiasciurus hudsonicus grahamensis*), an endangered species; Sierra Club, a non-profit corporation; National Wildlife Federation, a non-profit association, et al., Plaintiffs vs. Clayton Yeutter, et al., Defendants. 11 January 1990. John J. Rhodes III Papers, box 58, folder 7. See also Sam Negri, “Red-squirrel study fudged, biologists say,” *The Arizona Republic*. 07 February 1990.

Conservation Act (AICA) exempting the observatory from the Endangered Species Act (ESA) and other federal environmental laws partly on the judgment of USFWS biologists.⁸⁵ If the GAO determined that the BO that had provided the biological basis for passing the rider was influenced by UA's desire to build the observatory rather than the protection of the red squirrel, the project might be delayed indefinitely while new studies were conducted.

During the Joint Oversight hearing on the BO, the GAO heard testimony from USFWS biologists Spiller and Fitzpatrick and their supervisor Spear as well as Forest Service officials, UA astronomers and representatives, and the President of the Maricopa Audubon Society. Though no Apaches were called to testify, five members of the ASC, including two medicine men, were present at the hearing as well as a briefing held earlier in the week.⁸⁶ At the briefing, the Apaches described the mountain's sacredness and asserted that they had not been informed of the UA project on Mt. Graham until May of 1989 because they had never been contacted by the University.⁸⁷

A few days later, three House of Representatives Subcommittees convened to review the BO findings. Director of Natural Resources Management Issues Resources Jamus Duffus III, who was asked by DeConcini and McCain to determine whether the USFWS BO was consistent

⁸⁵ From the discussion on the House and Senate floors, it is clear that the decision to pass the rider was also heavily influenced by the economic and scientific benefits of building the MGIO. See chapter five.

⁸⁶ For a complete listing of the witnesses called, see Joint Oversight Hearing on Preparation of the 1988 Biological Opinion Regarding Mt. Graham Red Squirrels. 26 June 1990. The presence of San Carlos Apaches at the hearing was noted in the testimony of Charles J. Babbitt and in a confidential memo to Congressmen Rhodes and Kolbe from Rhodes' assistant a few days before the hearing. At the briefing, Senators McCain and DeConcini also learned that USFWS Regional Director Spear had mandated the inclusion of UA's preferred alternative. See Confidential Memo, Jim to JJR/Mr. Kolbe. 20 June 1990. John J. Rhodes III Papers, box 58, folder 3; Statement of Charles J. Babbitt, President of Maricopa Audubon Society, Presented on behalf of The Coalition to Save Mt. Graham. 26 June 1990, p. 1, John J. Rhodes III Papers, box 58, folder 3.

⁸⁷ Confidential Memo, Jim to JJR/Mr. Kolbe. 20 June 1990; Press Release (Press Release, Apache Survival Coalition. June 1990. John J. Rhodes III Papers, box 58, folder 3.

with the ESA first reminded the Committee that such questions were rendered moot by AICA. The BO did not have to meet the ESA standards because the AICA rider declared the ESA satisfied. Duffus then disclosed that the original BO had indeed been based on “nonbiological considerations,” namely, UA’s desired location for the observatory on Mt. Graham’s Emerald Peak.⁸⁸ Duffus had made a potentially damaging claim that the biological judgment that influenced Congress’ decision to pass the AICA rider was based on nonbiological factors. Just days earlier, Strittmatter had appealed to Rhodes to assist the observatory effort in any way possible, and Rhodes continued to advocate for UA interests when he was given the opportunity to question Duffus’ testimony:

Mr. Rhodes: Is it your conclusion that the Endangered Species Act specifically precludes the Regional Director of the Fish and Wildlife Service from considering anything other than scientific data related to a species in reaching a Biological Opinion?

Mr. Duffus: That’s our understanding, yes, sir.

Mr. Rhodes: Can you point out in the Endangered Species Act where that conclusion comes?⁸⁹

Rhodes essentially attempted to cast doubt on Duffus’ testimony by forcing him to admit that the ESA did not explicitly prohibit the consideration of nonscientific data.⁹⁰ Rhodes’ efforts to render the testimony of witnesses less damaging to the observatory were far more successful when it came time for Fitzpatrick to take the stand, however.

⁸⁸ See Statement of James Duffus III, Director Natural Resources Management Issues Resources, Community, and Economic Development Division Before the Subcommittee on National Parks and Public Lands Committee on Interior and Insular Affairs and the Subcommittee on Fisheries and Wildlife Conservation and the Environment Committee on Merchant Marine and Fisheries House of Representatives, p. 1-2. 26 June 1990. Papers of John J. Rhodes III, box 58, folder 3. In his testimony, Spiller stated that the modified BO was based on a “predetermined decision.” See Statement of Sam F. Spiller, Field Supervisor, U.S. Fish and Wildlife Service Ecological Services Field Office, p. 1. 26 June 1990. Papers of John J. Rhodes III, box 58, folder 3.

⁸⁹ Joint Oversight Hearing on Preparation of the 1988 Biological Opinion Regarding Mt. Graham Red Squirrels. Tuesday 26 June 1990. p. 34-35. Papers of John J. Rhodes III, box 58, folder 3.

⁹⁰ Rhodes was commended by UA Vice President for Research Michael A. Cusanovich for his “excellent performance” during the hearing. See Michael A. Cusanovich to The Honorable John J. Rhodes III. 18 July 1990. Papers of John J. Rhodes III, box 58, folder 3.

Fitzpatrick explained that although she believed the conditions imposed upon the BO were “inappropriate,” she had decided to prepare a BO permitting development at UA’s preferred site because she was told by Spear if she did not comply, another office would produce the BO needed to develop the observatory. Fitzpatrick was not happy about skewing the report, but she felt she could still provide adequate protection for the squirrel.⁹¹ Fitzpatrick concluded, “In my opinion, the Emerald Peak alternative was not developed to eliminate the jeopardy to the red squirrel; it was developed to provide the University of Arizona with an acceptable development alternative...in a biologically based biological opinion, the Emerald Peak alternative would not have appeared.”⁹² In his cross-examination, Rhodes pressed Fitzpatrick on her personal feelings about the observatory, and she admitted that she had always been opposed to the project.⁹³ One of the biologists responsible for preparing the BO harbored a personal bias against the observatory, a startling admission that would shortly come back to haunt the USFWS.⁹⁴

Perhaps even more surprising, Strittmatter testified that the Emerald Peak location at the source of the BO controversy was no longer considered an ideal site for MGIO. Much to the indignation of environmentalists who obtained copies of his testimony through a Freedom of

⁹¹Statement of Lesley A. Fitzpatrick, Fish and Wildlife Biologist, U.S. Fish and Wildlife Service Ecological Services Field Office, p. 2. 26 June 1990. Papers of John J. Rhodes III, box 58, folder 3. Spear later charged that he had been misunderstood. See Michael J. Spear to Honorable Jim Kolbe. 23 July 1990. Papers of John J. Rhodes III, box 58, folder 6.

⁹²Statement of Lesley A. Fitzpatrick. 26 June 1990.

⁹³Joint Oversight Hearing on Preparation of the 1988 Biological Opinion Regarding Mt. Graham Red Squirrels. Tuesday 26 June 1990. p. 94. Papers Papers of John J. Rhodes III, box 58, folder 3.

⁹⁴ Other scandalous claims surfaced in the hearing that were readily picked up by the press when the GAO report was made public. According to the testimony of Forest Service official Richard Flannelly released in the GAO report, McCain “severely chastised the Forest Service for dragging its feet” on the Mt. Graham project. The alleged incident took place during a meeting between Tucson Forest Service supervisor Jim Abbott in May 1989, but McCain denied the accusation. See Michael Murphy, “Report ties job threat to McCain: Forest Service staff bullied, GAO says,” *The Phoenix Gazette*. 28 July 1990. Papers of John J. Rhodes III, box 58, folder 6.

Information Act request, Strittmatter confessed that a new site on Mt. Graham's summit region known as Peak 10,298 was far superior to Emerald Peak, and that the final decision on where to locate the observatory would not be made until later in the year.⁹⁵ But the hearing was equally a forum for airing entrenched environmentalist narratives about Mt. Graham as it was for revelatory new information.

When President of the Maricopa Audubon Society Charles J. Babbitt took the witness stand, he echoed the language of the anti-observatory biologist group Scientists for the Preservation of Mt. Graham by introducing Mt. Graham as a "priceless biological museum."⁹⁶ Babbitt then noted Mt. Graham's value as a cool haven for summer recreationists before pointing out that it was also a sacred mountain to the Apaches. Babbitt used his remaining time before the Subcommittee to speak on behalf of the San Carlos Apaches in the room, briefly mentioning that the Apaches had formed the ASC to protect their sacred mountain "after years of silent suffering and poorly organized claims."⁹⁷

The Mt. Graham astronomy community did not have to wait long for the results of the hearing. Just hours after the hearing concluded, a GAO report was issued that deemed the original BO "flawed" and called for an updated BO. Though Congressmen Rhodes, Jim Kolbe, and Bob Stump opposed any new delays, Congressmen Udall, DeConcini, McCain, and Kyl immediately recommended that construction should be delayed pending new studies on the

⁹⁵ In a letter to Manuel Lujan printed on Maricopa Audubon Society letterhead, Babbitt and Witzeman demanded that based on Strittmatter's statement, "this project be put on hold for major re-study and re-evaluation at such time as the University knows where they want to build." See Charles J. Babbitt and Bob Witzeman to Manuel Lujan. 15 August 1990. Papers of John J. Rhodes III, box 58, folder 6.

⁹⁶ Statement of Charles J. Babbitt, President of Maricopa Audubon Society, Presented on behalf of The Coalition to Save Mt. Graham. 26 June 1990, p. 2, John J. Rhodes III Papers, box 58, folder 3.

⁹⁷ Babbitt, p. 5.

squirrel.⁹⁸ The next day, UA agreed to suspend construction, though the University's official stance was that it was the GAO report that was "flawed," not the BO.⁹⁹

Once again, the MGIO had come to a screeching halt, and to add insult to injury, UA's German and Italian partners responded to the news by indicating they would seek alternative locations for their telescopes. Germany's Max Planck Institute regretfully informed Strittmatter that

the current state of affairs creates serious difficulties on our side. The delay is causing increasing unhappiness especially among younger scientists who see their research careers slipping away. The financial burden of retaining staff and building instrumentation that can never be used is becoming intolerable...I am afraid I can no longer avoid beginning the search for an alternative site.¹⁰⁰

Italy's Arcetri Observatory and the Vatican Observatory Foundation expressed similar sentiments.¹⁰¹ Arcetri Observatory's Domenico Bonaccini made it clear that the delay had jeopardized not only the proposed partnership with UA, but future collaborative ventures with American astronomers because "we are embarrassed in reporting 'yet another hearing' and 'yet another delay up to the next trial in court.' The image of our American colleagues is appearing more and more shaky to the European public opinion, because of this delay. Future

⁹⁸ For Immediate Release: Delegation members call for Mt. Graham Biological Reassessment." 26 June 1990. John J. Rhodes III Papers, box 58, folder 3; Sam Stanton, "New UA-scopes studies urged: Udall, McCain, DeConcini, Kyl fear for squirrel," *The Arizona Republic*. 27 June 1990.

⁹⁹ For release immediately: "Udall applauds UA 'statesmanship,'" Committee on Interior and Insular Affairs, Morris K. Udall, Chairman. 28 June 1990. Papers of John J. Rhodes III, box 58, folder 3; Lourdes Medrano, "UA halts Mount Graham telescope project over concerns of 4 Arizona congressmen," *The Arizona Daily Star*. 29 June 1990; Response to GAO Report. 18 July 1990. Papers of John J. Rhodes III, box 58, folder 3.

¹⁰⁰ Max-Planck-Institut fur Radioastronomie to Dr. Peter A. Strittmatter. 29 June 1990. Papers of John J. Rhodes III, box 58, folder 3.

¹⁰¹ Franco Pacini, Osservatorio Astrofisico di Arcetri to Prof. Peter Strittmatter. 29 giugno 1990; George V. Coyne, S.J., Director, Vatican Observatory to Dr. Peter A. Strittmatter. 25 June 1990. Papers of John J. Rhodes III, box 58, folder 3.

collaborations may be considered more carefully.”¹⁰² As *The Wall Street Journal* wryly observed, the environmentalist opposition to the MGIO had forever tarnished American astronomy: “the telescopes and the scientists who go with them will likely be doing their work atop a mountain in Switzerland, having long since concluded that serious scientific minds aren’t welcome in the United States, which now belongs to the squirrels, owls and cuckoos.”¹⁰³ Both the Italian and German partners adopted a wait-and-see strategy and ultimately remained committed to the MGIO, but the international collaboration looked bleak in the summer of 1990.

When the updated USFWS BO was released in August suggesting reconsultation under the ESA between the USFWS and the Forest Service on the observatory’s impact on the squirrel, the project seemed to have finally lurched past the point of no return. Strittmatter’s admission that Steward Observatory was considering a new site for MGIO that had *not* been exempted from federal laws had outraged the environmentalist opposition. UA’s foreign partners could not afford to wait years for new biological studies to be carried out, the compromised BO had created a rift between UA’s once-united political allies, and now the project was facing new opposition from the San Carlos Apache tribe.¹⁰⁴

Speaking with ‘one voice:’ Native Solidarity Against MGIO

The ASC delegation sent to D.C. for the GAO hearing in June was largely ineffectual in shifting the discussion to the Apache’s claim on the mountain, but it had nonetheless proven influential after returning to the reservation. ASC Secretary-Treasurer and Tribal Councilman

¹⁰² Domenico Bonaccini to The Honorable John J. Rhodes. 27 July 1990. Papers of John J. Rhodes III, box 58, folder 6.

¹⁰³ “Squirreling Away Science,” *The Wall Street Journal*. 23 August 1990.

¹⁰⁴ For immediate release: news advisory. 06 August 1990. Papers of John J. Rhodes III, box 58, folder 6; Statement of Rep. Morris K. Udall. 07 August 1990, Bob Stump Papers. Arizona State University, box 1, folder 14.

Wendsler Nosie, Sr. informed San Carlos Apache Tribal Council members that in a meeting with Arizona Congressman Jon Kyl and the staff of Senator DeConcini, the ASC was told that if the tribe passed a resolution, it could be included in their report on the project.¹⁰⁵ This news from the ASC delegation apparently carried some weight with the Tribal Council. ASC Chairwoman Ola Cassadore Davis had made four unsuccessful appeals to the Tribal Council prior to the D.C. trip, but now the Tribal Council decided to pass a Resolution detailing the tribe's official stance against the telescopes.¹⁰⁶

The Resolution explained that any permanent modification of the mountain represented "a display of profound disrespect for a cherished feature of the Apache's original homeland."¹⁰⁷ Fifteen years before the Tohono O'odham Nation would make a similar claim against telescope construction on Kitt Peak, the Resolution warned that "the San Carlos Apache Tribe states its firm and total opposition to the construction of a telescope on the top of Mount Graham and that the Tribe stands ready to defend its constitutional rights if this project is allowed to continue," reflecting a political agency that owed much to indigenous rights movements that were now more than two decades strong.¹⁰⁸ UA decided to send representatives to visit the San

¹⁰⁵ "San Carlos Tribal Council opposes Mt. Graham telescopes," *The Moccasin*. 17 July 1990. MSM-512. Mt. Graham International Observatory Collection 1992.

¹⁰⁶ Ibid. The Apache Tribal Council Resolution opposing MGIO came just after the American Astronomical Society passed a unanimous Resolution endorsing the observatory. See "Resolution Passed Unanimously By the Council of the American Astronomical Society, June 9, 1990." John J. Rhodes III Papers, Arizona State University Libraries: Arizona Collection. Box 58, Folder 3.

¹⁰⁷ San Carlos Apache Tribal Council Resolution 90-68. 10 July 1990.

¹⁰⁸ Ibid. This sentiment is also the product of the broader trend toward solidarity in indigenous activism. In 1991, the first meeting of the national organization Keepers of the Treasures, Cultural Council of American Indians, Alaska Natives and Native Hawaiians with representatives from 60 native groups passed a resolution in support of the San Carlos Apache's fight to preserve Mt. Graham. The National Congress of American Indians passed a resolution supporting the introduction of legislation to remove telescopes from Mt. Graham in 1994. See Resolution No. EX DC 93-12, Resolution to Save Dzil Nchaa Si An (Mt. Graham). 18 January 1993.

Carlos Apache tribal headquarters with the hopes of making amends. The UA officials listened to the tribe's concerns about the impact of telescope construction on their sacred mountain and responded with the offer to delay the project by one week. In a letter to Regional Forester David F. Jolly, Tribal Chairman Buck Kitcheyan referred to Mt. Graham as sacred "since time immemorial" and dismissed UA's suggestion to briefly delay construction as "demeaning and hollow" to the Tribal Council.¹⁰⁹

The San Carlos Apaches were not making much headway with the Mt. Graham astronomy community, but the open declaration of Mt. Graham as a sacred mountain threatened by the observatory was having a ripple effect within the Native American community. At a Native American Sacred Mountains conference in late 1990 attended by three ASC members, 100 Native American tribal representatives from reservations across the United States discussed the Mt. Graham case and called for solidarity in protecting sacred sites.¹¹⁰ Native American tribes had historically been closed societies and there was no consensus on the definition of 'sacred' among Native peoples, but many conference attendees believed the time had come to work together because the federal government was systematically usurping native lands. A new tactic was needed since, as ASC member Nosie had learned from his trip to Washington, D.C., federal government officials wanted evidence in document form to support claims of sacredness, and his tribe lacked the kind of evidence that was recognized in Washington.¹¹¹ By the end of the year, the escalating conflict between the San Carlos Apaches and the Mt. Graham astronomy community both reflected and catalyzed a new historical

¹⁰⁹ Buck Kitcheyan, San Carlos Apache Tribal Chairman to U.S. Forest Service Regional Forester David F. Jolly. 31 August 1990. Arizona State University archives. MSM 512 Mt. Graham International Observatory Collection 1992.

¹¹⁰ "Victor, Nosie, Davis attend sacred site conference," *The Moccasin*. 04 December 1990.

¹¹¹ *Ibid.*

moment within the broader indigenous rights movement that had been snowballing since the 1970s.

The 'Red Power' movement discussed in chapter two sought to construct a common 'Native' identity from the diverse and isolated populations of Native Americans across the country. The Sacred Mountains conference represented the maturation of this impulse: while struggling to reclaim the unique indigenous identity specific to each tribe, Native Americans were also recognizing the value of forging a common Native identity by establishing solidarity with other tribes and indigenous groups to confront the federal government in disputes over land and religious rights. Even tribes that had historically been bitter enemies such as the Western Apaches and the Tohono O'odham were coming together to oppose the project.¹¹² The *Navajo-Hopi Observer* ran an editorial suggesting, "it may be in all tribes' interests to pool their resources in order to stop projects which are insensitive to Native American issues."¹¹³ Mt. Graham was by no means the only instance of tribes establishing political unity, but the struggle served as an important rallying point for tribes while exposing the weaknesses of the 1978 American Indian Religious Freedom Act (AIRFA) and initiating new conversations about protecting sacred sites located on and off reservation lands.¹¹⁴

¹¹² The Tohono O'odham Legislative Council passed a resolution supporting the San Carlos Apache Tribal Council's opposition to MGIO in 1992. See "O'odham oppose Mt. Graham scopes," *Arizona Daily Star*. 11 May 1992.

¹¹³ Stan Bindell, "Editorial: Arizona Regents should hold meeting on San Carlos Apache Reservation," *Navajo-Hopi Observer* 19 June 1991. Executive Summary of Preliminary Investigation of Apache Use, Arizona State University. MSM-391 1991.

¹¹⁴ The American Indian Religious Freedom Act, Public Law No. 95-341, 92 Stat. 469 (Aug. 11, 1978). In the Supreme Court case *Lyng v. Northwest Indian Cemetery Protective Association*, 484 U.S. 439 (1988), the religious protection afforded by AIRFA was seriously undermined. Tolowa, Yurok, and Karok tribes objected to a proposed road built by the U.S. Forest Service through northern California's Chimney Rock area in the Six Rivers National Forest because the mountains were essential to their religious practices. The Supreme Court ruled that the property rights of the federal government superseded the religious

Entering the Mt. Graham debate also signaled a major cultural and political shift for the San Carlos Apache tribe on a more local level. The San Carlos Apache Tribal Council and the ASC had dared to break free of cultural and social constraints on sharing tribal information with outsiders to produce a narrative framing Mt. Graham as a sacred site under assault by the observatory. In previous generations of institution-building in the United States, such narratives might have been discarded as tribal mythologies with little power to influence a Big Science project like the Mt. Graham International Observatory. However, the San Carlos Apaches exerted a religious claim on the mountain at a time when the conditions of laws such as the AIRFA, the National Environmental Policy Act, and the National Historic Preservation Act mandated further investigation of the Apaches' claim on the mountain. A letter signed by nine members of the San Carlos Apache Tribal Council in 1991 asserted that after consulting with anthropologists Brandt and Basso, the tribe had learned that "on Dzill ncha si an, the Forest Service failed to comply with the Natural Environmental Policy Act [sic], before the university managed to exempt the telescopes from NEPA. They also advised us that the Forest Service has never been released from its ongoing obligation to comply with the National Historic Preservation Act, the American Indian Religious Freedom Act, the National Forest Management Act, and the regulations which implement these statutes."¹¹⁵ Defining Mt. Graham as a sacred site suddenly threatened to derail a multimillion dollar telescope project.¹¹⁶

rights of the tribes, and with the legal precedent set by the judgment, AIRFA was rendered little more than a policy statement.

¹¹⁵ Raleigh Thompson, Acting Tribal Chairman, et al. to Mr. David Jolly, Regional Forester. 04 June 1990, p. 1. Betsy Brandt Papers. MSM-838. See also "On Mt. Graham telescope work SC Tribal Council demands halt," *The Moccasin* 18 June 1991, p. 11.

¹¹⁶ The National Environmental Policy Act (NEPA) was passed in 1969. See Public Law No. 91-190, 83 Stat. 852 (1969). Under Section 106 of the National Historic Preservation Act of 1966, federal agencies must undergo a review process for all federally funded projects on sites eligible for listing on the National Register of Historic Places. See Public Law 89-665.

The Antidote for the “Poison Pill”

The GAO had resulted in major setbacks for the Mt. Graham astronomy community, but it had also created an opening for the observatory project through the testimony of biologist Fitzpatrick, who confessed under oath that she had always been against the project. Ever since the BO was first issued with numerous restrictions such as the closure of a Bible camp and summer homes on the mountain, the Mt. Graham astronomy community had suspected that the USFWS was biased against the project. Fitzpatrick’s testimony strongly confirmed this theory. After the hearing, UA Vice President for Research Michael Cusanovich wrote to Interior Secretary Manuel Lujan to emphasize that Fitzpatrick’s testimony meant the USFWS had “attempted to delay and hence kill the project by using the endangered Mt. Graham red squirrel as a tool.”¹¹⁷ Patton, Boggs, & Blow took a more direct approach, informing Lujan that Fitzpatrick and Spiller had both corroborated that the USFWS had developed a “poison pill” of requirements imposed upon UA that would make the project onerous enough for the observatory to be abandoned altogether.¹¹⁸

Until then, the so-called poison pill had been nothing but a headache for MGIO planners, who had weathered a storm of negative public opinion as a result of accommodating USFWS demands such as road and cabin closures. Now the poison pill could be turned into an advantage for the observatory, however. The subject of the “poison pill” splashed across local headlines, and Lujan took heed of the allegation by ordering an immediate investigation of the

¹¹⁷Cusanovich to Mr. Manuel Lujan, Jr. 14 August 1990. Papers of John J. Rhodes III, box 58, folder 6. Conditions included in the so-called ‘poison pill’ included closing public access to the upper elevations of Mt. Graham coveted by hikers, installation of steel gates to minimize public access, non-renewal of permits for summer homes and a Bible camp, and reforestation several miles of existing dirt roads on the mountain.

¹¹⁸ Patton, Boggs, & Blow to The Honorable Manuel Lujan, Jr. 14 August 1990. Papers of John J. Rhodes III, box 58, folder 6.

USFWS.¹¹⁹ Against the wishes of USFWS officials, the Forest Service then decided to grant construction permits for three telescopes to UA.¹²⁰ Attempts by environmental groups to secure another restraining order against the construction were denied in federal District Court.¹²¹

For many telescope advocates, the Forest Service permits sent a clear message that the environmentalist opposition was losing the war for Mt. Graham. The squirrel was no longer serving as an effective vehicle for blocking development in the courts, but the mountain remained a battleground for the militant environmentalists who had always preferred less conventional strategies of environmental resistance.¹²² When construction began, Earth First!ers were present to circumvent construction by erecting barricades, digging a trench across an access road, and camping out at the site with banners reading "Save Mount Graham!"¹²³

Problematic Partnerships

The next year brought new financial uncertainties and continued litigation and public outcry over the MGIO. After withstanding years of student protests on campus and numerous

¹¹⁹Jim Erickson, "Mt. Graham 'poison pill' is noted by GAO," *The Arizona Daily Star*. 15 August 1990; Erickson, "Lujan enters scopes fray, order probe," *The Arizona Daily Star*. 16 August 1990.

¹²⁰ Press release. Jim Kolbe. 23 August 1990. Papers of John J. Rhodes III, box 58, folder 6. The Arizona Game and Fish Department called the issuing of permits "a breach of public trust." See Duane L. Shroufe, Director Game & Fish Department. The State of Arizona to Mr. David Jolly, Regional Forester. 23 August 1990. Papers of John J. Rhodes III, box 58, folder 6.

¹²¹ For immediate attention re: federal district court action today on Mt. Graham. Patton, Boggs, & Blow to Jim Huska. 28 August 1990. Papers of John J. Rhodes III, box 58, folder 6; Glen Creno, "Judge refuses to delay Mount Graham project; work to begin," *The Phoenix Gazette*. 29 August 1990. Papers of John J. Rhodes III, box 58, folder 6. In December 1991, the 9th U.S. Circuit Court of Appeals ruled that AICA protected the observatory project from further environmental review. See Arthur H. Rotstein, "Third partner sought for Mt. Graham," *Tucson Citizen*. 13 December 1991.

¹²² "Up telescopes!" *The Arizona Republic*. 25 August 1990; "Mount Graham: it's time to halt ridiculous delay," *Tucson Citizen*. 27 August 1990.

¹²³ "Telescope site is vandalized," *Tucson Citizen*. 04 September 1990; Sam Negri, "Telescope site work begins--7 arrested: activists cuff selves to trees," *The Arizona Republic*. 03 October 1990.

delays in construction, Ohio State University (OSU) announced in March 1991 that it would likely withdraw as a financial partner in the Columbus telescope, a potentially devastating financial loss to the MGIO.¹²⁴ In the midst of university budget cuts over the previous year, OSU had been struggling to find funding for its \$15 million share in the Columbus binocular telescope, a joint project with UA and Italy's Arcetri Observatory.¹²⁵ Astronomy faculty members at OSU who were hired with the promise of the university's participation in the MGIO felt betrayed when the administration suggested terminating its commitment to the project. Jay Frogel, who had accepted a position in OSU's Astronomy Department two years earlier, explained, "the entire buildup of the department over the last five years has been predicated on the telescope being built."¹²⁶

The following month, spokesperson for the Smithsonian Institution Jim Cornell broke the news that the Smithsonian's submillimeter telescope was slated to be built on Mauna Kea instead of Mt. Graham. Although the decision was hardly a surprise at that point and was based primarily on the scientific superiority of the Mauna Kea site, Cornell also disclosed that one consideration was that in Hawai'i, "we would have less of an environmental impact."¹²⁷ Given

¹²⁴ HopeAnn Kauffman, "Story of scope-stalling squirrels is told," *The Ohio State Lantern*. 19 July 1990; John Thomas, "Ohio State vs. the Mt. Graham red squirrel," *Columbus Monthly*. March 1990. Courtesy of Doug Officer; Robert Bunge, "Students protest Graham telescope," *The Ohio State Lantern*. 08 December 1990. John J. Rhodes III Papers, box 58, folder 6; Joanna Shipengrover, "Telescope disgrace," *The Ohio State Lantern*. 13 February 1991. John J. Rhodes III Papers, box 58, folder 1

¹²⁵ Tim Doulin, "Gee endorses plan for giant telescope: OSU would contribute \$15 million," *The Columbia Dispatch*. 20 November 1990.

¹²⁶ Frogel, quoted in Tim Doulin, "Astronomers say their fate tied to scope," *The Columbia Dispatch*. 10 March 1991. See also Doulin, "Faculty grills Gee on scope," *The Columbia Dispatch*. 09 March 1991; Norma Coile, "Ohio State may quit Mt. Graham project: budget cutbacks may doom support," *Tucson Citizen*. 20 March 1991. John J. Rhodes III Papers, box 58, folder 1.

¹²⁷ Cornell, quoted in Michael Murphy, "Court orders telescope work halted," *The Phoenix Gazette*. 10 April 1991. See also David Hoyer, "Hawaii site may get telescope: Mount Graham location too small for instrument," *The Phoenix Gazette*. 09 April 1991; Jim Erickson, "Smithsonian scope urged for Hawaii, not Mt. Graham," *The Arizona Daily Star*. 10 April 1991. Courtesy of Doug Officer. In late 1990, the Harvard-

that Strittmatter had recently expressed new doubts about the suitability of the Emerald Peak site and that the Smithsonian's sizable submillimeter array required more acreage than MGIO had been granted, the decision to build on Mauna Kea was surely based on scientific and logistical factors. However, the Smithsonian was also undoubtedly aware of the grassroots and legal opposition to its proposed involvement in the project after environmentalists made their objections known by staging numerous protests in Washington, D.C. One of the most visible incidents occurred just two months before the Smithsonian's announcement that its telescope would be located on Mauna Kea.

At an environmental law conference sponsored by the Smithsonian in February 1991, 450 attendees received a fake flyer distributed anonymously by an anti-observatory group. The flyer, printed on Smithsonian Institution letterhead, opened with deceptively neutral welcoming remarks before stating, "This year's conference is especially important to the Smithsonian Institution as our leadership role in circumventing the National Environmental Policy Act ("NEPA") and in disregarding the Endangered Species Act ("ESA") is rapidly becoming established."¹²⁸ The fake flyer went on to sarcastically congratulate the Smithsonian Astrophysical Observatory for disregarding the cultural and religious voice of the Apaches and for supporting environmental law "unless it interferes with our quest for prestige and glory."¹²⁹

The Smithsonian Institution had chosen Mauna Kea as a superior site for scientific reasons and OSU was considering a withdrawal of its financial support from the Columbus

Smithsonian Center for Astrophysics was still deciding between Mt. Graham and Mauna Kea as the site for its submillimeter telescope. See Michele F. Forman, "Can squirrels survive the Harvard-Smithsonian Observatory Plan? the battle for Mt. Graham," *The Harvard Crimson*. 29 October 1990. Available at thecrimson.com. Accessed 02 February 2013.

¹²⁸ Alan D. Ullberg to Ross Simons and Madeleine Jacobs. Memorandum: "SI letterhead flyer re Mount Graham distributed at Environmental Law Conference." 14 February 1991. Courtesy of Doug Officer.

¹²⁹ Ullberg to Simons and Jacobs.

telescope due to a lack of funding, but anti-observatory activists interpreted both decisions as a sign of the opposition's success. In a handwritten note scrawled across an article on the OSU pullout that was sent to Arizona Congressman Rhodes, Witzeman wrote "First Smithsonian, now OSU! The Mt. Graham house of cards collapses."¹³⁰

Witzeman may have exaggerated the causal relationship between the anti-observatory campaign and the Smithsonian and OSU decisions not to partner with MGIO, but he was right about one thing: the MGIO house of cards *was* collapsing. In September, OSU abruptly confirmed that it was pulling out of the Columbus project just hours before the Presidents of OSU and UA sat down together to watch a football game between the two universities in Ohio Stadium.¹³¹ Though the partnership was already rumored to be on shaky ground, a July meeting between administrators from both institutions had reaffirmed OSU's commitment to the telescope, so the news was a shock for UA and OSU astronomers.¹³² OSU President Gordon Gee defended the decision as a necessary measure to protect OSU's financial resources, but he also mentioned factors that had more to do with prestige than finances. Gee specified that "in the beginning, the Columbus Project was very much in the race to build big telescopes...but over the years, as the expected completion date for the instrument was extended again and again to its

¹³⁰ Bob Witzeman, fax of Tim Doulin, "Astronomers say their fate tied to scope" to John J. Rhodes III. John J. Rhodes III Papers, box 58, folder 1. A few months later, Hamilton Teaford, chair of OSU's Board of Trustees, clarified that "in no way did the environmental debate affect our decision to withdraw from the project." See Teaford, quoted in "UA loses partner in scope project," *Eastern Arizona Courier*. 11 September 1991. Courtesy of Doug Officer.

¹³¹ Bernie Karsko, "OSU can't pay, drops telescope," *The Columbus Dispatch*. 08 September 1991; Eugene Capriotti, chair of OSU's astronomy department for 13 years, decided to resign in protest of the decision to pull out of the Columbus project, and William Kern, dean of the College of Mathematics and Physical Sciences also decided to step down. See Jim Erickson, "OSU dean will step down to protest telescope project pullout," *The Arizona Daily Star*. 11 September 1991. Courtesy of Doug Officer. Embarrassingly, a commercial promoting the UA-OSU collaboration on the Columbus project still ran during the national TV coverage of the football game. See Norma Coile, "Ohio State kept its astronomers and UA in dark," *Tucson Citizen*. 10 September 1991. Courtesy of Doug Officer.

¹³² Coile, "Ohio State kept its astronomers and UA in dark."

current 1997, our window of opportunity steadily began to close...soon, the opportunity of 'building the biggest' was lost."¹³³ Those delays, of course, could directly be traced to the efforts of the environmentalist opposition over the years.

OSU's withdrawal from the Columbus project prompted UA to seek a new partner to help defray costs for MGIO as a dispute unfolded between the two institutions over fees owed to UA.¹³⁴ Strittmatter informed a reporter that the sudden loss of funding that was thought to be secure caused an "incredible jolt to the system."¹³⁵ UA's new President, Manuel Pacheco, commissioned the consulting firm Booz-Allen & Hamilton to assess the cost of abandoning the project altogether and discovered that the projected \$14.6 million already invested in the observatory was deemed more costly than abandonment.¹³⁶ The report recommended developing a new public relations strategy to "turn around (the) image of a faltering project."¹³⁷ By then, UA's public image was threatened not only by the longstanding environmentalist opposition, but by the increasingly vocal opposition from the ASC.

¹³³ E. Gordon Gee to University Faculty and Staff re: The Columbus Project. The Ohio State University. 12 September 1991. Courtesy of Doug Officer.

¹³⁴ UA argued that OSU owed several million dollars in order to be free of its contractual agreement to participate in the Columbus telescope, while OSU President Gordon Gee stated that OSU was only obligated to pay for the planning phase of the project. See Tim Doulin, "OSU liable for millions in telescope debts, sources say," *The Columbus Dispatch*. 12 September 1991. In 1992, OSU and UA worked out an arrangement in which OSU would receive twelve nights of viewing time on the telescope annually due to its \$2.5 million investment. See Jennifer L. Peterson, "Environmental group mad about telescope," *The Lantern*. 29 September 1992. Courtesy of Doug Officer. The project was ultimately saved by the Tucson-based Research Corp., which agreed to finance \$7.5 million in construction costs for the then-called Columbus Telescope in 1992, making up some of the \$15 million lost when OSU pulled out of the project. The Research Corp. investment made it possible for construction to begin on one of the 8.4-meter mirrors while UA continued to search for additional funding. See David P. Hamilton, "Columbus Telescope Project Back on Track," *ScienceScope* (12 June 1992), p. 1507.

¹³⁵ Strittmatter, quoted in Arthur H. Rotstein, "Third partner sought for Mt. Graham," *Tucson Citizen*. 13 December 1991. John J. Rhodes III Papers, box 58, folder 1.

¹³⁶ Jim Erickson, "Mt. Graham called best option for UA," *The Arizona Daily*. 15 January 1992; Norma Coile, "UA reassesses Mt. Graham: included in study, cost of abandonment," *Tucson Citizen*. 14 January 1992.

¹³⁷ Booz-Allen, quoted in Erickson, "Mt. Graham called best option for UA."

A “sacred mountain” and a “sacred ecosystem”

In August 1991, the ASC filed a lawsuit against the Forest Service in U.S. District Court seeking an injunction against telescope construction.¹³⁸ The ASC lawsuit charged that the Forest Service had violated the constitutional rights of the San Carlos Apaches by granting a Special Use Permit to the Arizona Board of Regents and the University of Arizona for telescope construction the previous summer.¹³⁹ In preparation for their legal battle, ASC members had invited anthropologists and legal experts to assist them in providing documentary evidence that Mt. Graham was sacred to the Western Apaches with the hopes that scholarly validation might be weighed more favorably than oral traditions in the courtroom. Brandt determined that previous efforts by UA and the Forest Service to evaluate the cultural resources of Mt. Graham during the EIS process had only considered archaeological resources consisting of the shrines discovered early in the EIS process. When it came to meeting the requirements of Section 106 of the National Historic Preservation Act (NHPA), which mandated federal agencies to identify traditional cultural properties eligible for inclusion in the National Register, Brandt believed UA and the Forest Service had failed miserably.¹⁴⁰

Relevant materials on the historic significance of Mt. Graham to the Apaches were located in the Arizona State Museum libraries right on the UA campus, “but no attempt was made to identify any traditional cultural properties which might be eligible.”¹⁴¹ Brandt was referring to the field notes of Grenville Goodwin, an early ethnographer of the Western Apaches. Like other repositories on the Western Apaches, Goodwin’s papers are restricted to

¹³⁸ “Dissent over lawsuit surfaces,” *Eastern Arizona Courier*. 04 September 1991. Courtesy of Doug Officer.

¹³⁹ *Ibid.*

¹⁴⁰ Brandt, Executive Summary of the Preliminary Investigation of Apache Use and Occupancy, p. 3.

¹⁴¹ *Ibid.*

non-Apache researchers due to privacy concerns.¹⁴² Brandt was able to obtain permission to examine the Goodwin papers, which document that Mt. Graham was one of four sacred mountains to the Apaches that was prayed to regularly for long life.¹⁴³ Speaking to the question of whether the Apaches had occupied Mt. Graham historically, Brandt noted that Spanish, Mexican, and American records also validated Apache use and occupancy of Mt. Graham, which had been part of the Apache territory since at least the mid-eighteenth century.¹⁴⁴ In Brandt's professional assessment, Mt. Graham contained Apache burials as well as sacred springs, plants, and animals that were needed for religious healing ceremonies. For these reasons, "loss of access to the mountain and to the use of the mountain will radically impact upon traditional Apache culture and religion."¹⁴⁵ Arguing that the Western Apaches were historically anchored to Mt. Graham and asserting that the tribe had not been properly consulted at the outset of the observatory project, Brandt concluded that UA and the Forest Service had violated the National Historic Preservation Act and the AIRFA, a serious charge that could not easily be dismissed.¹⁴⁶

The ASC lawsuit immediately sparked controversy on the reservation. A group of San Carlos Apaches from the Gilson Wash District formed a new organization called the People's Rights Coalition in response to the lawsuit and sent a letter to the Tribal Council criticizing its

¹⁴² These concerns were later formalized in the 1995 "Inter-Apache Policy on Repatriation and the Protection of Apache Cultures," which mandates that researchers who request access to archives containing Apache records must obtain written approval from the tribes. This policy was modeled on a similar initiative of the Hopi Tribe, which informed museums that all published or unpublished field data should be repatriated and that future research requests would only be honored by the written authorization of the tribe. See Michael F. Brown, "Can culture be copyrighted?" *Current Anthropology* 39 (1998): p. 193-206, p. 194.

¹⁴³ Grenville Goodwin papers. Arizona State Museum Archives. MS 17, folder 99. My thanks to Alan Ferg for generously providing access to some of the Goodwin collection that has previously been published.

¹⁴⁴ Brandt, Executive Summary of the Preliminary Investigation of Apache Use and Occupancy, p. 3.

¹⁴⁵ *Ibid.*

¹⁴⁶ *Ibid.*, p. 2.

involvement.¹⁴⁷ In the letter, William Belvado accused two Tribal Council members involved in the suit of neglecting the more urgent problems of “restoring the Tribal government, health care, education, economic development, housing and employment” afflicting the reservation.¹⁴⁸ Though his anger was directed at the Tribal Council for endorsing the ASC lawsuit, Belvado’s statements reflected a broader dissatisfaction with the Tribal Council over recent events. The reservation was in a state of deep turmoil, with Tribal Chairman Buck Kitcheyan under investigation for charges of theft and the embezzlement of \$100,000 of tribal funds. The Tribal Council had made the unpopular decision to suspend Kitcheyan and schedule a recall election for August, which caused tensions to boil over on the reservation as Kitcheyan’s supporters protested his suspension.¹⁴⁹ The Mt. Graham astronomy community was closely following these developments on the reservation, since the weekly “Mt. Graham Routing Slip” that included a round-up of newspaper clippings and memos related to the observatory project began to include relevant articles from the San Carlos Apache newspaper *The Moccasin* and other Native news sources.¹⁵⁰ UA administrators contacted Buck Kitcheyan, and he informed them that the Apaches in the ASC were among the group of Apaches who opposed Kitcheyan’s leadership as Tribal Chairman.¹⁵¹ Kitcheyan believed that the ASC’s anti-observatory campaign was motivated

¹⁴⁷ Dissent over lawsuit surfaces.”

¹⁴⁸ Belvado, quoted in “Tribal group wants council to focus on issues,” *Eastern Arizona Courier*. 04 September 1991. Courtesy of Doug Officer.

¹⁴⁹ Mark Shaffer, “Warrant issued for tribe leader,” *The Arizona Republic*. 09 July 1991; “Tribe says chairman owes \$81,000,” *Silver Belt*. 04 July 1991. The Arizona Historical Society. Tribal Government.

¹⁵⁰ See “Mt. Graham Routing Slip,” May 1990-August 1996; “MGIO Distribution Slip,” September 1996-January 2000. Courtesy of Doug Officer. Environmentalist newsletters were also tracked throughout this period as well as dating back to 1985.

¹⁵¹ Williams, Jr., “Large Binocular Telescopes, Red Squirrel Piñata,” p. 1161.

solely by the desire to embarrass him for failing to protect Apache religious interests.¹⁵² ASC members, on the other hand, claimed that Kitcheyan was representative of members of the Apache tribal government who had forgotten the old traditions because they were descended from families who had been heavily “Lutheranized” by missionaries in the nineteenth century.¹⁵³ Whether the opposition to the ASC was politically motivated or not, the Mt. Graham astronomy community had gained an important ally through the People’s Rights Coalition.

Later in the year, the ASC’s membership swelled to include environmentalists such as Witzeman and Babbitt. At the first Native American and environmentalist roundtable conference held in Washington, D.C. in December 1991, ASC leader Cassadore Davis briefed the environmental community on the Apache’s struggle to protect Mt. Graham.¹⁵⁴ Environmental and Native American groups present at the meeting agreed to form a partnership to protect sacred sites because, according to Davis, “both groups recognized the increasing threats from commercialism and development to sacred Indian places and see this initiative as part of a long term effort to instill in society a stewardship ethic for the earth.”¹⁵⁵ Conservationists and Apaches were motivated by different perspectives on the mountain’s significance, but they were effectively bound to the same cause, and anti-telescope discourse began to define Mt. Graham as both a “sacred mountain” and a “sacred ecosystem.”¹⁵⁶

¹⁵² Williams, Jr., “Large Binocular Telescopes, Red Squirrel Piñata,” p. 1161.

¹⁵³ Ibid, p. 1162.

¹⁵⁴ “Indians and environmentalists agree to protect sacred sites,” *Navajo-Hopi Observer*. 11 December 1991. Courtesy of Doug Officer.

¹⁵⁵ Davis, quoted in “Indians and environmentalists agree to protect sacred sites.”

¹⁵⁶ Handouts distributed by anti-observatory activists urged concerned citizens to save the sacred ecosystem and sacred mountain. See, for example, “Mt. Graham: Sacred Mountain—Sacred Ecosystem Background Information.” 25 May 1993. Betsy Brandt Papers, Arizona State University USM-837. In 1992,

However, although the anti-telescope campaign had evolved into an allied community of San Carlos Apaches and members of environmentalist groups, this community did not necessarily share an equivalent set of beliefs and values concerning the role of the mountain. Seeking to explain why native peoples have at times been reluctant to collaborate with environmentalists despite their mutual respect for plant and animal life, historian of religion and environmental ethics John A. Grim finds that there are “occasional misunderstandings in this seemingly intrinsic alliance.”¹⁵⁷ According to Grim, the lack of consensus on land as “wilderness,” the criticism of Native American subsistence practices, and environmentalists’ appropriation of Native spiritual traditions have often impeded partnerships between the two communities.¹⁵⁸

Significantly, the environmentalists who teamed up with San Carlos Apaches to oppose the MGIO included members of the Audubon Society but also several members of Earth First!. Bron Taylor’s case studies of the religious entanglements of Earth First! members and Native American spirituality have shown that the indigenous-environmentalist alliance has frequently been undermined by the radical environmental organization’s cultural borrowing of Native American spiritual practices.¹⁵⁹ In the Mt. Graham case, Apaches apparently did not perceive

this integrated platform was evident when members of the ASC, the National Audubon Society, Save America’s Forest, the Defenders of Wildlife, and the Friends of Mt. Graham teamed up to draft a bill calling for reconsultation of the AICA rider to “support our efforts to preserve a site of unique religious, cultural, and biological significance.” See “Mt. Graham Draft Bill.” July 1990. John J. Rhodes III Papers, box 58, folder 1.

¹⁵⁷ See Grim, “Indigenous Traditions and Deep Ecology,” in *Deep Ecology and World Religions: New Essays on Sacred Ground*, David Landis Barnhill and Roger S. Gottlieb, eds., (Albany: State University of New York Press, 2001), p. 48.

¹⁵⁸ See Grim, “Indigenous Traditions and Deep Ecology,” p. 48.

¹⁵⁹ Bron Taylor, “Resacralizing Earth: Pagan Environmentalism and the Restoration of Turtle Island,” in *American Sacred Space*, David Chidester and Edward T. Linenthal, eds. (Bloomington, Indiana University

their Earth First! allies as violating their intellectual property rights and cultural integrity, though the alliance would eventually be tested by the environmentalists' irreverent behavior on the mountain.

“A disguise of convenience”

As the 500th anniversary of the arrival of Columbus in North America in 1992 drew nearer, the Mt. Graham controversy plunged to new depths when members of the Mt. Graham astronomy community began to challenge the very notion that the mountain was sacred to the Apaches. In late 1991, a coordinator of American Indian studies at UA named Gordon Krutz made headlines when he announced that clear evidence that the Apaches had long regarded Mt. Graham a sacred mountain was located right on the UA campus in the field notes of Grenville Goodwin.¹⁶⁰ As Brandt had previously asserted, Goodwin's 3,000 pages of field notes written during his extended ethnography of the Western Apache in the 1930s contained numerous references to the sacred attributes of Mt. Graham.¹⁶¹ After reviewing the Goodwin papers, Williams attested, “the Goodwin field notes confirmed, virtually verbatim, what the Apache members of the Apache Survival Coalition were claiming about Mt. Graham—that the mountain was a sacred site for the Apaches, or at least some of the Apaches who remembered the old stories about the Mountain.”¹⁶² Krutz contended that UA must have known about the

Press, 1995): p. 97-151. See also Bruce Ziff and Pratima V. Rao, eds., *Borrowed Power: Essays on Cultural Appropriation* (New Brunswick: Rutgers University Press, 1997).

¹⁶⁰ David Hoye, “Mountain long sacred to tribe, newly found notes show: evidence jeopardizes observatory project,” *The Phoenix Gazette*. 21 November 1991; “60-year-old-notes raise questions on telescopes,” *Eastern Arizona Courier*. 04 December 1991. Courtesy of Doug Officer.

¹⁶¹ Hoye, “Mountain long sacred to tribe.”

¹⁶² Williams, Jr., “Large Binocular Telescopes, Red Squirrel Piñata,” p. 1152.

rich repository of evidence pointing to the sacrality of Mt. Graham, and the Mt. Graham astronomy community was once again put on damage control.¹⁶³

Responding to the Goodwin paper findings, Father George Coyne, a Jesuit astronomer who was then Director of the Vatican Observatory and Associate Director of the University of Arizona's Steward Observatory, declared in a March 1992 position paper that the Apaches had failed to convince the Catholic Church of Mt. Graham's sacred status through Apache oral history and statements made by anthropologists. In the paper, which was released to the press, Coyne explained, "We are not convinced by any of the arguments thus far presented that Mt. Graham possesses such a sacred character which precludes responsible and legitimate use of the land...In fact, we believe that responsible and legitimate use of the land enhances its sacred character."¹⁶⁴

Effectively appropriating the discourse of culture, Father Coyne positioned the Mt. Graham astronomy community and the Vatican as equally invested in the scientific and spiritual value of the land. Astronomers, he argued, were also stakeholders in the mountain's sacred status. In fact, according to Coyne, astronomers should be lauded for contributing to the sacredness of Mt. Graham by using the land for such a noble scientific pursuit. But Coyne's declaration was not merely a rhetorical strategy to place astronomers and Apaches on equal footing with respect to the spiritual value of Mt. Graham; he had essentially issued a challenge to the Apaches to prove through documentary evidence or archaeological record that the summit of Mt. Graham had been continuously used by the Apaches for religious rituals. Though Coyne expressed the desire to learn about "any such genuine concerns of authentic Apaches"

¹⁶³ Hoyer, "Mountain long sacred to tribe."

¹⁶⁴ Father George Coyne S.J. Vatican Observatory Research Group, Steward Observatory, The University of Arizona. "Statement of the Vatican Observatory on the Mount Graham International Observatory and American Indian Peoples." 05 March 1992, p. 1-8, p. 6. John J. Rhodes III Papers, box 58, folder 1.

regarding the sacredness of Mt. Graham, he announced that since “no credible argument” had been presented for halting telescope construction and operation on Mt. Graham thus far, the project would continue.¹⁶⁵

Coyne’s statement also exposed a theory then circulating among the Mt. Graham astronomy community that the Apaches were being manipulated to serve an environmentalist agenda. In the conclusion of his paper, Coyne remarked

The Vatican Observatory is extremely sensitive to criticism that accuses it of religious indifference. Of even more concern to us, however, is to see this issue exploited by outsiders who are radically opposed to the observatory and who have declared that they will use any means to stop it. They have, as a matter of fact, previously sought to stop it by manipulating the Endangered Species Act. These ideologs [sic] now seek to manipulate the American Indians. No mountain is as sacred as a human being and there is no desecration more despicable than the use of a human person for self-serving purposes.¹⁶⁶

Coyne then added, “We invite our Apache brothers and sisters to join in finding the Spirit of the Mountains reflected in the brilliance of the night skies.”¹⁶⁷

Coyne’s insinuation that the Apaches were being “exploited by outsiders” had previously been expressed by other members of the Mt. Graham astronomy community. Jim Huska, assistant to longtime observatory supporter and Arizona Congressman John J. Rhodes, wrote in 1990 that “the enviros” had “essentially lost in their legal efforts,” and Huska speculated that the environmentalists’ next move would be to attempt to repeal the Arizona-

¹⁶⁵ George V. Coyne, S.J., Director, Vatican Observatory, University of Arizona, “Statement of the Vatican Observatory on the Mt. Graham International Observatory and American Indian Peoples.” 05 March 1992. ASC member Victor, Jr. later wondered, “how can they learn about our concerns if they won’t let us speak to them?” See Victor, Jr. quoted in “Council members meet with Italian ambassador in D.C.,” *The Moccasin*. 07 July 1992. Arizona State University. MSM-512.

¹⁶⁶ Coyne, “Statement of the Vatican Observatory on the Mount Graham International Observatory and American Indian Peoples,” p. 7.

¹⁶⁷ *Ibid.*

Idaho Conservation Act of 1988.¹⁶⁸ But by the following year, some members of the Mt. Graham astronomy community suspected that the environmentalists had adopted a less obvious strategy: persuading the San Carlos Apaches to declare that Mt. Graham was sacred. Steward Observatory astronomer Nick Woolf wrote to the *Arizona Daily Star* in 1991 noting that he was a Catholic and a project scientist for MGIO who was offended by the suggestion in a previous *Star* article that the Church should pull out of the observatory project. Woolf's letter went on to bluntly communicate the conspiracy theory: "the pro-Native American approach now taken by the observatory opponents appears to be a disguise of convenience."¹⁶⁹ Woolf referred to the letter sent to the tribe in 1985 as evidence that UA had informed the tribe about the observatory and concluded that perhaps it was not surprising that the Apaches viewed Mt. Graham as sacred "since all high mountains are considered to be homes of spirits by the local tribe of Native Americans," but that rather, that "the objection has surfaced so late. It happened only after all other attempts to stop the observatory were failing."¹⁷⁰

UA History Professor and Jesuit priest Charles W. Polzer, who was the Curator of Ethnohistory at UA's Arizona State Museum where the Goodwin Papers were housed, wasted no time articulating the conspiracy theory after Father Coyne's position paper was released to the public in 1992. In a letter that was also released to the press, Father Polzer wrote Arizona Governor Fife Symington alleging, "the reality is that no Apache bothered to take up this cause until non-Indians coaxed certain long-term, political dissidents to block construction of the

¹⁶⁸ Jim to JJR, "Mt. Graham," 31 August 1990. John J. Rhodes III Papers, box 58, folder 6.

¹⁶⁹ Woolf, "Record distorted," *The Arizona Daily Star*. 01 December 1991.

¹⁷⁰ Ibid. Members of the Arizona Congressional delegation also weighed in on the theory that Apaches were being manipulated by environmentalists. In a memo from Congressman John J. Rhodes III to his assistant Jim Huska, Rhodes noted that two members of the Apache Survival Coalition were environmentalist leaders and remarked that this was "further evidence the enviros are using the Tribe to some extent." See Rhodes, quoted in John J. Rhodes III to Jim Huska. Memorandum. 24 June 1992. John J. Rhodes III Papers, box 58, folder 1.

telescope.”¹⁷¹ Father Polzer also supported Father Coyne’s allegation that the Apaches were not historically and culturally tied to Mt. Graham by lambasting Brandt’s anthropological expertise. In Polzer’s estimation, Brandt’s conclusions were “unworthy of a disinterested scholar, but unfortunately, they are typical of the hysteria that is being foisted on the public by members of this odd coalition of dissident Apaches and reactionary non-Indians.”¹⁷² In an affidavit issued on behalf of UA for the ASC trial against the Forest Service, which now included UA as a co-defendant, Polzer first asserted that the Apaches had never been mountain dwellers.¹⁷³ Polzer then dismissed the Apaches’ claim that Mt. Graham was a sacred site by remarking, “the sacredness is about as specific as references to the sky.”¹⁷⁴ Polzer again demeaned the anthropological expertise of both Brandt and Basso as well as the authority of the Goodwin Papers, which Polzer characterized as “only the notes of a graduate student, not an accomplished anthropologist.”¹⁷⁵ Coyne’s and Polzer’s denial of the sacred status of Mt. Graham to the Apaches followed on the heels of a Forest Service report that had recently concluded that it would be highly unlikely to find evidence of Apache religious activities on the mountain, which strengthened the Forest Service’s legal defense in the ASC case.¹⁷⁶

¹⁷¹ Charles W. Polzer, S.J., Curator of Ethnohistory to Gov. Fife Symington. 11 March 1992. Arizona State University. MSM-512.

¹⁷² Polzer to Symington.

¹⁷³ Affidavit of Father Charles W. Polzer, S.J., Curator of Ethnohistory, Arizona State Museum, University of Arizona, Exhibit “C”, 6 April 1992, p. 2, Apache Survival Coalition, et al. v. US, et al., University of Arizona, intervenor, CIV. No. 91-1350 PHX WPC. Arizona State University. MSM-512. Polzer called the use of Mt. Graham by the Apaches “casual and ephemeral.” See Ibid, p. 1.

¹⁷⁴ Ibid, p. 2.

¹⁷⁵ Ibid.

¹⁷⁶ John P. Wilson, Apache Use of the Pinaleno Mountain Range II Report No. 57. Prepared for the Coronado National Forest, Tucson, Arizona. Arizona State Museum Archives. This report has been criticized by Fort Apache Reservation archaeologist John R. Welch, who noted that several statements in the report were known to be false, including the assertion that the Pinaleno Mountains were never part

In a personal letter to Polzer, Brandt fired back, “I was astonished by your vicious personal attack on me without any direct knowledge of my work.”¹⁷⁷ Defending her conclusions based on thirteen years of experience with the Apache and her extensive review of the Goodwin Papers as well as archival materials at other research libraries, Brandt pointed out,

documents in your care speak to an Apache presence in and near the Pinalenos for centuries as well as south of there. The Goodwin Papers dating from over fifty years ago speak of the religious and cultural significance of the mountain well before the telescope project was a glimmer in any astronomer’s eye. Listen to the Apache people. Evaluate the evidence. Is the side you are on the one you really want to be on in the 1990’s?¹⁷⁸

The Mt. Graham debate had divided the scientific communities of astronomers and biologists, it had exposed a broadening schism in the American environmentalist community separating mainstream and radical activism, and now the conflict pitted anthropologist against anthropologist.¹⁷⁹

of the reservation. See John R. Welch, “White Eyes’ Lies and the Battle for *dził nachaa si’an*”, *American Indian Quarterly* 21 (1997): p. 75-109; p. 84-86. As Welch points out, the scholarly debate over the historical occupation and use of Mt. Graham by the Apaches reflects a wider divide between local and “expert” knowledge claims, since the Apaches themselves were never consulted by the USFS in its evaluation. Welch and others have documented shrines on Mt. Graham’s Hawk Peak and High Peak that have been disturbed by nineteenth century logging, recreation, and most recently, observatory development. Ceremonial caves, another class of Apache shrines, have also been documented.

¹⁷⁷ Elizabeth A. Brandt to Fr. Charles Polzer. 09 April 1992. John J. Rhodes III Papers, box 58, folder 1.

¹⁷⁸ *Ibid.*

¹⁷⁹ In a 2009 article on the Mt. Graham controversy for the online anthropology journal *Antrocom*, Sandra Busatta adopted many of the same arguments advanced by Polzer. Busatta takes as her starting point that “landscapes are ways of expressing conceptions of the world, although they also refer to physical entities, that is to say landscapes may refer both to the environment, generally shaped by human action, and to a meaningful representation of it” (p. 35). Busatta’s basic argument that “the controversy around Mt. Graham is an example of constructed vs. conceptualized landscapes, albeit much more nuanced, where both sides share some features of their opponents’ worldview” is unproblematic (p. 35). Yet strangely, after establishing that landscape is culturally constructed and continually negotiated, Busatta takes issue with Keith Basso’s scholarship on the Western Apaches in which he finds that the landscape evokes a moral authority rooted in story and place (p. 40). She incorrectly refers to Basso as one of the founding members of the ASC and points to the ASC’s failure to persuade a judge of Mt. Graham’s sacredness as proof that Basso’s arguments were flawed. Busatta even points out that “Apache religious

The following month, Father Coyne again argued that the Apaches had not demonstrated the sacredness of Mt. Graham, but this time, he denounced traditional Apache spiritual beliefs altogether as a “religiosity which must be suppressed with all the force we can muster.”¹⁸⁰ Later that summer, Polzer leveled a religious attack of a different variety. Polzer wildly asserted that the real motivation for opposition to MGIO was a “Jewish conspiracy” hatched by Jewish ACLU lawyers who wanted to undermine the Catholic Church.¹⁸¹ Polzer’s bizarre allegations aside, the heart of the ‘religion vs. religion’ aspect of the Mt. Graham controversy lies squarely in Father Coyne’s inflammatory remarks about Apache spiritual practices. Coyne’s position as a representative of the Vatican Observatory was even more baffling in light of Pope John Paul II’s 1987 address before a Phoenix audience of Native Americans, in which he encouraged all Native Americans to express and preserve their cultural identity (See Figure 9).¹⁸²

claims lack material culture evidence and rest on very scant documentation” (p. 40). Busatta also mischaracterizes Brandt by accusing her of constructing “Apaches who belong to other religions as being not really Apache,” overlooking Brandt’s acknowledgment that the Apaches have been heavily missionized and practice a wide variety of faiths. In short, Busatta is far less concerned with exploring the role of landscape in the Mt. Graham controversy than in discrediting the Apaches who asserted a religious claim on Mt. Graham and the anthropologists who supported them. See Sandra Busatta, “Landscapes and Skyscapes in Contest,” *Antrocom* 5 (2009): p. 35-44. Available at antrocom.net.

¹⁸⁰ George Coyne, “Personal Reflections on the Nature of Sacred” letter to Working Group for Indigenous Peoples in Amsterdam. 25 May 1992. Arizona State University. MSM-512.

¹⁸¹ Steve Yozwiak, “Priest calls telescope foes part of ‘Jewish conspiracy.’” *Arizona Republic*. 14 August 1992.

¹⁸² Pope John Paul II, quoted in *The Catholic Sun*. 24 September 1987. The Pope had also made it clear that he was a firm supporter of the MGIO in a 1989 address. See Address of Pope John Paul II to the Founders of the Vatican Observatory Foundation. 19 June 1989, quoted in George V. Coyne, S.J., “Statement of the Vatican Observatory on the Mt. Graham International Observatory (MGIO), the Ecology of the Pinaleno Mountains, and Related Political Issues.” 22 April 1992, p. 1-6; p. 6. John J. Rhodes III Papers, box 58, folder 1.



Figure 9. Matt Ritter, “Ha! You call that ‘sacred’?” *Arizona Daily Star*. 15 March 1992.

Not surprisingly, Coyne’s statements outraged members of the Native American community following the Mt. Graham case. The *Navajo-Hopi Observer* ran an editorial that sarcastically stated, “The San Carlos Apaches who have been protesting construction of the observatory on Mt. Graham might be glad to learn that this mountain is not sacred. Don’t bet on it. For the Vatican group to tell the San Carlos Apaches that Mount Graham is not sacred is much like the Muslims telling the Jews that the Wailing Wall is not sacred.”¹⁸³ Another Native American columnist asserted, “reliance on non-Indian opinion in determining whether Mount Graham is actually sacred to the Apache is paternalistic at best.”¹⁸⁴ Franklin Stanley Sr., a San Carlos Apache traditional leader and ASC member, responded to the denial of Mt. Graham’s

¹⁸³ Stan Bindell, “Vatican paper may give all reason to worry about sacred sites,” *Navajo-Hopi Observer*. 25 March 1992. Arizona State University. MSM-512.

¹⁸⁴ K.J. Scotta, “What is sacred to Apache must be defined by Apache,” *Tucson Citizen*. 03 April 1992. Arizona State University. MSM-512.

sacredness to the Apaches immediately with a written declaration on behalf of the ASC in which he compared the telescopes on the mountain to “damming a river, a spiritual river. The telescopes would be holding back all of our prayers.”¹⁸⁵

A “war between the Vatican and the Apaches”

Strikingly, once the Vatican officially denounced the sacredness of Mt. Graham to the Apaches through Father Coyne’s statement, narratives began to surface in activist literature and reservation publications depicting the observatory as a colonialist project.¹⁸⁶ In a statement to *The Florida Catholic*, tribal spokesman Ernest Victor argued that the Vatican had no right to decide if the mountain held religious significance for the Apaches. According to Victor, “History is repeating itself. If you go back to the time of Christopher Columbus, religion was used as a front for white people to get what they wanted.”¹⁸⁷ Holding the Vatican fully accountable, Victor insisted, “This is a war right now between the Vatican and the Apaches.” The conflation of a scientific project with European conquest was not merely an effective rhetorical strategy for Apache activists as the 500th anniversary of Columbus’ voyage to North America loomed in the public consciousness; it was a new narrative that reflected fundamentally divergent conceptions of what counted as evidence in the struggle for Mt. Graham.

¹⁸⁵ Supplemental Declaration of Franklin Stanley, Sr. in Support of Preliminary Injunction, Apache Survival Coalition, et al. v. USA, CIV. No. 91-1350 PHX WPC. 09 April 1992.

¹⁸⁶ The colonialist accusations appeared in activist publications and statements provided to journalists soon after Father Coyne’s remarks were made public. For a representative sampling, see Scotta, “What is sacred to Apache must be defined by Apache;” Patricia Cummings, Ola Cassadore Davis, and Ernest Victor, “Apache Remain Resolute Despite Courtroom Setback and 500 Years of European Oppression,” 11 April 1992. John J. Rhodes III Papers, box 58, folder 1.; George Hardeen, “Religious Freedom for Native People in Jeopardy Again,” *The Circle*. July 1992.

¹⁸⁷ Victor, quoted in Laurie Hansen, “Controversy continues over Vatican scope in Arizona,” *The Florida Catholic*. 03 April 1992. Arizona State University MSM-512. John Wesley also described the conflict as an international holy war. See Wesley, quoted in Hardeen, “Religious Freedom for Native People in Jeopardy Again.”

Apaches opposed to the observatory believed their religious claim on Mt. Graham was being denied by a powerful non-Native opposition that favored conclusive physical and documentary evidence over oral traditions. In order to defend their claim, the Apaches were required to reveal once-closely guarded spiritual knowledge within the American legal system in order to establish an historical tie to the mountain. In an essay on Native religion, Native American philosopher and activist Vine Deloria, Jr. bitterly observed that “courts will protect a religion if it shows every symptom of being dead but will severely restrict it if it appears to be alive.”¹⁸⁸ Historian Tracy Leavelle has argued that “this attitude is a reflection of well-developed colonial attitudes that relegate authentic Indian religion only to the past.”¹⁸⁹ For the ASC and other members of the Native American community sympathetic to their anti-observatory campaign, the Mt. Graham astronomy community had become a perpetrator of a colonialist agenda by challenging that Mt. Graham was sacred to the Apaches. However, other tribal members validated Father Coyne’s allegation that the Apaches were *not* historically and culturally tied to Mt. Graham, deepening the preexisting fault lines within the tribal community and bringing up new charges that the Apaches were being manipulated by an outside party.

“No mountain is as sacred as a human being”

In the hearings for the ASC trial, competing narratives about the mountain’s cultural significance produced protracted and deeply emotional debates over authority, access, and control of the mountain. In sworn testimony before the Arizona Board of Regents in 1992, San Carlos Apache tribal member Karen Long enthusiastically endorsed the observatory project. Virtually echoing Father Coyne’s earlier argument, Long asserted, “no mountain is as sacred as a

¹⁸⁸ Vine Deloria, Jr., quoted in Tracy Leavelle, “The Perils of Pluralism: Colonization and Decolonization in American Indian Religious History,” in Courtney Bender, Pamela Klassen (eds.), *After Pluralism: Reimagining Religious Engagement* (New York: Columbia University Press, 2010): p. 156-177; p. 172.

¹⁸⁹ *Ibid*, p. 173.

human being...responsible and legitimate use of the land enhances its true purpose.”¹⁹⁰

Apaches opposed to the observatory immediately cried foul, alleging that Long’s statement had been coached by astronomers.¹⁹¹ Buck Kitcheyan, who had sent a letter to the Forest Service in 1990 declaring that Mt. Graham had been sacred to the tribe “since time immemorial” testified on behalf of the Forest Service and UA that “I can safely say with the support of elder medicine people of my tribe, that there is absolutely no religious or sacred significance of Mt. Graham.”¹⁹² Kitcheyan further claimed that environmentalists were using Apaches as “token Indians” to further their cause, the same conspiracy theory that had been expressed by various members of the Mt. Graham astronomy community.¹⁹³ Somewhat ironically, because the testimony of Long and Kitcheyan so closely matched the rhetoric of the Mt. Graham astronomy community, the theory that the Apaches were being manipulated to serve an outside agenda was leveled back at UA.

Tribal Councilman and ASC member Ernest Victor, Jr. had previously accused Kitcheyan of having a change of heart about the observatory project to serve a “personal grudge against the tribal council” because Kitcheyan had been ousted from the Tribal Council on allegations of

¹⁹⁰ Karen Long, “Testimony Before Arizona Board of Regents, Mount Graham Open Forum Friday March 27, 1992. Testimony of Karon [sic] Long,” p. 4. John J. Rhodes III Papers, box 58, folder 1. Coyne’s statement was remarkably similar to Long’s, stating “No mountain is as sacred as a human being” and “responsible and legitimate use of the land enhances its sacred character.” See Coyne, Statement of the Vatican Observatory on the Mount Graham International Observatory,” p. 7; p. 6.

¹⁹¹ See statements made in Cindy Wooden, “Pope greets Apaches who support Mount Graham telescope project,” *The Catholic Sun*. 02 July 1992. Members of the Arizona Congressional delegation even weighed in on the theory that Apaches were being manipulated by environmentalists. In a memo from Congressman John J. Rhodes III to his assistant, Rhodes noted that two members of the Apache Survival Coalition were environmentalist leaders and remarked that this was “further evidence the enviros are using the Tribe to some extent.” Rhodes, quoted in John J. Rhodes III to Jim Huska. Memorandum. 24 June 1992. John J. Rhodes III Papers, box 58, folder 1.

¹⁹² See Buck Kitcheyan, “Testimony Before Arizona Board of Regents, Mount Graham Open Forum. Friday March 27, 1992. Testimony of Buck Kitcheyan,” p. 2-6, John J. Rhodes III Papers, box 58, folder 1.

¹⁹³ Kitcheyan, quoted in Jim Erickson, “Mt. Graham is sacred to Apaches, spiritual leader says: but ex-tribal chairman cites opposing viewpoint,” *The Arizona Daily Star*. 28 March 1992.

theft and embezzlement.¹⁹⁴ David Valenciano agreed that “to anyone even remotely aware of tribal politics, it is clear Kitcheyan and his followers are trying to get even with the council which apprehended him.”¹⁹⁵ In a letter to the editor of the *Tucson Citizen* commenting on the strategies employed by the University of Arizona, Apache Carol J. Waterman concluded, “buying off one Indian against another is an old trick.”¹⁹⁶ Kitcheyan defended his apparent change of heart by explaining that his original letter declaring Mt. Graham’s sacredness was written by an attorney. According to Kitcheyan, he had only signed the letter so that the Tribal Council could investigate the religious significance of Mt. Graham.¹⁹⁷ However, both the “token Indian” argument and the charges of colonialism by the ASC gained further momentum over the next few months as a bitterly anticipated Columbus Day drew nearer.

“They still want to divide us against each other to win something “

First, the ASC was denied a restraining order on telescope construction at Mt. Graham in April 1992.¹⁹⁸ Judge Robert Broomfield effectively reinforced the Mt. Graham astronomy community’s stance on the Apaches’ delayed opposition by reasoning that the Apaches had waited too long to file their lawsuit.¹⁹⁹ ASC attorney Patricia Cummings framed the decision as another episode in a colonialist saga: “Many Native Americans will see these courtroom procedural setbacks as less bloody than the way we slaughtered Indians 100 years ago here in

¹⁹⁴ See Peter La Chapelle, “Letter was only to begin inquiry, Kitcheyan says.” *Arizona Daily Wildcat*. 08 November 1991.

¹⁹⁵ Valenciano, “Apache trying to get even?” *Tucson Citizen*. 03 June 1992. Arizona Historical Society.

¹⁹⁶ Waterman, “Name change a weak response,” *Tucson Citizen* 16 June 1993.

¹⁹⁷ La Chapelle, “Letter was only to begin inquiry, Kitcheyan says.”

¹⁹⁸ “Judge refuses request to block construction on Mount Graham,” *The Arizona Daily Star*. 11 April 1992.

¹⁹⁹ “Apache remain resolute despite courtroom setback and 500 years of European oppression.” 10 April 1992. John J. Rhodes III Papers, box 58, folder 1.

America, but still part of the same process.”²⁰⁰ The ASC response paper issued on the day the judgment was rendered similarly revealed that the Apaches interpreted the legal setback from a colonialist perspective:

For Judge Broomfield to declare that the Apache have entered the court too late, can only be indicative of an anglo-european court system that demands that traditional Native American people show the same alacrity and promptness as European Americans in protesting cultural destruction to their sacred places and religious beliefs. How can this be fair or reasonable when the great majority of spiritual leaders, medicine men and traditional elders do not have the luxury of telephones, typewriters, local postal delivery, etc...now we see the European standard imposed upon a people who were not granted citizenship until 1924, who were essentially wards of BIA officials and did not have their own tribal council until 1935, and who did not have the right to vote in U.S. elections until 1948. Now they are expected to promptly and flawlessly meet these anglo-European standards in public and legal process, deadlines and timetables. This cultural genocide against indigenous Americans is being perpetuated not just by the U.S. (National Science Foundation astronomy funding dollars) and by Arizona state taxpayers, but by the German, Italian and Vatican governments who are financing all or part of these telescopes.²⁰¹

The ASC response paper concluded with a quote from Cassadore Davis vowing that “we will not give up. We Apache have strong religious traditions and 500 years of efforts by Europeans since Columbus to destroy our culture will not be erased by this five minute hearing.”²⁰² A federal judge dismissed the suit in May, and at a conference on Endangered Native American Holy Places convened in Tucson that month, San Carlos Apache councilman John Wesley informed

²⁰⁰ Patricia Cummings, quoted in “Apache remain resolute despite courtroom setback and 500 years of European oppression.”

²⁰¹ “Apache remain resolute despite courtroom setback and 500 years of European oppression.”

²⁰² Cassadore Davis, quoted in “Apache remain resolute despite courtroom setback and 500 years of European oppression.”

the audience that the federal government's support of the telescope project made him feel as though nothing had changed for the American Indian in 500 years.²⁰³

On the heels of the legal defeat, the ASC was disheartened when Apaches were denied an audience with the Pope after traveling to the Vatican to discuss the religious significance of Mt. Graham in May. After meeting with city officials in Rome, ASC members obtained a resolution calling for the Arcetri Observatory and the Vatican to withdraw from the project, and members of the Italian and German Parliament also met with the Apaches, but the scheduled meeting with the Pope was suddenly canceled after the Apaches' arrival.²⁰⁴ The sting of returning home without personally voicing their concerns to the Pope was made even more painful when Karen Long and other Apaches who had testified in support of MGIO received a warm reception with the Pope the following month.²⁰⁵

As part of a public relations campaign for the observatory sponsored by the Graham County Chamber of Commerce, Long's delegation of San Carlos People's Rights Coalition members received a private tour of the Vatican Observatory and posed for photos with the

²⁰³ K.J. Scotta, "Indians' conference calls for unity on sacred issues," *Tucson Citizen*. 29 May 1992; Scotta, "Scope ruling draws Apache tears," *Tucson Citizen*. 30 May 1992; Jim Erickson, "Judge rejects Apache claims on Mt. Graham," *The Arizona Daily Star*. 30 May 1991. The advertisement for the conference stated that "In this quincentennial year, Native Americans must stand united for the preservation of all holy spaces throughout the Americas." See "Endangered Native American Holy Places." Courtesy of Alan Ferg.

²⁰⁴ "Apaches visit Europe in bid to halt Mt. Graham telescope," *The Arizona Daily Star*. 24 May 1992; "Apache delegation denied audience with pope," *The Moccasin*. 26 May 1992 .

²⁰⁵ Tara Meyer, "Meeting with Pope angers tribal group," *Arizona Summer Wildcat*. 23 June 1992; George Coyne to Concerned Persons Re: Visit of a Delegation of the San Carlos Apache Tribe to Vatican City State and to the Vatican Observatory. 18 June 1992. Arizona State University MSM-512. Buck Kitcheyan was slated to head the delegation of pro-observatory Apaches sent to the Vatican, but he was unable to leave the country due to an outstanding warrant. See Tara Meyer, "Apaches leave for Europe leaderless," *Arizona Summer Wildcat*. 16 June 1992.

Pope.²⁰⁶ Long's message to the Pope was that the observatory project was supported by Apaches due to the economic and educational benefits the research facility would bring to the tribe. Long also maintained that the majority of the tribe was enthusiastic about the science that would be done on Mt. Graham because "our people have always been stargazers."²⁰⁷

ASC members claimed the preferential treatment of the second Apache delegation provided further evidence that UA and the Vatican Observatory had recruited sympathetic Apaches to the telescope cause.²⁰⁸ Cassadore Davis angrily observed, "It's like in the old days when the white people used other Apaches as scouts to defeat those opposing the white people. They still want to divide us against each other to win something."²⁰⁹

The ASC's suspicion that the People's Rights Coalition was supporting MGIO in part due to the friction over Kitcheyan's removal from the Tribal Council was validated when Long, speaking for the group, sat down for an interview with the tribal newspaper the *San Carlos Apache Moccasin*. Long declared that Tribal Council member and ASC member Wendsler Nosie had illegally ousted Kitcheyan the previous year and that the People's Rights Coalition aimed to "fight for the rights of those who feel they have been abused."²¹⁰ It was this desire to "protect

²⁰⁶ Cindy Wooden, "Pope greets Apaches who support Mount Graham telescope project," *The Catholic Sun*. 02 July 1992. Elizabeth Maggio, UA's Assistant Director for Development and Public Information, accompanied the four Apaches on the trip. See "Press Release: June 4, 1992 from Jack Hyde, President, Graham County Chamber of Commerce." Courtesy of Doug Officer.

²⁰⁷ Long, quoted in Wooden, "Pope greets Apaches who support Mount Graham telescope project."

²⁰⁸ "Apache delegation denied audience with Pope," *San Carlos Apache Moccasin*. 26 May 1992; Tara Meyer, "Meeting with Pope angers tribal group," *Arizona Summer Wildcat*. 23 June 1992. See also Dennis Wagner, "Pope can't see Apaches for the telescopes," *The Phoenix Gazette*. 07 July 1992.

²⁰⁹ Ola Cassadore Davis, quoted in "Kitcheyan denied trip to Europe," *San Carlos Moccasin*. 16 June 1992.

²¹⁰ Long, quoted in "Coalition protests tribal council decision," *The Moccasin*. 21 July 1992. Courtesy of Doug Officer. Kitcheyan was convicted of the charges against him in July 1994. See Ann-Eve Pederson, "Former San Carlos Apache Chairman pleads guilty to embezzling \$63,312," *The Arizona Daily Star*. 08 July 1994.

the tribes [sic] Sovereign Rights” that motivated the trip to Europe, where Long noted that she and other Apaches told the Germans that “not everyone in San Carlos was a believer in traditional religion.”²¹¹

As the summer wore on, the political dissension on the reservation continued to mirror the divide between Apache advocates and opponents of the observatory. The ASC and the Tribal Council jointly sponsored a “Peace and Serenity Run” from Mt. Graham to Tucson to raise awareness about the sacredness of Mt. Graham. The run was planned as one leg of an international relay commemorating “the 500th year of survival of indigenous people in the Americas.”²¹² After the run, San Carlos Apache Patsy Nosie drew an explicit connection between the Camp Grant Massacre in which over one hundred Western Apaches were murdered by American military officials, Mexican-Americans, and Tucson citizens. In Nosie’s view, “We Apaches, 121 years later, are again being attacked by ‘respected’ Tucson community leaders. The UA and Tucson optics industry, rolling in lucrative federal grants and contracts, this time hired lobbyists and lawyers to massacre all U.S. cultural, religious protection and environmental laws.”²¹³

At least for some Apaches, the Mt. Graham astronomy community was no different than the Tucson businessmen who had slaughtered Apache women and children a century ago. For others, the fact that the largest telescope in the MGIO complex was to be named *Columbus*, combined with the Vatican Observatory’s participation, only fueled the conviction that the observatory was akin to the missionizing presence that had once introduced disease and cultural

²¹¹ Long, quoted in “Coalition protests tribal council decision.”

²¹² Tara Meyer, “Mt. Graham protesters sponsor ‘Peace Run,’” *The Arizona Summer Wildcat*. 06 August 1992. Courtesy of Doug Officer.

²¹³ Nosie, quoted in Meyer, “Mt. Graham protesters sponsor ‘Peace Run.’”

assimilation to the Native population.²¹⁴ As tribal member Sandra Rambler inquired, “Why are the priests in court claiming Apaches’ religious beliefs are invalid instead of moving their telescope to another place? The Vatican continues the destruction of native cultures that Columbus started, and this is shocking and unacceptable.”²¹⁵

Three months later, a coalition of over 200 Native Americans, environmentalists, and students stormed Steward Observatory in a dramatic protest against MGIO. The crowd occupied the observatory lobby for hours while chanting and beating drums to detract from the University’s planned Columbus Day activities, serving as a dramatic display of the building sentiment among Apaches and other Native rights groups that building the observatory was akin to cultural genocide.²¹⁶

Problem 10,298

Following the tumultuous Columbus Day protest, the Columbus telescope was renamed the Large Binocular Telescope (LBT) in 1993 after UA President Pacheco met with San Carlos Apache Tribal Chairman Harrison Talgo and listened to his concerns that the telescope name was offensive to Native Americans.²¹⁷ Responding to the news of the name change, Cassadore

²¹⁴ Reflecting on the name selected for the telescope in a 1992 interview, Victor, Jr. said that Columbus was accompanied by Catholic priests who destroyed Native American culture. See Bindell, “Vatican paper may give all reason to worry about sacred sites.”

²¹⁵ Sandra Rambler, Chairwoman, The Concerned Members of the San Carlos Apache Tribe, “Church Slur,” *The Arizona Daily Star*. 22 July 1992.

²¹⁶ The protest eventually dispersed when two of the protesters were charged with interfering with the peaceful conduct of an educational institution. See David L. Tiebel, “Dropped gun ends undercover operation at UA: the Tucson Police Department was asked to monitor the Columbus Day protest,” *The Tucson Citizen*. 07 November 1992; Jason Auslander, “KVOA, ‘Wildcat’ receive subpoenas,” *Arizona Daily Wildcat*. 02 November 1992. For a report on the Columbus Day protest from a San Carlos Apache who equated the University of Arizona and its telescope partners with a “tragic legacy of conquest,” see Ola Cassadore Davis to Dr. Manuel Pacheco, President, University of Arizona. 21 October 1992.

²¹⁷ See Nicole Greason, “Telescope renamed at Apaches’ request,” *Tucson Citizen*. 29 April 1993.

Davis told a reporter, “they can name it Sally or John or whatever name they want, but we still don’t want it.”²¹⁸

Re-naming the telescope did little to ease tensions over the observatory, which was facing a new environmental challenge that again incited the wrath of environmentalists. MGIO planners were hoping to relocate the observatory from Mt. Graham’s Emerald Peak, which had been exempted from federal environmental and cultural protection laws, to another site on Mt. Graham called Peak 10,298 that was deemed more favorable for astronomical viewing.²¹⁹ Although the Vatican and Max Planck telescopes were nearing completion on Emerald Peak by that time, a new report had determined that the Emerald Peak location had too much air turbulence for the LBT.²²⁰ Though Peak 10,298 was not in the region exempted from the ESA and other federal laws through the 1988 AICA rider, Strittmatter asserted that Congress intended for the observatory to be constructed “in the most scientifically optimum locations within the 150-acre area specified.”²²¹ Since the report had deemed that Peak 10,298 was a superior site for the LBT, Strittmatter reasoned that the new site presented no conflict with the conditions of the rider.

²¹⁸ Davis, quoted in “Mt. Graham telescope’s name changed. ‘Columbus’ removed in gesture to Apaches,” *The Arizona Republic*. 02 May 1993.

²¹⁹ Jim Erickson, “Panel will weigh UA plea to move telescope site,” *The Arizona Daily Star*. 27 April 1993.

²²⁰ According to Associate Director of Steward Observatory Buddy Powell, the report on the superiority of Peak 10,298 was stolen from the observatory offices and provided to *The Arizona Republic*. See Steve Yozwiak, “Worst spot picked for UA telescope: school’s own report faults site selections,” *The Arizona Republic*. 15 June 1993. Richard Cromwell, staff scientist for Steward Observatory and co-author of the leaked report, defended the site selection process for the Vatican Advanced Technology Telescope and the UA/German Heinrich Hertz Submillimeter Telescope. Cromwell described all of the sites listed in the study as high-quality astronomical sites, but noted that UA had formally requested Peak 10,298 as the site for the LBT. See Cromwell, “We didn’t name site for the telescope,” *The Arizona Republic*. 04 July 1993.

²²¹ Strittmatter, quoting the 1988 AICA rider in Strittmatter, “It’s the most appropriate site,” *Tucson Citizen*. 14 August 1993.

As it turned out, the new site represented an active territory of the Mexican spotted owl, another threatened species, and this plan was summarily abandoned.²²² Instead, UA decided to focus its efforts on locating the observatory on a non-exempted eastern region of Emerald Peak close to the other two telescopes.²²³ Eager to develop the new site for the LBT, UA asked the Forest Service for permission to bulldoze a stand of 250 old growth conifers on East Emerald Peak early in December of 1993, an action that was later declared illegal for its violation of the ESA and NEPA.²²⁴ Environmentalists and Apaches criticized UA for rushing to clear the site just one day after securing permission from the Forest Service.²²⁵ Brandt later called the move an act of deliberate deception, explaining that

Registered letters asking for comment on the new site were sent to the Tribe, to Councilmen, and to the Apache Survival Coalition asking for comment in a scant few days. Unfortunately, almost everyone was attending the National Congress of American Indians in Reno, Nevada. Before any response was possible at 5:00 am on December 7, 1993, the University clear-cut the new site of trees in order to preempt a court challenge prohibiting such action. Concerned Apaches returned home on Tuesday to

²²² "Third Mt. Graham Telescope Site Approved." United States Department of Agriculture. 06 December 1993. Courtesy of Doug Officer. See also Gene Froelich, "Large binocular Telescope Biological Assessment and Evaluation," US Forest Service Safford Ranger District, November 1, 1993. Still concerned about the impact on MGIO of defining the Mexican Spotted Owl's critical habitat in the upper regions of the Pinaleno Mountains, Buddy Powell of Steward Observatory wrote to the USFWS to "respectfully request to withdraw that portion of the Pinaleno mountains above 8,200 feet elevation from proposed critical habitat for the Mexican Spotted Owl. It appears the proposed critical habitat will not benefit the owl but will potentially harm the Mount Graham International Observatory." See B.E. Powell to Mr. Sam Spiller, U.S. Fish and Wildlife Service. 09 February 1994. Courtesy of Doug Officer.

²²³ The original area designated for MGIO included a cluster of telescopes on the western end of Emerald Peak. The USFWS later determined that it had erred in approving the LBT site. See Martin Van der Werf, "U.S. taking 2nd look at telescopes: may have erred in Mt. Graham approval," *The Arizona Republic*. 11 December 1993. Courtesy of Doug Officer.

²²⁴ Court's Findings of Fact and Conclusions of Law and ORDER, Mt. Graham Coalition, et al., Plaintiffs, v. Jack Ward Thomas, et al., Defendants, v. Arizona Board of Regents, on behalf of the University of Arizona, Intervenor-Defendant, 28 July 1994. See also Jim Erickson, "250 trees are cut to make way for new Mt. Graham telescope," *The Arizona Daily Star*. 08 December 1993.

²²⁵ Steve Yozwiak, "UA clears Mount Graham forest for scope," *The Arizona Republic*. 08 December 1993. Courtesy of Doug Officer.

find not only the waiting letter asking for comment, but also another portion of the mountain destroyed.²²⁶

At the height of the Peak 10,298 controversy, Earth First! convened its annual Round River Rendezvous at Mt. Graham in the summer of 1993, a raucous gathering that introduced new tensions into the alliance between radical environmentalists and Apaches stemming from their divergent cultural constructions of Mt. Graham's spiritual geography.²²⁷ Most Earth First! members subscribed to what Bron Taylor has termed "environmental paganism," or a diverse set of spiritual beliefs anchored to conceptions of the environment that often provided the impetus for militant ecological resistance.²²⁸ Within this form of paganism connected to radical environmental activism, Mother Nature must be protected because it is sacred. Monotheistic religions, Western philosophy, and science are equally blamed for divorcing humans from nature.²²⁹ Reifying nature as a sacred space to argue for its preservation did not originate with groups such as Earth First! John Muir, the founder of the Sierra Club who is widely regarded as the father of the modern wilderness preservation movement in America, frequently referred to natural settings as "sacred" or "holy" when emphasizing their importance.²³⁰ Taylor has argued

²²⁶ Brandt, "The Fight for Dzil Nchaa Si An, Mt. Graham: Apaches and Astrophysical Development in Arizona," p. 50.

²²⁷ The Rendezvous was a weeklong protest held at Mt. Graham. 65 protesters marched toward the telescope site but were turned away by police before reaching the access road. See Steve Yozwiak, "Earth 1st! forced off UA road," *The Arizona Republic*. 30 June 1993. For a detailed description of the Rendezvous, including the tensions between Native Americans and Earth First! members, see Jim Nintzel, "Squirmin' on the Mount: Earth First! meets the forces of law and order on Mount Graham," *Tucson Weekly*. 07-13 July 1993.

²²⁸ Taylor attributes this style of activism with groups such as Greenpeace and Earth First! See Taylor, "Resacralizing Earth: Pagan Environmentalism and the Restoration of Turtle Island," p. 99.

²²⁹ *Ibid*, p. 100.

²³⁰ *Ibid*, p. 101. On Muir, see Stephen Fox, *The American Conservation Movement: John Muir and His Legacy* (Madison: University of Wisconsin Press, 1981); Michael P. Cohen, *The Pathless Way: John Muir and American Wilderness* (Madison: University of Wisconsin Press, 1984); Max Oelschlaeger, *The Idea of Wilderness* (New Haven: Yale University Press, 1991).

that the perception of nature as sacred expressed by Muir, Edward Abbey, and others provided the foundation for Earth First!ers' brand of spiritually-influenced wilderness conservation.²³¹ Indigenous peoples were venerated by Earth First!ers who understood Native populations as living in harmony with the land, but the alliance between Earth First! and ASC Apaches would be tested at the 1993 Rendezvous.²³²

The Earth First! Rendezvous had been made infamous for its drunken revelry in previous years, and the Mt. Graham Rendezvous was no exception. Even after a lengthy discussion on removing alcohol out of respect for the San Carlos Apache elders and other Native American activists present at the meeting, Earth First! members failed to reach a consensus on a no-alcohol policy because some members were against restrictions of any sort.²³³ Respecting the sacred mountain, some Earth First!ers insisted, meant honoring the wishes of everyone in attendance, both Natives and non-Natives. In Taylor's analysis, the incongruous notions of Mt. Graham's sacred geography posed a nearly insurmountable obstacle to reconciliation: "it is difficult to find unity when disputes remain about the nature of the sacred and the concomitant duties toward it."²³⁴

'A victory for science and the environment?'

The social dimensions of the indigenous-environmentalist alliance may have been strained by the actions of radical environmentalists at the Rendezvous, but Earth First!

²³¹ Taylor, "Resacralizing Earth: Pagan Environmentalism and the Restoration of Turtle Island," p. 101.

²³² Ibid.

²³³ Ibid.

²³⁴ Ibid, p. 134.

represented only one faction of the environmentalists aligned with the ASC Apaches.²³⁵ The relationship between Apaches and mainstream environmentalists belonging to the ASC such as Witzeman and Babbitt was still going strong, and the allied group continued to successfully postpone construction on the LBT through its legal interventions. In 1995, the U.S. Ninth Circuit Court of Appeals affirmed a lower court's decision that construction for the LBT on the East Emerald Peak site could not proceed without further environmental review.²³⁶ The judgment came down to the difference between east and west: Congress had granted UA permission to build on the western edge of Emerald Peak, but the East Emerald Peak site was just outside of the area designated exempt from the ESA and the NEPA.²³⁷ A *Phoenix Gazette* editorial declared, "it is the Apaches, the squirrels and the law that have won. At least for a while, the mountain can take a deep breath and savor the victory."²³⁸ However, UA's powerful political allies would once again come to the rescue of the project.

The Graham County Board of Supervisors encouraged Senator John McCain to support legislation that would amend the original telescope site to include the East Emerald Peak location for the LBT, noting that "opposition activists have successfully prevailed in the courts on procedural issues as opposed to substance."²³⁹ It appeared that the East Emerald Peak site for the LBT would be burdened by the same environmental and cultural review issues that had plagued the project from the outset, but Arizona Representative Jim Kolbe cleared the path for

²³⁵ Despite the feud between Apaches and other Native Americans present at the Rendezvous and Earth First! members over alcohol consumption, the Rendezvous concluded with an 18-mile sacred run that included Earth First!ers and Native Americans. See Taylor, "Resacralizing Earth," p. 135.

²³⁶ Graham County Board of Supervisors to Senator John McCain. 09 May 1995. Courtesy of Doug Officer.

²³⁷ "The law sides with a mountain," *The Phoenix Gazette*. 28 April 1995. Courtesy of Doug Officer.

²³⁸ Ibid.

²³⁹ Graham County Board of Supervisors to Senator John McCain.

development by passing a second congressional rider in 1996 that made the new site on East Emerald Peak exempt from federal environmental laws. Kolbe attached the rider to a multibillion dollar Interior Department spending bill the day before it was passed by the House of Representatives, and it was later signed into law by President Bill Clinton.²⁴⁰ Kolbe described the rider as “a major victory for science and astronomy and a major victory for the environment.”²⁴¹

New Partners, New Problems

For over a decade, the MGIO had drawn the ire of a broad spectrum of scientists, academics, activists, religious leaders, and indigenous groups, and in 1996, the Clinton Administration weighed in on the telescope project. Although President Clinton signed Kolbe’s rider into law in April 1996 as part of a major spending bill, Clinton took decisive action against UA by recommending that the AICA rider should be repealed because its exemptions had “never been justified.”²⁴² Clinton also issued Executive Order 13007 that year, which mandated federal agencies to avoid disrupting the physical integrity of sacred sites and to accommodate access to those sites by Native Americans, marking the first significant step toward strengthening religious freedoms provided for under AIRFA.²⁴³ Even more damaging, Clinton later made a line-item

²⁴⁰ Jim Erickson, “House Oks funding bill for Interior,” *The Arizona Daily Star*. 14 December 1995.

²⁴¹ Kolbe, quoted in Yozwiak, Steve, “Mount Graham victory stuns project’s foes,” *Arizona Republic*. 25 April 1996. The National Congress of American Indians passed a resolution in 1995 expressing its opposition to the rider. See NCAI Resolution DC 93-12. 03 November 1995.

²⁴² Correspondence, President William Clinton to Congress, dated 16 July 1996.

²⁴³ *Executive Order 13007: Indian Sacred Sites*. Federal Register: 29 May 1996 (Volume 61, Number 104). From the Federal Register Online via GPO Access. wais.access.gpo.gov. Accessed 22 September 2010.

veto of \$10 million in funding for MGIO, asserting that the technical merits of the LBT were inferior to other existing telescopes.²⁴⁴

Having already lost or failed to close deals on key financial partnerships and anxious to replace the funding lost in Clinton's veto, UA redoubled its efforts to solicit new members to join the LBT project.²⁴⁵ With OSU initially contributing \$2.5 million to the project instead of the original \$15 million investment, the LBT saw first light as a monocular telescope until increased funding materialized in 1997 with OSU and the LBT Beteiligungsgesellschaft in Germany added as full partners along with UA and Arcetri Observatory.²⁴⁶ The long-awaited telescope project finally had sufficient funds to begin construction on the full binocular telescope, which was built in Italy and shipped to Arizona in 2002.²⁴⁷ The LBT occupies a prominent position on the summit of Mt. Graham, where it is clearly visible from miles away on the valley floor (see Figure 10).

²⁴⁴ President William Clinton, Message to Congress, 01 November 1997. Raymond Stanley, Chairman of the San Carlos Apache Tribe, and Ramon Riley, Director of Cultural Resources for the White Mountain Apache Tribe, sent letters to President Clinton thanking him for the veto of MGIO funding as a formal recognition of Native American religious beliefs. See Correspondence, Raymond Stanley, Tribal Chairman, San Carlos Apache Tribe, to the Honorable William J. Clinton, President of the United States, 03 December 1997; "Tribes thank Clinton for blocking funds," *The Arizona Republic*. 31 Wednesday 1997. Courtesy of Doug Officer.

²⁴⁵ The University of Pittsburgh was strongly urged to reconsider making a proposed \$15 million investment in the LBT in a resolution passed by the Pittsburgh City Council in 1994, whose members feared that the university's proposed involvement "tarnishes the image of the Pittsburgh community." See Resolution of the City of Pittsburgh on Mt. Graham Telescopes. 05 April 1994. In 1993, University of Pittsburgh Chair of the Department of Physics and Astronomy James Maher revealed that the environmentalist-Apache alliance was a factor influencing the decision when he stated, "we don't want to get into anything that's harmful to the environment or the Apaches." See Maher, quoted in Dan Sorenson, "Pitt mulls technical side of Graham: environmental concerns to be considered later," *Tucson Citizen*. 07 May 1992. Arizona Historical Society—Astronomical Observatories—Mt. Graham.

²⁴⁶ See Peterson, "Environmental group mad about telescope." Funds for the LBT were also raised through private donations. See "Join our team and we'll write your name in the stars!" Steward Observatory. December 1999. Courtesy of Doug Officer.

²⁴⁷ LBT Project Overview, available at <http://www.lbto.org/project.htm>. Accessed 10 March 2013.

UA next solicited the University of Virginia and the University of Minnesota (UM) to join the telescope project, inadvertently initiating a new era of bitter debate about the telescopes on the mountain. UM astronomers soon secured a \$5 million matching donation in 2001 from private investor Stanley Hubbard that would permit UM to purchase a 5 percent share of viewing time on the LBT.²⁴⁸ Opposition to UM's involvement was first mounted by the university's American Indian Student Association and American Indian Cultural Center. Next, the Minnesota Indian Affairs Council passed a resolution requesting that the university not participate in the development of Mt. Graham, a stance upheld by the University Social Concerns committee in March of 2002. Student protesters convened outside the President's mansion and other campus locations to raise awareness about the university's involvement in the project.²⁴⁹



Figure 10. The Large Binocular Telescope (LBT). Photo: Leandra Swanner.

²⁴⁸ Tom Ford, "U Social Concerns Committee examines Mt. Graham telescope," *University of Minnesota Daily*. 12 March 2002.

²⁴⁹ Brad Unangst, "U official to recommend buying time at Mt. Graham telescope," *University of Minnesota Daily*. 25 September 2002.

The project seemed guaranteed when the UM Board of Regents pledged its support along with \$10 million later in 2002, but complications arose immediately. Explaining the decision to support the project, UM Vice President Sandra Gardebring declared, “The Apaches have values that need to be honored on that mountain. I just think science ought to have some values that are honored on the mountain,” which thrust the university directly into the center of the controversy.²⁵⁰ Following a report by the UM American Indian Advisory Board that recommended against the university’s participation in the LBT, the University Social Concerns Committee took a stance against the project it likened to “violence against indigenous culture.”²⁵¹ The report issued by the committee went on to justify its position by vowing “On ethical, material, political and cultural grounds, we cannot afford to join the project,”²⁵² and UM President Mark Yodof decided to delay a final decision on the university’s participation until Apache tribal members had been consulted. Hubbard urged UM to consider applying his donation to another telescope project that year after learning of the Apache opposition to further development on Mt. Graham, claiming he had previously been assured by UM astronomers that the Apaches were supportive of the project.²⁵³ Len Kuhl, chair of the UM Department of Astronomy, stated that he was never told that the Apaches had a competing claim on the mountain, and maintained that the department’s involvement in the project would

²⁵⁰ Gardebring, quoted in Unangst, “U official to recommend buying time at Mt. Graham telescope,” *University of Minnesota Daily*. 25 September 2002. See also “Morass on the mountain,” *University of Minnesota Daily*. 26 September 2002.

²⁵¹ Ford, “U Social Concerns Committee examines Mt. Graham telescope.”

²⁵² Ibid.

²⁵³ Helfrich, Metzger, and Nixon, “Native Tribes Struggle to Reclaim Sacred Sites,” 01 June 2005. *Pulse of the Twin Cities*.

be of great benefit to university astronomers.²⁵⁴ Both UM and UV joined the LBT under the banner of the private foundation called Research Corporation, but UM students registered a student group in the fall of 2004 called the Mount Graham Preservation Alliance with the goal of removing the telescopes from Mt. Graham.²⁵⁵ The student group reported that UM was eligible to break its contract with the LBT project if the telescope was not completed by June of the following year.²⁵⁶

In April 2004, San Carlos Tribal Councilors rejected a proposal presented by UA Indian Law Clinic Coordinator Don Nichols and UA law professors Robert Williams, Robert Hershey on behalf of UM and the University of Virginia that would provide the tribe with \$120,000 in university credit for programs in exchange for approving the telescope projects on Mt. Graham. Cassadore Davis dismissed the proposal as “giving us a little ice cream to quiet us down...money, like ice cream, does not last, but our mountain stands there for us and we must stand for our mountain.”²⁵⁷

²⁵⁴ Ford, “U Social Concerns Committee examines Mt. Graham telescope.”

²⁵⁵ The Research Corporation indicated to the University of Virginia that it would no longer be possible to wait for the university’s decision on partnering with the LBT in October 2001, and an ad-hoc committee appointed to advise the UV Provost determined that “a withdrawal by the University of Virginia at this late stage in the project would be entirely symbolic.” See Report of the Ad-hoc Committee to Advise the Provost on the Mount Graham Telescope Project 12 September 2002. Available at http://www.virginia.edu/insideuva/2002/28/adhoc_rept.html. Accessed 27 March 2013. According to the LBT website, the current partners in the LBT include: UA, the Instituto Nazionale di Astrofisica (INAF), Arizona State University, Northern Arizona University, the LBT Beteiligungsgesellschaft in Germany (Max-Planck-Institut für Astronomie in Heidelberg, Landessternwarte in Heidelberg, Leibniz Institute for Astrophysics in Potsdam, Max-Planck-Institut für Extraterrestrische Physik in Munich, and Max-Planck-Institut für Radioastronomie in Bonn), The Ohio State University, Research Corporation in Tucson, and the University of Notre Dame. See <http://www.lbto.org/project.htm>. Accessed 13 March 2013.

²⁵⁶ “University of Minnesota Students Organize the Mount Graham Preservation Alliance, Launch Divestment Campaign.” Mt. Graham Survival Coalition. Available at mountgraham.org. Accessed 10 September 2010.

²⁵⁷ Davis, quoted in Kamin, John, “San Carlos Rejects UA Proposal,” *Eastern Arizona Courier*. 18 April 2004. In the summer of 2005, members of the Mount Graham Coalition and Preservation Alliance descended on

“Nice people” or Neo-Colonialists?

It seemed that UA had at last won its observatory, but at what cost? The public image of the University had been thoroughly soiled through the years of controversy, aided by the relentless media coverage of each protest, lawsuit, and political intervention. Truly, one of the unique features of the Mt. Graham case is the staggering magnitude of the negative publicity engendered by appropriating the mountain for astronomical purposes. In the Tucson area, local newspapers have chronicled the controversy since its inception. Editorials in the *Arizona Daily Star*, the *Tucson Citizen*, and the UA student newspaper the *Daily Wildcat* have charged the UA with pursuing greedy corporate interests at the expense of environmental and cultural concerns, going so far as to label astronomers as “star whores.”²⁵⁸

One of the most notorious incidents reported in local newspapers involved an exposé of a public relations cover-up in 1997. A public relations firm retained by UA called Strategic Issues Management Group (SIMG) drafted a letter denouncing telescope opponents as “self-serving extremists” and mailed the letter to the UA student newspaper the *Arizona Daily Wildcat* and the local paper the *Tucson Citizen*. Although the text had been authored by SIMG, the letter was made to appear as if it had been written by a UA student, who subsequently accused UA of

the annual meeting of the American Astronomical Society, held in Minneapolis and distributed leaflets publicizing the university’s involvement with the telescope project. See “Leafleting at American Astronomical Society (AAS) Meeting,” Mt. Graham Survival Coalition. 01 June 2005.

²⁵⁸John Dougherty, “Star whores: the ruthless pursuit of astronomical sums of cash and scientific excellence,” *Phoenix New Times* 24 (15, 16 June 1993): p. 28-36.

dealing in propaganda.²⁵⁹ The story itself was enough of a public relations nightmare, but the headline calling UA's PR firm "Public Relations Sleazeballs" likely added fuel to the fire.²⁶⁰

It was only the latest incident in a series of unfortunate public relations disasters amplified by the tendency toward hyperbole in the press. According to Leif Robinson, then editor of *Sky & Telescope* magazine, "The university, from day 1, badly mishandled their public relations."²⁶¹ Indeed, as these chapters have shown, UA made numerous missteps in its public dealings with the observatory opposition, but the unrelenting media coverage of every twist and turn certainly contributed to the public image of the University as a villain that preyed upon the powerless, often by characterizing the legal battles as hopeless 'David and Goliath' struggles. Clearly, the Mt. Graham astronomy community believed the local press was distorting the image of UA and the astronomers invested in MGIO, since astronomers and university administrators repeatedly wrote letters to newspapers clarifying and contesting points made in articles about the observatory.

For the Mt. Graham astronomy community, the characterization of MGIO as a colonialist project proved particularly difficult to overturn. A similar instance of colonialist rhetoric is found in Joseph Masco's post-Cold War ethnography of security debates centered on Los Alamos National Laboratory, which explores how nuclear testing and the aftermath of the Cold War were experienced by neighboring indigenous communities and antinuclear activists.²⁶² In northern New Mexico, Masco asserts that the nuclear weapons laboratory at Los Alamos

²⁵⁹ See Tim Vanderpool, "Public Relations Sleazeballs Go Too Far In Defense Of The Latest Mount Graham Telescope Project," *Tucson Weekly*, 22-28 May 1997.

²⁶⁰ Ibid.

²⁶¹ See Robinson, quoted in Steve Yozwiak, "UA's nightmare began at scope project's start: fierce resistance couldn't be foreseen, aid contends," *The Arizona Republic*. 04 July 1993.

²⁶² Masco, *The Nuclear Borderlands*.

became emblematic of a new kind of Western colonization for some members of Native American and Hispanic communities from the surrounding regions, and he finds that colonial narratives were appropriated by scientists in their discourse about the bomb.

Considered alongside the history of conflict at Mt. Graham, Masco's study demonstrates that when indigenous and scientific communities seek to share a common resource, scientists may find themselves cast as neo-colonialists, particularly when they draw from colonialist rhetoric themselves. When members of the Mt. Graham astronomy community alleged that the ASC was really a front for the longstanding environmentalist opposition, they further ignited the colonialist characterization by perpetuating the notion that Native Americans were a powerless and easily manipulated community. By the quincentennial of Columbus' arrival in the Americas, the indigenous-environmental alliance of anti-observatory activists regularly issued narratives equating building a scientific instrument with committing cultural genocide and desecrating a pristine wilderness. The perceived hypocrisy of the Pope's remarks on safeguarding Native American culture and Father Coyne's culturally insensitive remarks further opened the door to charges by Apaches that history was repeating itself.

This depiction of the Mt. Graham astronomy community as neo-colonialists has also found favor among some activist scholars outside the Apache community. As articulated by historian and self-proclaimed activist Joel T. Helfrich, "Rather than seeking to expand knowledge or improve the human condition, the University of Arizona and its research partners have pursued prestige and high national rankings for their institutions. As a result, they have used questionable means to appropriate land and resources from Native Americans and have

permanently altered a unique ecosystem.”²⁶³ In his 2010 dissertation on the Mt. Graham controversy, Helfrich accuses UA of following “a pattern of colonialism that used history and myth to appropriate resources,”²⁶⁴ arguing, “these actions replicate earlier efforts—including those of the Spanish in the 1600s and the United States government in the 1800s—to colonize Mount Graham and exploit its indigenous residents and the mountain’s resources.”²⁶⁵

Related to the colonialist narrative is the charge that the Mt. Graham astronomy community has used the “Apache Legend” to its advantage. The Apache Legend, as defined by Fort Apache Anthropologist and Historic Preservation Officer John R. Welch, is the damaging caricature of the Apache people as militaristic, culturally homogeneous, and uneducated about their history and culture.²⁶⁶ Welch faults Euro-American scholars with arrogantly assuming a privileged grasp of Apache history and believes telescope proponents have adopted this flawed version of historical events to suit the observatory’s agenda at the expense of robbing Apaches of cultural agency. To support this claim, Welch refers to the response from observatory

²⁶³ Joel T. Helfrich, “A Mountain of Politics: The Struggle for *dzil nchaa si’an* (Mount Graham), 1871-2002.” Dissertation, University of Minnesota (2010), p. 31. Since Helfrich has devoted an entire dissertation to the topic of the history of conflict between the Apaches and MGIO, it is worth noting that the approach in my dissertation differs radically. Helfrich’s ahistorical arguments seek to prove that UA officials have perpetrated a colonialist agenda by supporting claims found in Apache narratives, while I analyze the narratives of all the historical actors not for their veracity, but to gain insight into how this discourse has shaped identity and both scientific and cultural outcomes pertaining to the use and control of the mountain landscape over time. Helfrich’s main stated goal is to aid the Apaches in seeking social justice by offering his dissertation as “an effort to begin a process of healing and forgiveness, as well as justice, peace, and land restoration.” For Helfrich, the purpose of his dissertation is to reveal “a dark spot on American legal history, environmental history, US-Indian relations, higher education, astronomy, but most significantly the American conscience. It did not have to be this way. It is time to acknowledge past wrongs, apologize for past and present wrongdoing, and take steps to create a postcolonial future for the U.S. It can only be achieved by understanding how we got to this point.” To this end, his conclusion, titled “Return the Sacred,” suggests a plan to restore Mt. Graham to the Apaches. See Helfrich, p. 35, and conclusion, p. 422-439.

²⁶⁴ Helfrich, p. 33.

²⁶⁵ *Ibid*, p. 31.

²⁶⁶ See Welch, p. 92.

officials following UA's notification of the planned observatory to tribal leaders in 1985. The requests of the Hopis and Zunis, long known as peaceful agricultural tribes, were accommodated, but Welch asserts that anti-Apache bias associated with the Apache Legend was responsible for ignoring the tribe's cultural concerns. Echoing the colonial narratives of anti-observatory Apaches, Welch asserts that "white America is unwilling to yield control of Native America. The failure of the observatory proponents to recognize and respect the Apaches as stakeholders in Mt. Graham is the newest chapter in a tediously repetitive history of discrimination that I believe is almost inextricably rooted in popular notions about American Indians."²⁶⁷

According to the characterizations of the observatory made by Welch, Helfrich, and the Apaches themselves, the legacy of colonialism has played a critical role in determining whether Apache concerns are taken seriously. The prevalence of colonialist rhetoric should not be taken at face value—it represents one perspective expressed by one stakeholder in the Mt. Graham debate—yet it does underscore that this dispute is as much about a socially and politically marginalized group's struggle for agency as it is a history of scientific controversy.

Astronomers affiliated with MGIO have been publicly vilified, accused of violating environmental and cultural laws and desecrating a sacred peak with colonialist ambitions, which begs the question: how has such overwhelmingly negative public perception affected the Mt. Graham astronomy community, both personally and professionally? By analyzing the varied responses to the negative public opinion about the observatory project, this episode of conflict reveals much about how scientists' personal and professional identity can be shaped by practicing science in ethically and socially challenging environments.

²⁶⁷ Welch, p. 91.

Though the American Astronomical Society passed a unanimous resolution in support of MGIO in 1990, some members of the American astronomy community experienced great internal conflict over the Mt. Graham controversy. As one astronomer noted, “We astronomers like to think of ourselves as ‘nice people’, and it bothers us when others do not see us that way. A lot of astronomers were disturbed over the way the Mt. Graham situation developed, not least because we were often portrayed as rapacious developers who trampled the due process of law.”²⁶⁸ According to former Kitt Peak National Observatory astronomer and current webmaster for *Storytellers: Native American Authors Online* Karen M. Strom, her objection to the astronomical development of Mt. Graham has made it difficult to maintain amicable professional relationships with her colleagues. Weighing the decision to make her opinion public, Strom concludes, “it is absolutely necessary that I make my opposition to the University of Arizona projects on Mt. Graham clear. I am sorry if this hurts some of my colleagues at U of A, but I can no longer be held hostage to their political and financial interests.”²⁶⁹ Astronomer Roger Lynds of the National Optical Astronomy Observatories, located just across the street from Steward Observatory at the perimeter of the UA campus, told an *Arizona Republic* reporter in 1993 that “they’ve had to slide to get around the environmental stuff and slide to get around the cultural stuff. What has happened is all of astronomy has gotten a bad name for all of this in the minds of a lot of people.”²⁷⁰

²⁶⁸ Leslie Sage, “A Brief History of the Controversy Surrounding the Mt. Graham International Observatory,” in A. Heck, ed., *Organizations and Strategies in Astronomy 4* (Kluwer Academic Publishers, 2003), p. 75-91; p. 76.

²⁶⁹ See Strom, “Mt. Graham and the University of Arizona Astronomers.” www.hanksville.org/voyage/misc/MtGraham.html (accessed 12 June 2010).

²⁷⁰ Lynds, quoted in Yozwiak, “Worst spot picked for UA telescope.”

The Mt. Graham controversy has certainly introduced some tension into the American astronomy community by straining professional relationships, but it has also led to more direct threats to scientific enterprise on the mountain. By issuing numerous legal challenges, the grassroots opposition to the observatory limited telescope development far more substantially than at Kitt Peak or Mauna Kea. The sheer tenacity of the radical fringe of the environmentalist opposition, and later the indigenous-environmentalist alliance, led to increased federal scrutiny that delayed or interrupted telescope construction. The anti-telescope campaign also generated an enormous public backlash against the telescope projects on Mt. Graham that caused MGIO to lose the support of proposed partnerships. But the lawsuits and newspaper stories that created the public fallout over the Mt. Graham controversy were animated by narratives about the environmental and cultural significance of the mountain and the historical treatment of Apaches by scientific and political interests. In the absence of such narratives, the public—and the courts—might never have taken note of telescope development on Mt. Graham at all, so this episode of conflict demonstrates that narratives wield considerable power to shape the development of Big Science projects.

Trading Zones and Claims of Incommensurability

Should Native American prayers be given higher priority than scientific inquiry? Can small endangered squirrels really coexist with giant telescopes? The narratives of environmentalists, Apaches, and astronomers often read like sensationalist newspaper headlines, but beyond the hyperbole lies an important clue to how these different communities interact. These kinds of narratives have not only influenced the scientific enterprise on the mountain, they reveal a commonly held conviction that the conflicts between the interests of astronomical research and cultural or environmental interests are fundamentally irreconcilable. Depicting the controversy as a battle between cultures with incommensurable value systems

governing the use of the mountain has proven an effective rhetorical strategy for participants on all sides of the telescope controversy. To cite one example, UM's Social Concerns Committee listened to the testimony of Apache elders from the Mt. Graham Coalition and concluded that "the opposing groups bring incompatibly different systems of politics, knowledge, belief and history to bear, and as a result, are incapable of either understanding or compromise."²⁷¹ Lending further support to this notion of incompatibility, both sides of the debate have even issued 'fact sheets' with contradicting arguments and historical timelines intended to dispel common "myths" about the environmental and cultural impact of the observatories.²⁷²

In previous chapters, I have argued that the successful introduction of observatory visitor centers promoting cultural awareness and observatory-sponsored astronomy outreach programs geared towards the native population complicates such claims of incommensurability by demonstrating that these disparate groups have sought to coexist by establishing trading zones. Yet narratives of colonialism and irreconcilable values have critically shaped the contested terrain of Mt. Graham, making it a cultural battleground that appears to be more resistant to negotiation and compromise than other sites.

Concessions toward the San Carlos Apache are certainly less visible at MGIO than at other observatories considered in this dissertation. The observatory does participate in an annual summer youth program for Bylas and San Carlos high school students, and UA initiated a

²⁷¹ Quoted in *Mt. Graham Telescope Project and the University of Minnesota Social Concerns Committee Position Report, March 2002*. Available at <http://www1.umn.edu/usenate/soccon/mountgraham.html>. Accessed 15 March 2013.

²⁷² For a representative sampling, see *Mt. Graham and the Large Binocular Telescope (LBT) Fact Sheet*, The Ohio State University Department of Astronomy. Available at www.astronomy.ohio-state.edu/LBT/facts.html. Accessed 06 July 2010; *Record of Apache Opposition to the Desecration of Mt. Graham by the University of Arizona and their Astronomer-Collaborators*. Available at www.mountgraham.org. Accessed 28 June 2010; *Setting the Record Straight: Rebuttal to University of Virginia Astronomy Dept. Fact Sheet 2002*. Available at www.mountgrahamcoalition.org. Accessed 06 July 2010.

San Carlos Model Services Program in 1993 to extend the University's educational resources to the reservation, but observatory opponents have dismissed tribal support measures as a bribe.²⁷³

The Visitor Centers at Mauna Kea and KPNO have served as long-term centers of dynamic exchange between the astronomical and indigenous communities invested in the mountains by preferentially hiring Native employees and displaying Native Hawaiian and Tohono O'odham history and cultural artifacts. Mt. Graham's Visitor Center stands in stark contrast to these forums of local exchange. There are no Apache employees affiliated with the Eastern Arizona Discovery Park in Safford, Arizona, and the only direct reference to Apaches at the Discovery Park comes in the form of a small diorama depicting the Apache 'legend of the lazy coyote' alongside similar displays on creation myths around the world.²⁷⁴ In the guided public tours of MGIO, docents are trained to provide scientific and technical information about the three telescopes and are knowledgeable about the natural history of the mountain, but they receive no specialized training in Apache culture and history. According to Paul R. Anger, Director of the EAC Discovery Park Campus, "we don't have a scripted dialog pertaining to the Native Americans that were and still are, in the area. Native Americans play an integral part of the history of the Gila Valley from prehistoric times, to the settling of the area, and up to the current time."²⁷⁵ Noting that "Many of the Current San Carlos Apache Tribe members are our

²⁷³ Jason Auslander and Joseph Barrios, "Tribe-support program called bribe by some." *Arizona Daily Wildcat*. 10 December 1993. Founded in 1992, one of the most turbulent years in the Mt. Graham debate, the MGIO Summer Youth Program is funded by MGIO, the Large Binocular Telescope Organization, and the UA Vice President for Research. The program provides students from San Carlos and nearby Bylas with construction and conservation jobs and students attend weekly lectures by guest speakers throughout the 10-week program. See "MGIO Summer Youth Program." Available at oric.uanativenet.com/projectPage/mgio-summer-youth-program. Accessed 13 January 2013.

²⁷⁴ These observations are drawn from my visits to the Eastern Arizona Discovery Park in Safford, Arizona on 02 June 2012 and 12 June 2012.

friends and neighbors in the community, or live close by on the San Carlos Apache Reservation,” Anger explained that the Visitor Center guides are sensitive to the history of conflict between Native Americans, the Forest Service, and the MGIO.²⁷⁶ Anger further affirmed that “While these issues have caused some division and hard feelings, we expect our guides to be professional and share pertinent information while remaining respectful to all parties involved in the history of Mt. Graham and the Mt. Graham International Observatory.”²⁷⁷

Anger’s comments reveal that the Discovery Park management strives to distance visitors from the mountain’s turbulent history, a neutral stance that accounts for the decision not to present Mt. Graham as a sacred mountain anywhere in the museum displays or during the observatory tours. At the same time, Discovery Park staff are trained to be respectful of the Apaches’ religious views. However, ASC members took offense at the central theme of the center from its inception. When the Discovery Park and accompanying museum was first under development in the mid-1990s, ASC leader Cassadore Davis was disturbed by the museum’s literature, which “exalts this desecration of our sacred Apache mountain as the ‘second age of discovery,’ 500 years after Columbus. It also praises the White settlers farming and mining discoveries –on lands they took from our reservation without compensation or permission.”²⁷⁸ For Cassadore Davis and other Apaches, the Discovery Center glorified “the white colonizers” by featuring exhibits on Arizona’s pioneer days.²⁷⁹ A far cry from the unifying themes of ‘exploration’ and ‘discovery’ that served as a pidgin language between Native Hawaiians and

²⁷⁵ Correspondence with Paul R. Anger. 05 April 2013.

²⁷⁶ Ibid.

²⁷⁷ Ibid.

²⁷⁸ Cassadore Davis, “Coalition position not laughable,” *Eastern Arizona Courier*. 23 February 1994.

²⁷⁹ Cassadore Davis, “Museum is no celebration of history, only wrongs,” *San Carlos Apache Moccasin*. March 1994.

astronomers at 'Imiloa, the Discovery Park's emphasis on 'discovery' further alienated Apaches and astronomers.

Mirroring the Discovery Park's nonexistent showcase of traditional Apache arts and crafts, the official MGIO website glaringly omits any reference to the Apaches.²⁸⁰ In a section titled "A little bit of history," the webpage briefly details Mt. Graham's discovery by Spanish Conquistadores and describes its history of occupancy and use by the U.S. military and early settlers in the nineteenth century before it became a top recreational destination for southern Arizona. The Western Apaches are never mentioned.²⁸¹ The environmental objections to the telescope projects on Mt. Graham are also conspicuously absent from the official website. On a MGIO webpage devoted to the Mt. Graham Red Squirrel, one finds a sterile account of the distribution of the endangered species on the mountain with no mention of the debate over the destruction of habitat caused by the telescopes.²⁸²

In the process of pushing telescope projects forward, the Mt. Graham astronomy community issued narratives dismissing the religious claims of the Apaches, argued against the listing of an endangered species, and recruited a powerful lobbying agency to gain exemption from environmental laws on two occasions. If UA had not made these particular choices, the MGIO would likely have been stalled in litigation until the project was abandoned out of economic necessity, but these actions also severely strained relations between the Apaches, conservationists, and many students-turned-activists. By pursuing observatory development on a sacred mountain without directly engaging Apaches in cultural consultation, the public image of UA and its partners in MGIO has become so thoroughly tarnished that for many telescope

²⁸⁰ MGIO website. See <http://mgio.arizona.edu>. Accessed 15 March 2013.

²⁸¹ "A little bit of history." <http://mgio.arizona.edu/MG%20History.htm>. Accessed 15 March 2013.

²⁸² "Environmental Issues." <http://mgio.arizona.edu/Environment.htm>. Accessed 15 March 2013.

opponents, the science of astronomy has become indelibly conflated with colonialist acquisition. After the 1996 Congressional rider was passed, there were no further legal setbacks for MGIO, and the estranged cultural groups of astronomers, Apaches, and environmentalists were never forced to communicate and settle on common meanings. Thus it is perhaps not surprising that the participants in this controversy have been reluctant to independently seek accommodation and communication through trading zones. Instead, tensions over the MGIO seem to have produced a climate of distrust that precludes communication within the kinds of trading zones that have been established at KPNO and Mauna Kea.

Conclusion

Today, instead of the 18 telescopes originally envisioned, the Mt. Graham International Observatory is composed of just three, including the Vatican telescope. Certain regions of the summit have been designated as a squirrel refuge due to a University of Arizona-funded monitoring program for the Mt. Graham Red Squirrel. Apaches who wish to worship at the summit are subject to the same access restrictions as astronomers and recreationists, and an Apache man was arrested for trespassing in 1998 after praying in a restricted area.²⁸³ The squirrel population appears to be rebounding.²⁸⁴

²⁸³ As described in the introduction to this dissertation, in 1997, Steward Observatory's B. E. Powell asked the USFS to regulate praying on Mt. Graham by requiring Native Americans to obtain a 'prayer permit' "at least two business days" in advance of praying on the mountain. All requests to pray on Mt. Graham, according to Powell's letter, should be made in writing by federally recognized tribe members with a description specifying where the prayer would occur. A separate permit was required for Native Americans who wished to access the summit of Mt. Graham above 10,000 feet, where astronomical activity occurs. See B.E. Powell to U.S. Forest Service. 07 October 1997. See also "Have you got your permit to pray?" News Release, Mount Graham Coalition. 13 August 1998; Jim Erickson "Mt. Graham 'prayer permit' angers Apaches," *The Arizona Daily Star*. 13 August 1998.

²⁸⁴ The fluctuating squirrel population of the Mt. Graham Red Squirrel continues to be a source of debate between conservation biologists, environmentalists, the United States Forest Service, and the Mt. Graham astronomy community. The Forest Service conducts an annual squirrel census and Forest Service biologists have determined that there is no connection between observatory construction and squirrel population decline. Squirrels are dependent on adequate spruce, fir, and cone crops for their food supply

Mt. Graham evidently does not highlight the dynamic of accommodation that has been observed at other sites of conflict between indigenous groups and scientific communities; it reveals much, however, about the refashioning of scientific identity in the face of public opposition and the political and social meaning of narratives. During the peak of the Mt. Graham controversy in the early 1990s, the dominant narratives of environmentalists and Apaches often paralleled sensationalist newspaper headlines. For environmentalists who considered the mountain a sacred ecosystem, the debate was frequently sketched as a battle between an 8-ounce squirrel and a giant telescope. For Apaches who regarded the mountain as sacred “since time immemorial,” the observatory became emblematic of Western colonization, particularly after astronomers reframed the mountain as sacred for astronomy but denounced its sacredness to the Apaches. Bolstered by federal law, both groups of activists mobilized these narratives in a grassroots campaign against the observatory that played out in the courts and through a series of dramatic public protests. Defining the *spiritual* landscape of Mt. Graham represented an attempt to control the *physical* landscape for all of the stakeholders, and thus the mountain was alternately framed as a sky island refuge to an endangered squirrel, a spiritual temple, or the best location for astronomy in the continental United States.

The Mt. Graham case also sheds light on the larger implications of opposition to telescope construction on mountains viewed as sacred peaks by tracing the impact of Big

and the squirrel population rises and falls according to the availability of these crops. Conservationists maintain that the destruction of critical squirrel habitat warranted by telescope construction has negatively affected the squirrel population, but the MGIO website asserts that the squirrel population has increased since 1989. See <http://mgio.arizona.edu/Environment.htm>. This claim is validated by the Arizona Game and Fish Department (AZGFD) and the U.S. Forest Service. In a 2011 press release, the AZGFD announced that the most recent squirrel survey showed an increase in the squirrel population while noting that “biologists remain concerned about the species’ status and are exploring new ways to conserve it...” See “Endangered Mount Graham red squirrel numbers increase,” 07 November 2011, Arizona Game and Fish Department website, available at <http://azgfd.net/artman/publish/NewsMedia/Endangered-Mount-Graham-red-squirrel-numbers-increase.shtml>.

Science projects on neighboring communities. The body of literature on public disputes over science and technology in the United States holds that scientific controversies involving public protests express wider political and social tensions while providing a lens on how moral judgments influence scientific practice. As Dorothy Nelkin explains, “the social movements organized to challenge science and technology are driven by a moral rhetoric of good and evil, of right and wrong... thus controversies matter and must be taken seriously as an indication of public attitudes towards science.”²⁸⁵ In this light, the Mt. Graham case traces shifting public understandings of science against the backdrop of constantly renegotiated conflicts between scientific, cultural, and religious values.

In my analysis of the controversies over observatories at Kitt Peak, Mauna Kea, and Mt. Graham, I have argued that debates on the meaning and control of the mountain landscape at these sacred sites took place against the backdrop of key social, cultural, political, and environmental movements in the United States that were largely initiated during the second half of the twentieth century. In the conclusion of this dissertation, I consider these distinct histories as a whole.

²⁸⁵ Dorothy Nelkin, “Science Controversies: the Dynamics of Public Disputes in the United States,” in *Handbook of Science and Technology Studies*, Sheila Jasanoff, Gerald E. Markle et al., ed. (Thousand Oaks: Sage Publications, 1995): p. 444-456; p. 456.

Conclusion

Narrative, Communication, and Conflict: the Making of Contested Landscapes in Postwar American Astronomy

A tour group hesitantly enters the cavernous room containing the massive twin 8.4-meter mirrors of the Large Binocular Telescope (LBT). After making the 90-minute ascent up Mt. Graham's winding access roads to the summit, the tour began earlier in the day with visits to the much smaller Vatican Advanced Technology Telescope and the Submillimeter Telescope. The LBT is the final stop on the itinerary, boasting its uniquely powerful mirrors designed and fabricated at the University of Arizona's Mirror Lab in Tucson. This behemoth of modern science manifested in glass and steel is what everyone has been waiting to see, and the instrument does not disappoint. The group assembles directly below one of the massive mirrors, and two LBT staff members eagerly take a break from the monotony of daytime work at the observatory to answer their questions. After a few minutes, a woman introduces herself as a local with a good view of the LBT from her home. She wonders aloud why the scope hadn't seemed "quite so shiny" over the past few months. The LBT manager has been patiently and enthusiastically fielding questions ranging from how to remove moths stuck on the mirrors to the function of the oversized labyrinth of ductwork criss-crossing the dome ceiling, but this seemingly innocent question seems to give him pause. "Well," he begins after a moment of consideration, "we try to be sensitive to the Apaches. For them, this is a sacred mountain, and if we tilt the scope so it doesn't reflect the sunlight quite as much, it's... well, we do what we can to be sensitive to all that." He quickly brings some levity to the suddenly awkward mood among the group by quipping, "As of yet, no one's volunteered to paint this dome for us." The chuckles come right on cue, and the moment passes.²⁸⁶

In 2012, the spiritual beliefs of Apaches who view Mt. Graham from the desert plains 100 miles away are grafted onto each technical adjustment of one of the world's most advanced telescopes. The LBT manager's speculation that camouflaging the dome with paint would mitigate the impact of the observatory on Apache religion reveals the magnitude of cultural dissonance in the perception of how the mountain is valued at Mt. Graham today. For the Western Apaches who regard the entire mountain as a living being, no effort to diminish the visual impact of the LBT dome will change the fact that permanent metal structures block the flow of energy and prayers through the mountain. Aligned with the views of many environmentalists who see the observatories as a continued threat to the red squirrel

²⁸⁶ This anecdote is derived from my visit to the Mt. Graham International Observatory as part of a tour group on 12 June 2012.

population at the summit, removing all three telescopes on Mt. Graham is the only acceptable demonstration of accommodation. Astronomers, on the other hand, believe their voluntary decision to reduce the amount of sunlight reflected off the LBT dome should be appreciated as a gesture of goodwill.²⁸⁷ In some astronomers' estimation, painting the dome a concealing color might resolve the conflict altogether.²⁸⁸

At first glance, 'painting the dome' might well be considered a serviceable metaphor for the pattern of interactions between astronomers and other communities invested in mountain sites. After all, the histories of conflict at Kitt Peak, Mauna Kea, and Mt. Graham are riddled with examples of failed communication and attempts at accommodation that point to fundamentally incommensurable views of the mountain held by multiple interest groups. Indigenous and environmental activists want the domes removed; making them less obvious will not suffice. Indeed, astronomers and conservationists hammered out their competing constructions of the mountain as an ideal observing site and a fragile ecosystem largely through the Environmental Impact Statement (EIS) process, which only underscored tensions stemming from divergent epistemological claims about the environmental impact of the observatories.

²⁸⁷ Other local residents had complained about the light reflecting off the LBT. One resident of a nearby town noted that "a gigantic, shiny box has appeared on the mountaintop reflecting sunlight in our eyes...I thought those astronomers promised us that nothing would be visible from the valley! Maybe no one realized what an eyesore the observatory would turn out to be. See Peter Sundt, "Observatory has become eyesore," *Eastern Arizona Courier*. 17 November 1999. Courtesy of Doug Officer.

²⁸⁸ In fact, there has been much discussion at Mauna Kea and Mt. Graham about painting telescope domes concealing colors. The Environmental Assessments and Environmental Impact Statements for several telescopes proposed at both sites contain letters from concerned members of the public requesting that the telescopes should be camouflaged with paint to render them less visible from viewpoints below the mountains. Astronomers responded by explaining that telescope domes are typically coated with highly reflective white paint to reduce heat because the instruments are extremely sensitive to temperature fluctuations. In the 2002 Environmental Assessment for the Keck Outriggers, astronomers vowed that "all above ground parts of junction boxes and retaining walls will be colored red to match the cinder," but the telescope domes would be painted the standard white color. See Appendix F. Keck Outrigger Telescopes Construction Best Management Practices Plan (BMP) Draft Revision A, January 23, 2002. p. 6 in *Environmental assessment for the Outrigger Telescopes Project: Mauna Kea Science Reserve, Island of Hawai'i* (Washington, D.C.: National Aeronautics and Space Administration, Office of Space Science, 2002). February 2002. UH Manoa: Hamilton Hawaiian Library.

Accommodating these disparate views of the mountain typically amounted to ‘solutions’ that were judged objectionable or insufficient by both parties, such as biological studies and monitoring programs mandated by the Final EIS. But the preceding chapters have shown that at some sites, astronomy communities abandoned ‘painting the dome strategies’ in favor of seeking a more authentic and sustained dialogue with critics of the observatories.

In particular, when astronomers and indigenous groups entered into collaborative relationships, the result was a frequently common language of mutually agreed-upon concepts. The formation of these trading zones, or dynamic forums of local exchange, complicates the notion that the cultural worlds of scientists and nonscientists were irreconcilable by showing that these groups actively sought common ground. However, these important social and material sites of exchange did *not* emerge uniformly across all three sites, and at Mt. Graham, trading zones did not materialize in any form. Because the epistemologies and values of astronomical and indigenous cultures never converged at Mt. Graham, the ‘painting the dome’ approach to easing tensions holds true as a metaphor indicating the immensity of the conceptual gulf between astronomers and Apaches.

This conclusion establishes a more nuanced analysis of why trading zones developed between astronomers and indigenous groups invested in the mountain sites at Kitt Peak and Mauna Kea, but failed to emerge at Mt. Graham. I argue that the presence or absence of trading zones was contingent upon the way narratives were deployed by key stakeholders in debates over the use and meaning of the mountain landscape. Narratives defined the contested landscape of the mountain, but as those narratives changed over time, they also opened up new cross-cultural contact languages that allowed for communication and local agreement.

Throughout this dissertation, I have argued that narratives are integral to deconstructing the social, cultural, and political consequences of confrontations between the

communities of astronomers, environmentalists, and native peoples. To that end, I interweave the distinct but overlapping episodes of conflict at all three mountains from the late 1950s to the first decade of the twenty-first century, tracking the shifting narratives of astronomers, environmentalists, and indigenous groups about the use and significance of the mountains. My aim is to situate these narratives within a broader social and cultural history of late twentieth-century America. I also seek to map the translation of narratives within and beyond their communities of origin onto the key questions animating this dissertation. How did American astronomers define the moral imperatives of their work from the 1950s-2000s, and how did they reconstruct their professional identities in response to the controversies surrounding observatories at Kitt Peak, Mauna Kea, and Mt. Graham? Why did indigenous opposition to all three observatories emerge long after the first telescopes were proposed at each site? How did building astronomical observatories expose anxieties about the fragility of environmental and cultural protections, and why did they become symbols of colonialist acquisition? This comparative analysis of the dominant narratives deployed in the telescope controversies reinforces my central argument that narratives wield social, cultural, and political power to restrict scientific development, to facilitate a dialogue between different cultures, to reinforce individual or group identity, and to redefine hierarchical power relationships.

As this dissertation has shown, each history can be viewed as a microcosm of shifting social, cultural, political, and environmental tensions. Taken as a whole, pinpointing when and how each mountain became a contested landscape yields new insights into the historical trajectory of American astronomy, the rise of indigenous and environmental justice movements, and the mutability of narrative and identity among the different communities competing for the mountain's resources.

Founding Kitt Peak National Observatory in “the golden age of astronomy”²⁸⁹

In the first half of the twentieth century, building new observatories was a relatively straightforward process. Distinguished observatory directors who wrote persuasive proposals could often secure patronage for a new observatory from private donors. Site selection was frequently a matter of finding a convenient location for university astronomers, and the only environmental issues that might interfere with construction were likely related to weather since there were no federal regulations to impede the process. Justifying the project to the public was unnecessary because astronomy was widely viewed as a noble scientific discipline engaged in the pursuit of pure knowledge. For these reasons, prior to World War II, a new observatory could be proposed and dedicated in the United States in only a few years, and observatory directors retained significant autonomy over the project from start to finish.²⁹⁰

²⁸⁹ The early years of Kitt Peak National Observatory’s (KPNO) operation were referred to as “the golden age of astronomy” by several participants involved in its founding. See, for example, Aden B. Meinel, Marjorie P. Meinel, and Barbara Meinel Jacobs, *The Golden Age of Astronomy: The Kitt Peak Years* (2008). Unpublished manuscript. Courtesy of Helmut Abt. Leo Goldberg fondly recalled the dedication of KPNO as a “great day for American astronomy.” See Leo Goldberg to Dr. Robert R. McMath, 21 March 1960. Series: HUGFP 83.16 Association of Universities for Research in Astronomy, 1961-1977, Box 1 AURA Board correspondence, 1960s. Harvard University Archives.

²⁹⁰ Observatory directors such as Harlow Shapley, George Ellery Hale, and Henry Norris Russell played major roles in institution-building during the first half of the twentieth century. David DeVorkin’s biography of Henry Norris Russell provides an excellent overview of the American astronomy community in the early twentieth century and emphasizes the authority of observatory directors during this period. See DeVorkin, *Henry Norris Russell: Dean of American Astronomers* (Princeton: Princeton University Press, 2000). On the growth and professionalization of American astronomy in the late nineteenth and early twentieth centuries, see Stephen G. Brush, “Looking Up: The Rise of Astronomy in America, 1800-1950,” *American Studies* 20, 2 (1979): p. 41-67; Norriss S. Hetherington, “Mid-Nineteenth-Century American Astronomy: Science in a Developing Nation,” *Annals of Science* 40 (1983): p. 61-80; John C. Greene, “Some Aspects of American Astronomy, 1750-1815,” *Isis* 45 (1954): p. 339-358; John Lankford, with the assistance of Ricky L. Slavings, *American Astronomy: Community, Careers, and Power, 1859-1940* (Chicago: University of Chicago Press, 1997); Alexander Pang, “Technology, Aesthetics, and the Development of Astrophotography at the Lick Observatory,” in *Inscribing Science*, Timothy Lenoir, ed., (Stanford, Calif.: Stanford University Press, 1998), p. 223-248; Howard Plotkin, “Henry Tappan, Franz Brunnow, and the Founding of the Ann Arbor School of Astronomers, 1852-1863,” *Annals of Science* 37 (1980): p. 287-302; Marc Rothenberg, “Organization and Control: Professionals and Amateurs in American Astronomy, 1899-1918: *Social Studies of Science* 11 (1981): p. 305-325.

In the immediate Cold War period, this style of observatory building was still very much the norm. Astronomy and the space sciences became a national priority after the launch of *Sputnik* in 1957, and astronomers were well poised to argue for federal support of a new national observatory that promised to democratize American astronomy and increase national prestige while advancing “man’s quest for greater knowledge of the universe.”²⁹¹

Years after astronomers Helmut Abt and Aden Meinel declared Kitt Peak the winner of the exhaustive site survey process for what would become Kitt Peak National Observatory (KPNO), moving from site selection to the lease approval was described by astronomers as “a simple matter.”²⁹² According to the dominant narrative of the observatory’s founding available on the KPNO website and in several publications authored by the astronomers involved, Association of Universities for Research in Astronomy (AURA) officials worked with the Tohono O’odham Nation (then Papago) to secure the perpetual lease of 200 acres of their reservation to the National Science Foundation (NSF) in 1958.²⁹³ These narratives assert that despite an initial reluctance to surrender their mountain to “The Men With Long Eyes,” the O’odham Tribal

²⁹¹ Morgan Monroe, National Science Foundation to Aden Meinel, Director, “The Kitt Peak Story.” Edwin F. Carpenter Papers, The University of Arizona Special Collections. The National Science Foundation, founded in 1950, had already significantly expanded its budget to support the development of scientific infrastructure by the mid-1950s, and *Sputnik* was a catalyst for further changes in the patronage structure of astronomy, leading to the creation of the National Aeronautics and Space Administration (NASA) in 1958. See Frank K. Edmondson, *AURA and Its U.S. National Observatories* (Cambridge: Cambridge University Press, 1997); Daniel J. Kevles, “The National Science Foundation and the Debate over Postwar Research Policy, 1942-1945: A Political Interpretation of Science - The Endless Frontier.” *Isis* 68 (1977): p. 5-26. On the shift in patronage patterns for astronomy before and after NASA, see Ronald E. Doel, *Solar System Astronomy in America: Communities, Patronage, and Interdisciplinary Research, 1920-1960* (Cambridge: Cambridge University Press, 1996).

²⁹² Interview of Dr. Frank K. Edmondson by Dr. David DeVorkin. 02 February 1978, Niels Bohr Library & Archives, American Institute of Physics, College Park, MD USA, Available at www.aip.org/history/ohilist/4588_2.html#6. Accessed 10 Oct 2011.

²⁹³ See “The Kitt Peak Virtual Tour,” Kitt Peak National Observatory: Tohono O’odham, available at http://www.noao.edu/outreach/kptour/kpno_tohono.html Accessed 11 Oct 2011; Interview of Dr. Frank K. Edmondson by Dr. David DeVorkin. 02 February 1978; Meinel, Meinel, and Jacobs, *The Golden Age of Astronomy: The Kitt Peak Years* (2008), p. 28-29.

Council enthusiastically embraced the observatory after witnessing a telescope demonstration at the University of Arizona's Steward Observatory.²⁹⁴

For astronomers, this sequence of events has been interpreted as the O'odham Nation's recognition that astronomers shared their people's appreciation of the stars. As chapter one has shown, the lease negotiation process was not quite as simple as astronomers' narratives later implied, however. The Papago Tribal Council had been managing O'odham tribal business for over two decades by the late 1950s, and this governing body was beginning to exercise its political authority by challenging the federal government in mineral and water rights cases.²⁹⁵ Fearing that telescopes might disturb the home of their sacred deities on Kitt Peak, the O'odham District Council rejected early drafts of the land lease on two occasions until the lease specifically prohibited tribal outsiders from entering the caves near the summit.²⁹⁶ The O'odham evidently played a more decisive role in determining the outcome of the selection of Kitt Peak than astronomers' narratives disclose, and the sacred attributes of the mountain were certainly integral to the lease discussions.

Years later, members of the Tohono O'odham Nation pointed out that negotiations conducted with the Tribal Council did not necessarily capture the spectrum of opinion on the

²⁹⁴ After looking through the eyepiece of the 36-inch telescope at the Steward Observatory, Tohono O'odham tribal council members gave the astronomers a name that a Bureau of Indian Affairs officer translated as "The Men With Long Eyes" in reference to the telescope, which was translated as "long eyes." See Meinel, Meinel, and Jacobs, *The Golden Age of Astronomy: The Kitt Peak Years* (2008), p. 21; James E. Kloeppel, *Realm of the Long Eyes: a brief history of Kitt Peak National Observatory* (San Diego: Univelt, 1983), p. 20.

²⁹⁵ The Tohono O'odham Tribal Council regained mineral rights to Tohono O'odham lands and filed a petition with the Indian Claims Commission in 1951 seeking reparations for lands seized by the federal government. See chapter one.

²⁹⁶ According to the terms of the lease, the caves near the summit that are visited by the god *l'ittoi* would be kept free from development. For contemporaneous accounts of the discussion about protecting the caves from desecration, see Clifton Abbott, "Men with long eyes promise not to disturb the caves of Ee-ee-toy," *The Tucson Citizen*. 23 January 1956; "Search for observatory site," *The Bisbee Daily Review*. 14 February 1956.

lease of Kitt Peak among O’odham outside the Council, a view that is supported by scholarly analysis. In Daniel McCool’s case study on the federal government’s efforts to solve “the Indian problem,” he concludes that the Tohono O’odham of the late 1950s were far from a politically and culturally unified people because they had been subjected to a prolonged and systematic program of cultural assimilation by the federal government.²⁹⁷ During the postwar era of ‘Termination’ politics, which lasted from the mid-1940s until the mid-1960s, Native Americans were encouraged to demonstrate good citizenship by assimilating into the ‘dominant culture’. The Tohono O’odham Nation was politically and culturally fractured as a result of this forced assimilation, so the Papago Tribal Council that signed the lease of Kitt Peak likely may not have represented a true consensus on the reservation. Joan April Suwalsky similarly associates Termination-era ideals with the Tribal Council’s decision to sign the lease, arguing that signing the lease would have reflected favorably on the tribe as a show of good citizenship.²⁹⁸ Signing the lease may indeed have been a symbolic means of showing that the tribe was accepting mainstream American values, but it was also a pragmatic means of generating revenue and job opportunities. The tribe was in a state of economic crisis in the 1950s, and as Tribal Chairwoman Vivian Juan-Saunders asserted in 2005, the NSF and KPNO astronomers were offering financial incentives that would have been difficult to resist.²⁹⁹

Thus when Helmut Abt and Aiden Meinel first approached the O’odham Tribal Council in 1955, they entered into a relationship with a political entity that sought to achieve a balance between creating economic and social opportunities for the tribe and respecting traditional

²⁹⁷ Daniel McCool, “Federal Indian Policy and the Sacred Mountain of the Papago Indians,” *Journal of Ethnic Studies* 9 (1981): p. 58-69.

²⁹⁸ Joan April Suwalsky, *Somewhere touching Earth to Sky: the lease of Kitt Peak and the Intersections of Citizenship, Science, and the Cultural Landscape*. AB. Degree in Urban Studies (Environmental Science and History), 20 April 2005.

²⁹⁹ See Susan Carroll, “Tribe Fights Kitt Peak Project,” *The Arizona Republic*. 24 March 2005.

spiritual beliefs. The network of local and national grassroots activist organizations that proliferated through the American Indian Movement (AIM) would not materialize for nearly two decades, so the Tribal Council was the only representation of O’odham voices to outsiders. Tohono O’odham tribal members did not openly criticize the Tribal Council’s decision to approve the perpetual lease of their sacred mountain for nearly fifty years. Negotiating the lease of Kitt Peak from the Tohono O’odham Nation may not have been “a simple matter” as some astronomers later maintained, but the overall process of acquiring the rights to build a national observatory on Kitt Peak did reflect a simpler period of institution-building in American astronomy. With federal funding already guaranteed and site testing complete, securing the lease was the last major hurdle in the effort to build KPNO. In the absence of environmental or cultural objections, the Kitt Peak National Observatory was founded in 1960 as “a towering landmark on man’s long road toward knowledge of the unknown.”³⁰⁰

Building Telescopes in Paradise

In the late 1960s and 1970s, proposals for the next generation of observatories in Hawai’i confirmed that astronomers continued to justify the necessity of building large telescopes strictly as the technological vehicles for the production of knowledge.³⁰¹ High mountains with dark skies and low atmospheric turbulence were referred to as “ideal” or “prime” observing sites, and the proposal-to-construction phase was still relatively unencumbered by bureaucratic restrictions. Astronomers’ narratives about the goals of their

³⁰⁰ Morgan Monroe, National Science Foundation to Aden Meinel, Director, “The Kitt Peak Story.” Edwin F. Carpenter Papers, The University of Arizona Special Collections.

³⁰¹ Early telescope proposals on Maui and the Big Island were short documents focusing on the technical merits of the telescope, but even more detailed proposals mainly emphasized the scientific contributions that could be made using the new instrument. See, for example, *An assessment of Environmental Impact Resulting from the Development of a Telescope and Observatory Facilities. Mauna Kea (Summit), Hawaii. Preliminary Draft. Canada-France-Hawaii Telescope Corporation.* Honolulu, HI. December 1973; *Mauna Kea - an overview.* University of Hawaii Institute for Astronomy(Honolulu) July 1974.

science and how mountain sites served those goals remained fairly static in the American astronomy community for much of the twentieth century, then. Correspondingly, astronomers approached the task of building a new observatory mainly as a financial and logistical challenge. Aside from negotiations with representatives of the Tohono O’odham Nation that were later downplayed by astronomers, seeking approval from nonscientists was not common practice because the merits of the project—advancing knowledge of the universe—were never a matter of public debate.

University of Hawai’i Astronomy Professors Walter Steiger and John Jefferies later observed that this was a remarkably informal period in astronomy because no environmental impact statements or building permits were required for the scientific development on Maui’s Haleakala or the Big Island’s Mauna Kea.³⁰² Though both Haleakala and Mauna Kea are part of the State of Hawai’i’s ceded lands, or “crown lands” held in trust for the Hawaiian people, no Native Hawaiians were consulted during the proposal process for either mountain. The perpetual lease of Kitt Peak to the NSF provides for certain concessions to the Tohono O’odham Nation such as jobs and an annual payment to the tribe, but the lease of Mauna Kea contained no such allowances for the Native Hawaiian population. Instead, the State of Hawai’i’s Board of Land and Natural Resources approved a 65-year lease of the summit of Mauna Kea to the University of Hawai’i’s Institute for Astronomy in 1968 for \$1 per year.³⁰³ Native Hawaiians, like the Tohono O’odham Nation, would later point to this lease as a grossly unfair arrangement secured during a time when the cultural identity of their people was submerged in a history of conquest and assimilation.

³⁰² See Walter Steiger, “Origins of Astronomy in Hawai’i: the Haleakala Period.” Available at www.ifa.hawaii.edu. Accessed 06 December 2012; John T. Jefferies, “Astronomy in Hawaii, 1964-70,” Available at www.ifa.hawaii.edu. Accessed 07 December 2012.

³⁰³ See General Lease #S-4191. 21 June 1968.

The cultural revival and political mobilization of the Hawaiian Renaissance was unfolding just as the Canada-France-Hawaii Telescope was being constructed on Mauna Kea in 1973, and it would be more than twenty years before Native Hawaiians were prepared to make a cultural and religious claim on the mountain. In the early 1970s, environmentalists were in a much better position to oppose telescope construction than indigenous groups because the American environmentalist movement had already gained significant social and political support.

Astronomers' Narratives Go Green

As chapter three detailed, public participation in scientific analysis was one of the hallmarks of American environmentalism in the wake of Rachel Carson's *Silent Spring*. Once scientific assessment entered the domain of the informed general public on an unprecedented scale, long-established environmental groups such as the Sierra Club adopted an increasingly political environmental advocacy agenda to promote legislative change. The progressive demand for more environmental regulation was formalized through the 1969 National Environmental Policy Act and soon found an institutional home in the Environmental Protection Agency in 1970.³⁰⁴ Armed with an arsenal of new legislative tools that included the Endangered Species Act in 1973, environmentalists were beginning to develop a significant social and political presence by the time the first major telescope was proposed on Mauna Kea.³⁰⁵ Thus the first challenge to the observatories on Mauna was not cultural, but environmental, and took the form of local opposition from the Hawai'i Sierra Club and Audubon Society.³⁰⁶

³⁰⁴ National Environmental Policy Act of 1969; EPA Order 1110.2.

³⁰⁵ The Endangered Species Act of 1973, P.L. 93–205.

³⁰⁶ Members of both groups wrote numerous letters to astronomers and the Hawai'i Department of Land and Natural Resources outlining their environmental concerns and urging increased oversight of development on Mauna Kea through the adoption of a master plan. The Appendices of the Environmental Assessment for the Canada-France-Hawaii Telescope are a rich source of early

Mauna Kea became the first contested landscape in modern American astronomy because telescopes appeared on the summit shortly after the environmental movement had begun to take hold in the United States. The charge that ‘piece-meal’ observatory development would destroy a sensitive ecosystem put astronomers in the unfamiliar position of defending their work to nonscientific audiences. At public hearings and in the Environmental Assessments for the Canada-France-Hawaii Telescope, astronomers’ well-entrenched narratives about the value of astronomy as the pursuit of pure knowledge—once more than sufficient to gain approval for a telescope project—were expanded to emphasize astronomy’s value to ordinary people.³⁰⁷ Astronomers now argued that telescopes were economically beneficial to Hawai’i residents and assured worried reviewers of the telescope proposal that appropriate measures were being taken to protect the mountain’s environmental resources.

For the first time in the history of the discipline, astronomers were being asked to assess the impact of their science on the mountain environment by a concerned group of citizen environmentalists. Forced to respond to the environmental critique, astronomers engaged with the local community in new ways and modified old narratives that focused solely on the intrinsic value of astronomy. KPNO astronomers would never have considered inviting the general public to comment on any telescope proposed for the summit of Kitt Peak, but Mauna Kea astronomers were operating in a markedly different social and political climate. Nonscientists were now part of the process of building new observatories. Ultimately, the Canada-France-Hawaii Telescope was built on schedule in spite of vocal community protest. However, the

environmental opposition. See *An Assessment of Environmental Impact Resulting from the Development of A Telescope and Observatory Facilities. Mauna Kea (Summit), Hawaii. Canada-France-Hawaii Telescope Corporation*. Prepared by Neighbor Island Consultants, December 1973.

³⁰⁷ See *An Assessment of Environmental Impact Resulting from the Development of A Telescope and Observatory Facilities*. 1974; *Final Environmental Impact Statement: Proposed Telescope and Observatory Facilities, Mauna Kea (Summit), Hawaii. Canada-France-Hawaii Telescope Corporation*. Honolulu, Hawaii. Neighbor Island Consultants. May 1974.

environmentalist opposition had inaugurated a pattern of observatory building characterized by bureaucratization and community engagement, and astronomers were beginning to conceive of different ways to justify their claim to the mountain.

Saving an 'Endangered Species': an observatory for Mt. Graham

Astronomers continued to seek bigger and more powerful telescopes in the 1980s, and as I have argued in chapters three, five and six, the environmental opposition to telescope construction paralleled the growth of the environmentalist movement in the United States. When observatories were first proposed at Mauna Kea, the American environmental movement was already supported by federal laws and formally institutionalized in networks of environmental activist groups across the country. By the 1980s, American environmentalism had become a broad-based movement and environmentalists were organized and well-equipped to voice an immediate objection to the telescope proposal for the Mt. Graham International Observatory (MGIO), first proposed by the University of Arizona (UA) in 1982.

Unlike Kitt Peak and Mauna Kea, Mt. Graham is located on publicly owned land managed by the United States Forest Service as part of the Coronado National Forest. Though Mt. Graham was once part of the San Carlos Apache reservation, it was removed from the reservation by an Executive Order in 1873.³⁰⁸ For this reason, the tribal negotiations that were so instrumental to securing the land lease for Kitt Peak were unnecessary at Mt. Graham. A UA research assistant sent a written notice of the observatory plans to the San Carlos Apaches and several other Native American tribes in 1985, but years later, the San Carlos Apaches denied that the letter had been "received."³⁰⁹

³⁰⁸ Grant, U.S. Executive Order. 05 August 1873.

Denying that the letter was sent in the first place, Apache activists further asserted that a form letter would not have qualified as proper notification in any event. For many traditional Apaches, important communication required direct personal interaction. Arizona State University anthropologist Elizabeth Brandt explained, “The nature of ‘what counts’ as evidence and the need to hear native voices is also at issue in this conflict. Apaches rely upon oral tradition passed down over centuries and face-to-face contact. The only formal contact made with the San Carlos Tribe when the project began was a form letter.”³¹⁰ MGIO astronomers and administrators did not initiate face-to-face meetings with the Apaches, and in Brandt’s estimation, sending a form letter in lieu of visiting with tribal officials marked an epistemological divide about standards of communication that would never be resolved. Tribal notification had been settled from the perspective of observatory planners at UA, however, and since the 1984 Arizona Wilderness Act had already designated 3,500 acres as an astrophysical research area, securing the rights to build on Mt. Graham was thought to be a straightforward matter of drafting a proposal to the Forest Service.³¹¹

As a “sky island” ecosystem, Mt. Graham was already well known to conservation biologists and environmentalists as the home of eighteen species of genetically isolated plants and animals found nowhere else in the world.³¹² Because it was widely recognized as a valuable

³⁰⁹ At a 1992 press conference held in Washington, D.C., San Carlos Apache tribal councilman Ernest Victor said that the tribe was not informed of plans to build the telescopes on Mt. Graham and would have begun fighting construction earlier if it had been properly notified. See Ellen Gamerman, “Apaches’ scope trip to Congress gains little,” *The Arizona Daily Star*. 27 June 1992.

³¹⁰ Elizabeth Brandt, “The Fight for Dził Nchaa Si An, Mt. Graham: Apaches and Astrophysical Development in Arizona,” *Cultural Survival Quarterly* 19 (1996): 50.

³¹¹ Arizona Wilderness Act of 1984. Public Law 98-406. Stat. 1485. 28 August 1984.

³¹² The term “sky island” refers to the interpretation of the Pinaleno range where Mt. Graham is located as an ecological island within the framework of island biogeography. For more on the ecological debate

and delicate ecosystem, the observatory proposal drafted by astronomers at UA prompted the United States Fish and Wildlife Service to undertake new studies of the endangered subspecies known as the Mt. Graham Red Squirrel that dwelled at the summit. Before the studies were completed, the 1986 Draft Environmental Impact Statement (DEIS) produced by the Coronado National Forest revealed its endorsement of up to eighteen telescopes on the summit.³¹³ The DEIS made little mention of mitigation measures for the squirrel population other than suggesting that a support building could be relocated outside of squirrel habitat and telescope platforms could be modified to reduce clear-cutting at the summit.³¹⁴

Because the UA had not prepared its own DEIS and the Forest Service DEIS was issued before studies of the red squirrel population were available to inform the recommendation, outraged conservationists accused UA and the Forest Service of rushing the proposal process and failing to outline a comprehensive long-term plan to ensure the survival of the red squirrel. Like their counterparts at Mauna Kea, who had been contending with charges of environmental insensitivity for a decade by the time the MGIO was proposed, Mt. Graham astronomers vehemently denied the anti-environment characterization. To counter this charge, one Mt. Graham astronomer borrowed from environmentalist discourse by explaining that observatories were an “endangered species” that could soon become “extinct” if sites like Mt. Graham were not developed.³¹⁵ Environmentalists in turn issued their own counter-narratives that the

from a participant opposed to telescope development, see Peter Warshall, “The Biopolitics of the Mt. Graham Red Squirrel (*Tamiasciurus hudsonicus grahamensis*),” *Conservation Biology* 8 (1994): 977-988.

³¹³ See Draft Environmental Impact Statement, Proposed Mt. Graham Astrophysical Area; Pinaleno Mountains, Graham County, Arizona. USDA Forest Service, Coronado National Forest. 1985.

³¹⁴ Ibid.

³¹⁵ In his essay on the need to build an observatory on Mt. Graham, astronomer Nick Woolf wrote “Observatories are an endangered species. The observatories of the last century, largely built in cities,

mountains were “pristine” environments despoiled by telescope construction, which astronomers actively sought to discredit by pointing out the history of recreational and industrial uses of the mountains.³¹⁶

Moving beyond the rhetoric of astronomy as a clean, environmentally-friendly science, astronomers also actively responded to the environmentalist criticism by funding monitoring programs for the Wēkiu bug at Mauna Kea and the red squirrel at Mt. Graham. Astronomers at both sites asserted that they were making a serious effort to respond to environmentalist concerns by outlining detailed mitigation plans for the rare and endangered bug and squirrel populations at Mauna Kea and Mt. Graham, respectively. Environmental advocates at both sites deemed the mitigation plans woefully inadequate and pushed observatory planners to prepare more rigorous Environmental Impact Statements, sparking vigorous public debates that played out at town hall meetings and in local newspapers.

Environmentalist Opposition at Mauna Kea and Mt. Graham: a Radical Difference

On the surface, the controversies at Mauna Kea and Mt. Graham appear strikingly similar: the mountain site was valued by astronomers as an “ideal” observing site and by environmentalists who valued the mountain as a “pristine” and vulnerable ecosystem. The summits of both mountains are home to a rare and threatened species found nowhere else in the world, and telescope proposals incited environmentalist opposition. In turn, astronomers

have become extinct...” See Nick Woolf, “An Observatory for Mt. Graham,” unpublished essay. July 1985. Courtesy of Doug Officer.

³¹⁶ Activist publications and letters to the editor in local newspapers from this period contain multiple references to Mt. Graham’s “pristine” environment. See, for example, Jeff Thompson, “Delighted by UA’s troubles,” *The Eastern Arizona Courier*. 04 November 1992. Astronomers frequently wrote letters to local newspapers during the peak of the controversy to dispute the notion that Mt. Graham was a pristine environment. The University of Arizona even issued a fact sheet addressing the ‘pristine’ argument in 1989. See “Myths and Facts About Mount Graham,” Fall 1989. John J. Rhodes III Papers, Arizona State University Libraries: Arizona Collection. Box 58, folder 7.

were put on the defensive and sought new ways to demonstrate that constructing telescopes was in the best interests of the environment and the community. Both controversies underscored tensions between different ways of knowing ranging from the divergent epistemologies of astronomers and conservation biologists to the divide between western and Native religious beliefs. However, the similarities in these episodes of conflict begin to break down profoundly when considering the magnitude of environmentalist resistance at Mt. Graham and the measures taken by astronomers to combat the environmental obstacles to building the observatory.

Like the other communities considered in this dissertation, I do not treat “environmentalists” as a homogeneous group, and their actions must be understood as a product of place and time. Environmentalist resistance at Mt. Graham assumed a decidedly different form than the Sierra Club and Audubon Society protests over the Mauna Kea observatories. Although local opposition to the MGIO included Arizona chapters of the Sierra Club, the Audubon Society, and many other mainstream nonprofit environmental groups, the style of protest was colored by the involvement of the more radical environmentalist group Earth First! Earth First! was founded in New Mexico in 1980 as an alternative to mainstream environmental advocacy groups, and its founders sought to incorporate the “monkeywrenching” style of industrial sabotage into environmental justice campaigns.³¹⁷ Earth First! activists were already tied to the Southwest, and the environmental issues surrounding telescope construction at Mt. Graham presented an ideal vehicle for displaying this new style of “ecodefense.”

³¹⁷ See David Foreman, *Ecodefense: A Field Guide to Monkeywrenching* (Tucson: Ned Ludd Books, 1981); Christopher Manes, *Green Rage: Radical Environmentalism and the Unmaking of Civilization* (Boston: Little, Brown, 1990); Rik Scarce, *Eco-Warriors: Understanding the Radical Environmental Movement* (Walnut Creek, CA: Left Coast Press, 2006); Susan Zakin, *Coyotes and Town Dogs: Earth First! and the Environmental Movement* (New York, NY: Viking, 1993).

Joined by UA students and members of other environmental groups, Earth First! led dramatic protests against the observatory that ranged from public rallies on the UA campus to storming informational meetings held by astronomers or blocking the access road to the summit.³¹⁸ The Canada-France-Hawaii Telescope had been built on Mauna Kea without delay over the objections of Sierra Club and Audubon Society members, who made their opinions known at public meetings and letters of protest, indicating that the environmental challenge to the Mauna Kea observatories was not yet a major obstacle for the astronomy community in the 1970s. By contrast, the listing of the Mt. Graham Red Squirrel as an endangered species in 1987 gave environmental activists sufficient ammunition to threaten litigation that would bring telescope construction to a complete halt, and the style of resistance was more threatening and far-reaching than that encountered by Mauna Kea astronomers.³¹⁹ By saturating Arizona newspapers with narratives about the mountain's "pristine" state and the impending decimation of the endangered red squirrel population following telescope construction, environmentalists succeeded in polarizing the local community of students and concerned members of the public far more rapidly than Mauna Kea activists.

³¹⁸ As described in chapter six, one of the most dramatic protests took place on Columbus Day 1992, when Native Americans, environmentalists, and students stormed the Steward Observatory on the campus of the University of Arizona to protest the 500th anniversary of the arrival of Columbus in North America by blocking the Steward Observatory lobby to show their outrage over the proposed Columbus Telescope at MGIO. See David L. Tiebel, "Dropped gun ends undercover operation at UA: the Tucson Police Department was asked to monitor the Columbus Day protest," *Tucson Citizen*. 07 November 1992; Jason Auslander, "KVOA, 'Wildcat' receive subpoenas," *Arizona Daily Wildcat*. 02 November 1992. Another protest that could not easily be overlooked by astronomers took place on the day of the dedication for the Vatican Advanced Technology Telescope in 1993, when protesters chained themselves to cattle guards on the main access road to the summit of Mt. Graham. See John Dougherty, "Making a Mountain into a Starbase: The Long, Bitter Battle Over Mt. Graham," *High Country News*. 24 July 1995; Tim McCarthy, "Protest Delays Debut of Vatican Telescope," *National Catholic Reporter*. 01 October 1993.

³¹⁹ See Federal Register 21 May 1986, 51 FR 18630-18634. Proposed Determination of End. Status & Crit. Hab. for Mount Graham Red Squirrel; Federal Register, 03 June 1987, 52 FR 20994- 20999. Determination of End. Status for Mount Graham Red Squirrel.

After the red squirrel became a federally recognized endangered species, Mt. Graham astronomers were convinced that the observatory project was in serious jeopardy.³²⁰ American astronomers were in a heated contest to build the world's biggest telescope in the 1980s, and Mauna Kea was quickly proving to be the most desirable observing site for the proposed 15-meter National New Technology Telescope (NNTT), but UA hoped to secure the colossal telescope for Mt. Graham.³²¹ Within this climate of intense competition between the Arizona and Hawai'i astronomy communities, any uncertainty about the potential to develop the Mt. Graham site could cost the Arizona astronomy community the much-coveted NNTT. Facing years of delays in construction due to the mandatory long-term studies on the squirrel population at the summit, UA astronomers solicited the political intervention of the Arizona Congressional delegation. Their efforts resulted in a rider attached to the 1988 Arizona-Idaho Conservation Act (AICA), which instantly rendered the conditions of the ESA and the NEPA fulfilled with no further studies required. Effectively, this act permitted three telescopes to be constructed on Mt. Graham immediately, and up to four additional telescopes could be constructed after an environmental impact study showed no significant impact on the Mt. Graham red squirrel.³²² It was a major win for the Mt. Graham astronomy community, and a devastating blow to the environmental groups who had campaigned against telescope

³²⁰ Voluminous correspondence between members of Mt. Graham astronomy community and the UA administration indicate that astronomers and observatory planners were well-informed about the potential ramifications of listing the squirrel as an endangered species. For example, UA President Henry Koffler sent a letter to the Fish and Wildlife Service urging the agency to consider alternatives to listing the red squirrel as an endangered species in 1986. See Correspondence, UA President Henry Koffler to USFWS Regional Director Michael Spear. 21 July 1986. Courtesy of Doug Officer. In August 1986, University of Arizona Vice President for Research Laurel Wilkening attended a public hearing about the proposed listing of the squirrel and asked the USFWS to halt the listing process that would lead to the endangered designation. See Jim Erickson, "UA asks U.S. to drop rare squirrel from endangered list," *The Arizona Daily Star*. 27 August 1986.

³²¹ See Carl A. Posey, NOAO Press Release 84-21, "Site evaluation under way for Giant Telescope." 01 August 1984. Courtesy of Doug Officer.

³²² S. 2840 (100th): Arizona-Idaho Conservation Act of 1988.

construction. Federal law was no longer at odds with the MGIO; it was suddenly facilitating the observatory project.

However, the observatory's victory was fleeting because the Sierra Club Legal Defense Fund sued to stop telescope construction in 1989 on the grounds that AICA was unconstitutional, bringing the project to a standstill while the lawsuit was reviewed.³²³ It was a costly delay for the Mt. Graham astronomy community, both financially and in terms of prestige. The UA was obligated to honor construction contracts whether construction took place or not, and the delay further damaged relations between the UA and the Ohio State University (OSU), a major financial partner in the observatory. Though the Sierra Club lawsuit was dismissed the following year, environmentalists had succeeded in delaying the project temporarily and inadvertently sowed the seeds for the withdrawal of OSU from the MGIO. Mt. Graham astronomers had been given the green light to proceed with construction in 1990, but by then, the astronomy community was grappling with a new claim on the mountain.

Defending the sacred at Mt. Graham

An allied group of San Carlos Apaches and environmentalists called the Apache Survival Coalition formed in 1990 to challenge telescope construction on a mountain that was both a

³²³ The history of litigation over the Mt. Graham International Observatory is nearly as long as the observatory itself. The Sierra Club Legal Defense Fund (SCLDF) filed a lawsuit against the U.S. Forest Service (USFS) and the U.S. Fish and Wildlife Service (USFWS) in 1989 to stop telescope construction on the grounds that AICA was unconstitutional and the UA subsequently became involved as a co-defendant. Following a 1990 ruling by the Tucson District Court in favor of the UA, the USFS, and the USFWS on seven of the nine claims filed in the Sierra Club lawsuit, the SCLDF appealed the ruling to the Ninth U.S. Circuit Court of Appeals. The District Court ruling was upheld, and that same year, the Tucson District Court granted a summary judgment to the UA and the federal agencies on the remaining two claims, resulting in another appeal to the Ninth Circuit, which upheld the District Court's ruling once again. The nonprofit organization called the Apache Survival Coalition also sued the USFS in 1991 to stop telescope construction, but this suit was dismissed in 1992 by the Phoenix U.S. District Court, a decision that was upheld by the Ninth Circuit in 1994.

“sacred ecosystem” and sacred to the Apaches.³²⁴ Mt. Graham astronomers were “blindsided” by the news that the mountain was sacred to the Apaches since the tribe had been sent a letter announcing the plans to build the observatory five years earlier. During five years of the ensuing highly visible public debate about the observatory, no Apaches had come forward to oppose the telescopes. Even if the Apaches contested the receipt of the letter, surely the tribe had been made aware of the plans to develop the summit for astronomy since then, astronomers reasoned. So why had members of the Native community remained silent about telescope construction on their sacred mountain for so many years? It was a question that would be echoed by Mauna Kea astronomers in just a few years, and KPNO astronomers would also express the same sentiment in the wake of the VERITAS controversy of 2005.

The San Carlos Apache Tribal Council passed a resolution in 1990 opposing the telescopes at Mt. Graham with the warning that the tribe was prepared to defend “its constitutional rights,” a bold declaration of political agency derived from the indigenous rights movements that had been gaining momentum for the past twenty years.³²⁵ When compared with the decades-long gap between observatory proposal and indigenous opposition at the other two sites, the San Carlos Apaches’ announcement of Mt. Graham’s sacredness came relatively quickly after the MGIO plans were made public. The astronomy community was suspicious of the new cultural claim on the mountain, however, since the timing coincided with the expected defeat of the Sierra Club lawsuit. As discussed in chapter six, some astronomers

³²⁴ Handouts published urged concerned citizens to save the sacred ecosystem and sacred mountain. See “Mt. Graham: Sacred Mountain—Sacred Ecosystem Background Information.” 25 May 1993. Betsy Brandt Papers, Arizona State University USM-837.

³²⁵ San Carlos Apache Tribal Council Resolution 90-68. The Tribal Council’s Resolution may have been issued in response to the Resolution endorsing the MGIO by the American Astronomical Society the previous month.³²⁵ See “Resolution Passed Unanimously By the Council of the American Astronomical Society, June 9, 1990.” John J. Rhodes III Papers, Arizona State University Libraries: Arizona Collection. Box 58, Folder 3.

and their political supporters believed the Apaches were being manipulated by environmentalists, a charge dismissed by Apaches as a paternalistic denial of agency by colonialist powers.³²⁶

Because Mt. Graham astronomers doubted that that the tribe had continuously used the summit for religious purposes, tribal members in the Apache Survival Coalition found it necessary to prove that the mountain had always been sacred. At Kitt Peak and Mauna Kea, Native groups also struggled to establish the enduring spiritual significance of the mountain to cultural practitioners, but the historical value of the mountain as a sacred site was never in question. In order to pursue a religious claim on Mt. Graham, the San Carlos Apaches would first have to demonstrate that the mountain was historically valued as a sacred peak, a difficulty compounded by the fact that the tribe had no legal right to the land. While Kitt Peak is squarely located on the Tohono O’odham reservation and Mauna Kea is part of ceded land held in trust for the Hawaiian people, the Apaches’ association with Mt. Graham was less obvious to tribal outsiders at the time of the observatory proposal.

The historical continuity of the Apaches’ relationship with Mt. Graham had been disrupted by the federal government when the Apaches were forced off a traditional territory that encompassed Mt. Graham in the late nineteenth century. Further, since Apache religious

³²⁶ Astronomer Nick Woolf called the relationship between Apaches and environmentalists “a disguise of convenience.” See Nick Woolf, “Record distorted,” Letter to the Editor. *The Arizona Daily Star*. 01 December 1991. The theory that Apaches were being used by environmentalists was also advanced by Father Charles W. Polzer, curator of ethnohistory at the Arizona State Museum on the University of Arizona campus. Polzer wrote Arizona Governor Fife Symington alleging that “no Apache bothered to take up this cause until non-Indians coaxed certain long-term political dissidents to block construction of the telescope.” Polzer, quoted in Jim Erickson “Mt. Graham is ‘sacred’ to Apaches, spiritual leader says. But ex-tribal chairman cites opposing viewpoint,” *The Arizona Daily Star*. 28 March 1992. Members of the Arizona Congressional delegation even weighed in on the theory that Apaches were being manipulated by environmentalists. In a memo from Congressman John J. Rhodes III to his assistant, Rhodes noted that two members of the Apache Survival Coalition were environmentalist leaders and remarked that this was “further evidence the enviros are using the Tribe to some extent.” Rhodes, quoted in John J. Rhodes III to Jim Huska. Memorandum. 24 June 1992. John J. Rhodes III Papers, Arizona State University Libraries: Arizona Collection. Box 58, folder 1.

rituals were designed to leave the mountain in an undisturbed state, there was little physical evidence to validate the claim that the summit was a sacred site.³²⁷ Providing documentary evidence of Mt. Graham's sacred attributes was also challenging for the San Carlos Apaches because the tribe's religious practices were verified through oral traditions, and Apaches were extremely reluctant to disclose the details of their spiritual practices to outsiders. Prior to the Mt. Graham controversy, the Apaches closely guarded tribal knowledge from outsiders to protect the tribe from exploitation. Maintaining secrecy about their religious customs was so important for the Apaches that even outsiders recruited by the Apache Survival Coalition to help the tribe establish that the mountain had been sacred "since time immemorial" were not informed about all the sacred attributes of Mt. Graham. Anthropologists enlisted to conduct archival research for the tribe in a 1991 Apache Survival Coalition lawsuit to stop telescope construction noted in their legal testimony that their knowledge was limited because the Apaches were unwilling to share certain spiritual information.³²⁸

Despite these efforts to persuade the astronomy community of Mt. Graham's sacredness, which required the San Carlos Apaches to set aside long-honored cultural proscriptions on disclosing spiritual knowledge beyond the tribe, astronomers remained skeptical. Tensions between astronomers and Apaches escalated when Vatican Observatory Director Father George Coyne openly denounced the legitimacy of Apache religious practices in

³²⁷ Elizabeth Brandt articulates the challenges of providing evidence to support the claim that Mt. Graham was historically significant to the Apaches as a religious site in an article that characterizes the conflict as a "David and Goliath" scenario. See Elizabeth Brandt, "The Fight for Dzil Ncha Si An, Mt. Graham: Apaches and Astrophysical Development in Arizona," *Cultural Survival Quarterly* 19 (1996), p. 50.

³²⁸ Anthropologists Elizabeth Brandt Keith Basso were asked by Apache Survival Coalition leader Ola Cassadore Davis to use their anthropological expertise to document the Apache's use of Mt. Graham, and Brandt noted that some of the sacred attributes of the mountain were known only to certain spiritual leaders in the tribe and such information could not be revealed to outsiders. See Brandt, "The Fight for Dzil Ncha Si An," p. 50.

a 1992 statement on behalf of the UA and the Vatican.³²⁹ In his statement denying Apache spiritual beliefs, Coyne also positioned the Mt. Graham astronomy community as spiritually connected to the mountain through the pursuit of science, a rhetorical strategy that was later employed by astronomers at Mauna Kea in responses to Native Hawaiian opposition.³³⁰ Some Apaches affirmed Father Coyne's allegation that the Apaches had never been historically and culturally tied to Mt. Graham, and their support of the observatory project generated deep fault lines within the tribal community.³³¹ But for other Apaches, Coyne's comments marked the beginning of a 'holy war' between the Vatican and the Apaches, and narratives depicting the MGIO as a colonialist project soon began to surface in activist literature.³³² These colonialist narratives were also fueled by outrage over the decision to name the largest telescope on Mt.

³²⁹ Father George Coyne S.J. Vatican Observatory Research Group, Steward Observatory, The University of Arizona. "Statement of the Vatican Observatory on the Mount Graham International Observatory and American Indian Peoples." 05 March 1992, p. 6-7.

³³⁰ Coyne believed "responsible and legitimate use of the land enhances its sacred character," a sentiment similar to University of Hawai'i at Hilo astronomer Michael West's insistence that the cultural practice of astronomy was "a spiritual quest." See Coyne, "Statement of the Vatican Observatory on the Mount Graham International Observatory and American Indian Peoples," p. 6; Michael West, "There's room for everybody on Mauna Kea," *The Honolulu Advertiser*. 17 February 2003.

³³¹ A group of Apaches publicly supported the MGIO, stating that it would bring economic and educational benefits to the tribe in their testimony on behalf of the UA. This delegation of pro-telescope Apaches was sent to the Vatican to meet with Pope John Paul II as part of a public relations campaign for the observatory in 1992. Since members of the Apache Survival Coalition had been denied an audience with the Pope on their visit to the Vatican the previous month, Apache activists accused the UA of recruiting Apaches to the telescope cause. See Cindy Wooden, "Pope greets Apaches who support Mount Graham telescope project," *The Catholic Sun*. 02 July 1992; Buck Kitcheyan, "Testimony Before Arizona Board of Regents, Mount Graham Open Forum. Friday March 27, 1992. Testimony of Buck Kitcheyan," p. 2-6. John J. Rhodes III Papers, Arizona State University Libraries: Arizona Collection. Box 58, folder 1; Jim Erickson "Mt. Graham is 'sacred' to Apaches, spiritual leader says. But ex-tribal chairman cites opposing viewpoint," *The Arizona Daily Star*. 28 March 1992.

³³² San Carlos Apache tribal spokesman Ernest Victor declared that Coyne's comments represented a war between the Vatican and the Apaches in Laurie Hansen, "Controversy continues over Vatican scope in Arizona," *The Florida Catholic*. 03 April 1992. Arizona State University MSM-512, Mt. Graham International Observatory Collection, 1992. San Carlos Apache councilman John Wesley also described the conflict as an international holy war in George Hardeen, "Religious Freedom for Native People in Jeopardy Again," *The Circle*. July 1992.

Graham *Columbus* as well as the impending celebrations of the 500th anniversary of the arrival of Columbus in North America that year.³³³

Environmentalists and Apaches continued to exercise their political authority to fight telescope construction at Mt. Graham through a series of lawsuits throughout the 1990s, and the controversy received extensive coverage in local newspapers. When the Mt. Graham astronomy community decided to relocate the project site to another region of the summit after studies showed that the original site was inferior, astronomers were publicly scorned on campus and in the local media. The new site was more favorable to telescopes, but it was not exempted from federal laws such as the Endangered Species Act and the National Environmental Policy Act. Wary of facing another series of legal confrontations to secure the new site, UA again drew upon political allies to pass a Congressional rider in 1996 exempting the project site from federal environmental and cultural review.³³⁴

Declaring the sacred at Mauna Kea

Around the time that Mt. Graham astronomers were granted the exemption for the new telescope site, Mauna Kea astronomers were learning of Native Hawaiian opposition to telescope development. As discussed in chapter four, the cultural and political transformations sparked by the Hawaiian Renaissance of the 1970s had matured by the late 1990s into a broad network of sovereignty activists, cultural practitioners, and traditional performing arts groups across the Hawaiian Islands. Native Hawaiians on the Big Island were buoyed by the recent geothermal victories of the 1980s and President Clinton's 1993 Apology Resolution on the 100th

³³³ Colonialist rhetoric in anti-telescope discourse after 1992 is extensive. See chapter six.

³³⁴ Steve Yozwiak, "Mount Graham victory stuns project's foes," *Arizona Republic*. 25 April 1996. The National Congress of American Indians passed a resolution in 1995 expressing its opposition to the rider. See NCAI Resolution DC 93-12. 03 November 1995.

anniversary of the overthrow of the Hawaiian monarchy.³³⁵ After a flurry of new telescope construction on Mauna Kea between 1996-1999, Native Hawaiians were motivated to reveal their objections to the observatories in a series of meetings and protests triggered by the critical 1998 State Audit.³³⁶

Following the charges of mismanaging the mountain's cultural and environmental resources outlined in the 1998 State Audit and the news that Mauna Kea was "still sacred" to Native Hawaiians, astronomers' narratives proved extremely malleable. Astronomers began to produce more inclusive accounts of the mountain's uses that reflected a growing understanding of the multiple ways the mountain was valued, and they sought new definitions of astronomical practice. As I have argued in chapter four, astronomers' narratives after 2000 were largely shaped by the negative response from an allied group of environmentalists and Native Hawaiians. The 2000 Master Plan was the first management plan for the Mauna Kea Science Reserve produced after the Native Hawaiian opposition became public, and it revealed that astronomers had shifted from sterile descriptions of Mauna Kea as an ideal observing site to lengthy acknowledgments of the mountain's spiritual meanings.³³⁷

In the Master Plan and in other sources of astronomers' narratives that followed, astronomy on the mountain was no longer described as beneficial to the residents of the State of Hawai'i only for its economic, scientific, and educational benefits. Telescope and grant

³³⁵ United States Public Law 103-150. 103rd Congress Joint Resolution 19. 23 Nov. 1993.

³³⁶ During this three-year period, the Keck II, Subaru, and Gemini North telescopes were completed on Mauna Kea. The 1998 State Audit concluded that the University of Hawai'i had mismanaged the natural and cultural resources of Mauna Kea for 30 years. See *Audit of the Management of Mauna Kea and the Mauna Kea Science Reserve. A Report to the Governor and the Legislature of the State of Hawaii*. Report No. 98-6 February 1998.

³³⁷ See *Mauna Kea Science Reserve Master Plan*. Adopted by the University of Hawaii Board of Regents on June 16, 2000. Available online at www.hawaii.edu/maunakea. Accessed 29 November 2012.

proposals, promotional materials, and newspaper articles authored by astronomers began to emphasize that astronomy was the same science that once guided Polynesians to the Hawaiian Islands. According to this view, embracing astronomy was not a betrayal of cultural identity; it was an embrace of the same spirit of exploration and discovery that had led to the settlement of the islands in the first place.³³⁸ Astronomers renegotiated their dominant narratives to show that science was not only a cultural practice, but represented the cultural *heritage* of the Native Hawaiians. Astronomers refined their narratives of the centrality of astronomy as both a bridge to the past and future for Native Hawaiians in proposals for educational outreach initiatives.

Hoping that educational outreach would offer a solution to escalating tensions, astronomers became actively involved in astronomy programs targeted at Native Hawaiian youth such as the New Opportunities through Minority Initiatives in Space Sciences (NOMISS) beginning in 2001.³³⁹ The 'Imiloa astronomy education center opened its doors in 2006, representing the ultimate expression of integration between the values and belief systems driving both Polynesian navigation and modern astronomy.³⁴⁰ 'Imiloa created a unique social and physical trading zone for where astronomers and Native Hawaiians could achieve local agreement about core concepts such as 'origins', 'exploration', and 'discovery.'³⁴¹

³³⁸ See especially *Voices and Visions of Mauna Kea: Mauna Kea Science Reserve Master Plan and Implementation Process Summary*. Prepared by the University of Hawai'i. March 2000. Available at www.hawaii.edu/maunakea. Accessed 29 November 2012.

³³⁹ For a description of the program authored by the co-investigators, see "New Opportunities through Minority Initiatives in Space Science (NOMISS)." *NASA Office of Space Science Education and Public Outreach Conference. ASP Conference Series* 319 (2004): 102-106, p. 102.

³⁴⁰ See Joseph E. Ciotti, "Historical Views on Mauna Kea: From the Vantage Points of Hawaiian Culture and Astronomical Research," *The Hawaiian Journal of History* 45 (2011): 147-166. See also www.imiloahawaii.org. Accessed 02 December 2012.

³⁴¹ During the collaboration between astronomers and Native Hawaiians that led to 'Imiloa, these concepts emerged as critical points of convergence in otherwise disparate cultural worlds, and 'Imiloa was

The narratives linking Polynesian navigation and modern astronomy were accepted by some Native Hawaiians who became park rangers at the mountain, served on the Office of Mauna Kea Management Board as cultural experts, or accepted positions at 'Imiloa, though most expressed feelings of internal conflict over their decision to support astronomy on Mauna Kea. Other Native Hawaiians were insulted by the comparison between their Polynesian ancestors and present-day astronomers, pointing out that navigation by naked eye observation of the stars left the mountains undisturbed.³⁴² Rejecting the astronomy community's attempts to narrow the cultural divide, a group of Native Hawaiian activists joined with environmentalists to fight the proposed Keck Outriggers through a contested case in 2002.³⁴³

The Keck Outrigger contested case highlighted the tensions between the astronomy and Native Hawaiian communities, but there were also signs that many members of both groups were invested in reconciling their differences. When the Keck Outrigger contested case hearings began in 2002, construction for 'Imiloa was just underway and NOMISS was already in its second year. Whether articulated in the testimony offered by astronomers in the contested case, the 'Imiloa mission statement, or the NOMISS grant proposal, astronomers' narratives consistently referenced direct engagement with members of the Native Hawaiian community. Native voices were gaining representation in the astronomy community, and sustained interactions facilitated by NOMISS and 'Imiloa prompted many astronomers to renegotiate their scientific narratives in order to better accommodate traditional Native Hawaiian beliefs. Even as the alliance of Native Hawaiians and environmentalists involved in the Keck Outrigger case awaited a decision that

designed to communicate the commonalities between modern astronomy and early Hawaiian navigation and star knowledge. See Ciotti, "Historical Views on Mauna Kea," 102-106.

³⁴² Interview with Paul K. Neves. 17 September 2012.

³⁴³ DLNR File No. HA-02-06.

would limit telescope development, other Native Hawaiian groups were tentatively developing new means of communicating and collaborating with astronomers.

‘Columbus’ Conquers Mt. Graham: a New Observatory, an Old Narrative

Communication and collaboration with astronomers seemed to be out of reach in 2002 for the allied group of San Carlos Apaches and environmentalists who had campaigned against telescope construction on Mt. Graham for over a decade. That year, the Apache Survival Coalition (ASC) was forced to accept that its efforts to thwart telescope construction had failed. The Vatican Advanced Technology Telescope and Germany’s Submillimeter telescope were already operational on Mt. Graham, and construction was now beginning on the Columbus telescope, which had been renamed the Large Binocular Telescope (LBT) in 1993 as a gesture to the Apaches.³⁴⁴ The MGIO would finally come to fruition, but it bore little resemblance to the observatory originally envisioned by UA astronomers and their partners in the early 1980s. The long battle to build an observatory on a mountain held to be both environmentally and culturally significant had resulted in significant scientific and social casualties for the MGIO. Due to litigation-induced delays and concerns about public image, several potential partners declined to fund MGIO, including Ohio State University (which later rejoined the project due to contractual obligations) the University of Pittsburgh, and others.³⁴⁵

³⁴⁴ Carol J. Waterman, “Name change a weak response,” *Tucson Citizen* 16 June 1993; Nicole Greason, “Telescope renamed at Apaches’ request,” *Tucson Citizen*. 29 April 1993.

³⁴⁵ Due to the negative public backlash about their involvement in the MGIO, OSU, the University of Virginia, and the University of Minnesota found it necessary to issue ‘fact sheets’ to dispel common “myths” about the environmental and cultural impact of building the observatory on Mt. Graham. See, for example, *Mt. Graham and the Large Binocular Telescope (LBT) Fact Sheet*, The Ohio State University Department of Astronomy. Available at www.astronomy.ohio-state.edu/LBT/facts.html. Accessed 06 July 2010; *University of Virginia Astronomy Department Fact Sheet*, 18 October 2001. available at http://www.mountgraham.org/old-site/WhitePapers/VArebuttal.html#_ftn1. Accessed 09 December 2012; *University of Minnesota Astronomy Department 2001 Mt. Graham Position Paper*, Dr. Leonard Kuhi, Chair, Department of Astronomy, available at <http://www.mountgraham.org/old-site/mnastropos.html>. Accessed 06 July 2010.

Budget shortfalls for the project meant that the world-class binocular telescope would initially be operating as a monocular telescope, but the MGIO was required to allocate some of its annual budget to fund a long-term squirrel monitoring program for the life of the observatory. After facing a series of legal and political hurdles to secure the first three telescopes on the mountain, it was unlikely that the observatory would be able to attract other partners to fund additional telescopes, and any new telescopes would be subject to the standard process of cultural and environmental review.

From the 1982 proposal for a “Mt. Graham Astrophysical Area” to publications authored by astronomers in recent years, astronomers’ narratives about the value of astronomy and the use of Mt. Graham as an observing site have remained fairly static. With the exception of defending astronomy as an environmentally friendly, “clean” industry and Father Coyne’s claim that astronomy was also a form of religion, astronomers’ narratives throughout the Mt. Graham controversy were remarkably consistent: astronomy was an inherently valuable practice, and Mt. Graham was a mountain that should serve astronomical interests.

The narratives issued by Mt. Graham astronomers in 1982 may not have deviated substantially from the narratives issued in 2012, but they are still historical artifacts that provide insight into how astronomers conceived of their scientific identities and their relationship to other stakeholders in the mountain during this period. At the outset of the project, Mt. Graham astronomers were harassed by radical environmental activists and had to respond to some of their allegations, but astronomers were nonetheless able to obtain Congressional riders in 1988 and 1996 to circumvent federal cultural and environmental protection laws that stood in the way of telescope construction. Since the Apaches did not have legal ownership and control of Mt. Graham, bypassing federal oversight in this way effectively meant astronomers were freed

from the task of persuading the Apaches that the observatory benefited the tribe. Consequently, astronomers never modified their narrative strategies in order to demonstrate that the observatory was compatible with Apache religion or to justify astronomy as a modern incarnation of the detailed celestial knowledge possessed by early Apaches. In addition, Father Coyne's dismissal of Apache spiritual beliefs and the astronomy community's demand for physical evidence linking Apaches to the summit of Mt. Graham drove a wedge between the Native and scientific communities at Mt. Graham that has no analog at the other two sites of conflict. At Mauna Kea, directly engaging with the Native Hawaiian community led astronomers to expand their narratives about the role of astronomy and the significance of the mountain. At Mt. Graham, the strained relations between the astronomy community and the Apaches have been a major obstacle to entering into the kind of sustained interactions that might have served as the catalyst for astronomers to renegotiate their narratives about the mountain. Public outreach with the tribe was provided for in the Final EIS for the MGIO, but Mt. Graham astronomers had little reason to reach out to the Apache communities because extending an olive branch would likely have necessitated validating that Mt. Graham was a sacred site.³⁴⁶

Thus for political and social reasons, Mt. Graham astronomers continued to envision themselves not as public outreach figures who worked on a mountain that was also valued for its natural and cultural resources, but primarily as taking part in a valuable scientific enterprise on a mountain that was best suited for astronomy. The intransigence of this narrative both contributed to and reflected the absence of trading zones at Mt. Graham. The relationship between the mutability of astronomers' narratives and the formation of trading zones becomes

³⁴⁶ Offers by the UA to provide astronomy outreach to the Apaches were dismissed as a "bribe" by some Apache elders, while such outreach was welcomed at Kitt Peak and Mauna Kea.

even clearer when comparing the physical, social, and digital domains of Mt. Graham, Kitt Peak, and Mauna Kea.

Narratives and Trading Zones

Because the Mt. Graham astronomy community has never acknowledged the sacredness of Mt. Graham to the Apaches, visitors to MGIO do not confront the same kinds of visual and social clues to the mountain's sacred status that are found at Kitt Peak and Mauna Kea. At the Mt. Graham Visitor Center, references to the San Carlos Apaches are conspicuously absent from the display cases when compared to the Visitor's Centers of KPNO and Mauna Kea, where western and Native knowledge has been carefully integrated into the exhibit spaces in a way that does not privilege one system of knowledge over the other.³⁴⁷ Though the KPNO astronomers and the Tohono O'odham Nation lack the equivalent of an 'Imiloa-style gathering place, the KPNO Visitor Center and Mauna Kea Visitor Center both serve as an informal locus of exchange between astronomers and Native communities. These Visitor Centers host regular astronomy outreach events for the Native communities associated with the mountains, and KPNO and Mauna Kea Visitor Centers both offer preferential employment to members of the Native population.

As described in previous chapters, the summits of Kitt Peak and Mauna Kea are marked by artwork and signage to clearly indicate that native groups are stakeholders in the mountain. At the summit of Mt. Graham, there is no indication that this mountain is significant to the Apaches other than a small placard near the entry gate reminding visitors to "respect this place."³⁴⁸ Docents lead tours of the observatories on all three mountains, and KPNO and Mauna

³⁴⁷ For more details about the Visitor's Centers at Kitt Peak, Mauna Kea, and Mt. Graham, see my analysis in chapters two, four, and six.

Kea guides are trained to highlight cultural and religious information to ensure that tourists are respectful of the mountain's most sacred areas. The MGIO tour guides take a more casual approach, discussing the spiritual value of the mountain to the Apaches if specific questions about Apache religion are raised by members of the tour group.³⁴⁹ The lack of representation of Apache spiritual narratives at the physical sites associated with MGIO is mirrored in the observatory's online presence. Online, a section of the website called "A Long Time Ago..." points visitors to "A Little Bit of History" that discusses the naming of Mt. Graham in 1846 with no reference to the Apache's name for the mountain, *Dzil Nchaa Si An*. The webpage, last modified on 16 October 2012, then traces the history of land use on Mt. Graham from the late-nineteenth century to its current uses without any mention of the Apaches, who lost Mt. Graham as part of their reservation in 1873.³⁵⁰ The individual websites for the three telescopes that form the MGIO also fail to make reference to the Apaches, with the exception of Father Coyne's position papers denouncing the Apaches' religious claim to Mt. Graham on the Vatican Observatory website, which administers the Vatican Advanced Technology Telescope at Mt. Graham.³⁵¹ The debate over the observatory's impact on the red squirrel receives somewhat more attention in the "Environmental Issues" section of the main MGIO website, which

³⁴⁸ The sign informs visitors that "this area is considered sacred by several Native American tribes, including the White Mountain Apache and San Carlos Apache, and is a precious and irreplaceable part of our national heritage. Please do not disturb this beautiful mountain's natural and cultural objects. Their removal, destruction, or defacement is prohibited by federal law."

³⁴⁹ Correspondence with Paul R. Anger. 05 April 2013.

³⁵⁰ "A little bit of history," MGIO website. <http://mgio.arizona.edu/History%20and%20Issues%20Index.htm>. Accessed 20 December 2012.

³⁵¹ George V. Coyne, S.J., Director, Vatican Observatory. Statement on MGIO and American Indian Peoples, Thursday 05 March 1992. www.vaticanobservatory.org/index.php?option=com_content&view=article&id=105. Accessed 20 December 2012. See also the Submillimeter Telescope page on the Arizona Radio Observatory homepage. Available at "Arizona Radio Observatory." <http://aro.as.arizona.edu/index.htm>. Accessed 20 December 2012.

summarizes the UA's squirrel monitoring results since 1989. Though the webpage does not specifically address the concern that the observatory might pose a risk to the squirrel population, it does conclude that "There are no signs of any effect of the observatory construction on the red squirrel."³⁵²

By contrast, the Institute for Astronomy's Mauna Kea Observatories website discusses Hawaiian cultural beliefs and the protection of environmentally sensitive habitat head-on as "deeply rooted concerns" of the community that have been addressed by the Mauna Kea 2000 Master Plan.³⁵³ Many of the websites for individual telescopes on Mauna Kea provide additional information about the cultural and environmental issues on Mauna Kea. Similarly, the KPNO website offers a virtual tour that begins with a "History" section that openly acknowledges the sacredness of the mountain to the Tohono O'odham Nation.³⁵⁴ In the midst of the Very Energetic Radiation Imaging Telescope Array System (VERITAS) lawsuit, the KPNO newsletter plainly described Kitt Peak's historical and present value to the Tohono O'odham:

The Tohono O'odham name for the mountain is Iolkam, and it has been used for much longer than 76 years. The mountain is of great cultural significance to the people of the Tohono O'odham Nation and is sacred to them. Astronomers are fortunate to be able to operate our observatories on land leased from the Nation by the National Science Foundation (NSF) since 1958.³⁵⁵

The newsletter continued, "Independent of the discussions regarding VERITAS, we are working to improve communication between the observatory and the O'odham people. We want all of

³⁵² See "Environmental Issues," MGIO website. <http://mgio.arizona.edu/Environment.htm>. Accessed 20 December 2012.

³⁵³ See www.ifa.hawaii.edu. Accessed 20 December 2012.

³⁵⁴ "The Kitt Peak Virtual Tour," Kitt Peak National Observatory: Tohono O'odham. http://www.noao.edu/outreach/kptour/kpno_tohono.html. Accessed 11 Oct 2011.

³⁵⁵ Buell T. Jannuzi and Jeremy Mould, "The Tohono O'odham Nation, the NSF, VERITAS, and Kitt Peak National Observatory," *KPNO/Kitt Peak*. June 2006, p.30.

the citizens of the Tohono O’odham Nation to understand that we respect and acknowledge how important the mountain is to them as a sacred cultural site. We want them to know that they continue to have full access to all of the land they have shared with the world for the purpose of exploring the Universe.”³⁵⁶ The MGIO stands apart from the other observatories for its lack of a social, physical, or digital space for astronomers and Apaches to open up the kind of dialogue that has been an integral part of the journey toward reconciliation at other sites.

Still, even successful astronomy outreach and culturally inclusive museum displays cannot fully mediate the tensions between scientific and indigenous communities, as these chapters have shown. Astronomers’ narratives about Kitt Peak’s relationship to the Tohono O’odham during the VERITAS conflict indeed reflect open acknowledgement of the mountain’s sacredness. However, the fact that the lawsuit was filed in the first place makes it clear that accommodating different spiritual constructions of the mountain was insufficient from the tribe’s perspective. After nearly fifty years of amicable relations, astronomers at KPNO were shocked when the Tohono O’odham Nation filed a lawsuit against KPNO, the NSF, and the Smithsonian Institution Astrophysical Observatory to halt construction of the seven-telescope VERITAS project in 2005.³⁵⁷

Reclaiming the sacred at Kitt Peak National Observatory

To many KNPO astronomers, the Tohono O’odham Nation’s accusations of sovereignty violations and demands to revisit the lease terms were confusing and hurtful after so many years of working to integrate the cultures of astronomy and the O’odham at the Visitor Center and on other parts of the reservation. Astronomers may have felt blindsided by the sudden of

³⁵⁶ Jannuzi and Mould, p. 31.

³⁵⁷ Tohono O’odham Nation Resolution 6-808, p. 1; Brenda Norrell, “Lawsuit to Halt Kitt Peak Telescopes Filed,” 11 April 2005. *Indian Country Today*.

the lawsuit against VERITAS, but the timing of Tohono O'odham opposition was related to slowly unfolding internal tribal developments as well as the external growth of indigenous rights movements over the second half of the twentieth century.

The American Indian Movement (AIM) did not surface until well over a decade after the lease was signed by the Papago Tribal Council in 1958. After the 'Red Power' movements gained momentum in the 1970s and 1980s, the Papago reclaimed their ancestral name 'Tohono O'odham' and adopted a new tribal constitution.³⁵⁸ In the years that followed, there were isolated incidents of conflict between Tohono O'odham and the KPNO astronomy community that indicated the relationship was deteriorating.³⁵⁹ However, it was not until site preparation for the VERITAS project was initiated on a 25-acre region of Kitt Peak without Tohono O'odham consultation that the tribe took decisive action by filing a lawsuit. The VERITAS controversy became a vehicle for the Tohono O'odham to voice their objections to other telescopes on Kitt Peak, and although the NSF had already spent \$1 million on groundbreaking and EIS preparation, the site was eventually abandoned.³⁶⁰ Similar to the lag in Native opposition to telescopes at Mauna Kea and Mt. Graham, the long-delayed opposition of the Tohono O'odham to the telescopes on Kitt Peak is less mystifying within the context of a history of cultural

³⁵⁸ Constitution of the Tohono O'odham Nation. 18 January 1986.

³⁵⁹ Aside from isolated reports of disgruntled Tohono O'odham Nation workers at KPNO, the most substantive indication of the tribe's dissatisfaction with the observatory came in 1998, when Schuk Toak district chairwoman Frances Francisco called for a reappraisal of the lease terms. See Anne T. Denogean, "Fresh look at Kitt Peak Lease proposed," *The Tucson Citizen*. 16 November 1998.

³⁶⁰ Though the grounds of the O'odham lawsuit were rendered moot when the NSF voluntarily suspended construction activities, the Section 106 National Historic Preservation Act consultation report determined that construction had an "adverse effect" on Kitt Peak. See Resolution of the Tohono O'odham Legislative Council (The Tohono O'odham Nation's Position Regarding Further Construction on Ioligam Doag (Kitt Peak), Resolution No. 06-806. 07 December 2006, p. 2. When the Advisory Council on Historic Preservation (ACHP) released a critical report to the NSF on construction activities for VERITAS, the project leaders decided to relocate the VERITAS array to a less favorable location in southern Arizona. See Nau, John L. III, Susan S. Barnes, and John M. Fowler to Honorable Arden L. Bement, Jr. Advisory Council on Historic Preservation. 23 February 2007, p. 1-3; p. 2.

suppression by the federal government and the slow rise of the indigenous rights movement in America.

Colonialist Telescopes in a Postcolonial World?

Both Mauna Kea and Mt. Graham saw environmental opposition soon after being founded due to the strength of the green movement at the time of their founding, but neither observatory saw opposition from indigenous groups until the 1990s, and at Kitt Peak, indigenous resistance did not appear until the 2000s. For astronomers, the long delay in the emergence of indigenous opposition to the observatories at Kitt Peak, Mauna Kea, and Mt. Graham was a puzzle that defied explanation. But as I have argued throughout this dissertation, socioeconomic, cultural, and political factors strongly influenced the timing and form of indigenous resistance. The narratives about the sacredness of each mountain were historically tethered to the rise of indigenous rights movements, the legacies of colonialism, and shifting cultural constraints on divulging spiritual narratives within Native communities.

Each Native community experienced its own cultural renaissance, and in each case, the indigenous groups involved in the controversies over telescope construction did not voice a religious claim on the mountain until indigenous rights movements had gained sufficient political momentum. Scientists at Kitt Peak, Mauna Kea, and Mt. Graham were equally incredulous of the 'sudden' emergence of cultural objections after years of silence, and many members of the astronomy communities perceived colonialist accusations as a far-fetched attempt at stirring public sympathies. However, this dissertation has shown that scientific communities and indigenous communities argued from different understandings of time and place. It is unlikely that astronomers who questioned the timing of indigenous opposition gave much consideration to the slow-grinding gears of the indigenous rights movement in America,

but Native peoples only gained significant legal freedom to assert claims on sacred sites in the late 1990s with President Bill Clinton's Executive Order 13007.³⁶¹ Responding to an astronomer who asked why the Apaches had waited so long to complain about the proposed observatory on Mt. Graham, San Carlos Apache Delores Jordan angrily retorted

He might as well have asked Black people why they waited until 1955 to complain about riding in the back of buses, and getting refused at lunch counters. The terrible laws under which our people were imprisoned for practicing their beliefs or holding ceremonies were not removed until 1934. Our Apache sunrise ceremonies were held in remote areas in the shadow of Mount Graham out of the eyes of government officials up until then. The cultural protection laws that would have protected our sacred mountain did not come to pass until the end of this century.³⁶²

Indigenous groups also faced unique sets of internal and external cultural barriers to divulging the mountain's spiritual value ranging from guarding tribal knowledge from outsiders to gaining sufficient cultural and political agency to confront large, federally-funded institutions. After breaking their silence, proving the mountain was "still sacred" to astronomical interests and the courts became an important mission for Native activists and cultural practitioners who sought protection of current religious practice. But as one Native commentator queried, "How do Native Americans assert political, economic, and cultural rights to non-Indians without having to take a non-Indian approach?"³⁶³ Historian of Native American religion Tracy Leavelle argues that requiring Native peoples to 'prove' their religious claims in court is culturally damaging because "it makes indigenous spiritual practices and sacred places available for neocolonial

³⁶¹ *Executive Order 13007: Indian Sacred Sites*. Federal Register: 29 May 1996 (Volume 61, Number 104). From the Federal Register Online via GPO Access. wais.access.gpo.gov. Accessed 22 September 2010.

³⁶² Delores Jordan, San Carlos Apache Reservation, "Apaches still wait for respect," *Eastern Arizona Courier*. 07 July 1999. Courtesy of Doug Officer.

³⁶³ K.J. Scotta, "What is sacred to Apache must be defined by Apache," *Tucson Citizen*. 03 April 1992. Arizona State University. MSM-512.

enterprises that classify, judge, appropriate, and sometimes destroy Native cultures,” an interpretation affirmed by many Native scholars and activists.³⁶⁴

The charge by Native groups that the efforts to build observatories at Kitt Peak, Mauna Kea, and Mt. Graham represented a new manifestation of colonialism must also be understood within the cultural and historical context of the subjugation of indigenous peoples. Though the connection between colonialist encounters and the observatory was arguably clearer at Mt. Graham than at the other sites due to Father Coyne and Father Polzer’s attacks on Apache religion, the later narratives of the Native Hawaiians and Tohono O’odham also framed the observatory as the perpetuation of colonialism. The prevalence of colonialist rhetoric across all three sites of conflict provides an important clue to the transient cultural identities of these groups as they grappled with the aftermath of a cultural and political rebirth. The Tohono O’odham, Native Hawaiians, and San Carlos Apaches believed building telescopes on sacred peaks was an act of conquest that forfeited the promises of a supposedly postcolonial world. Opposing the observatories was also defying the colonizer, then, and reflected a tension between acknowledging the ongoing insinuation of cultural dispossession and reclaiming cultural identity and political power.

Astronomers who simply could not envision an observatory as an agent of colonialism drew from a perception of the cultural repression of Native peoples as a series of events relegated to the distant past. The historical pattern of interactions between white society and Native peoples seemed wholly irrelevant to astronomers who merely wished to build an astronomical observatory on a suitable site. Yet as this dissertation has demonstrated, the

³⁶⁴ Tracy Leavelle, “The Perils of Pluralism: Colonization and Decolonization in American Indian Religious History,” in Courtney Bender, Pamela Klassen (eds.), *After Pluralism: Reimagining Religious Engagement* (New York: Columbia University Press, 2010): p. 156-177; p. 157. See also comments by noted Standing Rock Sioux activist and scholar Vine Deloria, Jr., quoted in Leavelle, p. 172.

intertwined nature of past and present forms a key link to cultural identity in many Native communities. Indigenous groups sustained a historical memory of “cultural genocide” through oral traditions and still suffered the social and economic consequences of political, social, and cultural disenfranchisement. As Joseph Masco’s study of the cultural meanings of nuclear weapons at Los Alamos National Laboratory powerfully demonstrates, in the collective memory of Native peoples, landscapes are often inseparable from the colonialist agendas visited upon them.³⁶⁵ In other words, for indigenous groups who have never understood themselves as inhabiting a postcolonial world, science was readily viewed as the new conquistador.

Anishinaabekwe activist and scholar Winona LaDuke explains, “A century after Geronimo and his followers gave themselves up to the military at Skeleton Canyon—a long time in the history of a state born so recently, but a short time in the lifespan of the Apache people—the expanding settler community turned a deaf ear and blind eye to the sacredness of Mt. Graham.”³⁶⁶ For Native peoples who relied on oral traditions to trace their history through the millennia, the events of the preceding century constituted recent generational memory and greatly influenced the response to encroachment upon ancestral lands.

Though Father Coyne’s efforts to delegitimize Apache religion certainly betray a colonialist subtext, my analysis of the narratives of other astronomers involved in these controversies does not in any way suggest that the observatories were planned as instruments of conquest. Yet strikingly, all three indigenous communities depicted the observatories as colonialist perpetrators, revealing that the genesis of these controversies lies in the history of

³⁶⁵ Joseph Masco, *The Nuclear Borderlands: The Manhattan Project in Post-Cold War New Mexico* (Princeton: Princeton University Press, 2006).

³⁶⁶ Winona LaDuke, “God, Squirrels, and the Universe: the Mount Graham International Observatory and the University of Arizona,” in *Recovering the Sacred: the Power of Naming and Claiming* (Cambridge, MA: South End Press, 2005): p. 19-32, p. 225.

broken trust between the federal government and Native populations. For the Native communities who value Kitt Peak, Mauna Kea, and Mt. Graham as sacred sites, their struggle has not been a confrontation between science and religion or indigenous and scientific ways of knowing, but a product of shifting hierarchical power structures. In Pi'ilani Smith's statement to University of Hawai'i Board of Regents prior to their vote on the Mauna Kea Science Reserve Master Plan in 2000, she explained

The issue is not the importance of astronomy versus the native world view. This is not the concern. In fact, the real issue is native versus settler, colonizer versus colonized. And that's because the relationships that the native people have to the land are of a power structure that is different from the power structure that upholds this board, this state and the federal government which pumps millions of dollars into this industry called astronomy.³⁶⁷

Narratives, Trading Zones, and the Moral Economy of Modern Astronomy

Astronomers did not equate building telescopes with colonization, but this did not mean they were unable or unwilling to reevaluate their scientific claims on the mountains. While maintaining an unwavering commitment to developing the mountain sites for astronomy, some astronomy communities broadened their narratives about the value of astronomy and the uses of the mountain to show that astronomy was compatible with Native religion. In the process, astronomers effectively refashioned their scientific identities and the moral imperatives of astronomy.

The astronomers who founded Kitt Peak in the late 1950s belonged to an elite and celebrated group of physical scientists who saw themselves chiefly as participants in the production of knowledge about the universe. Astronomers believed the value of such a lofty scientific enterprise was self-evident, and their recollections of the lease negotiations with the

³⁶⁷ Pi'ilani Smith, statement to University of Hawai'i Board of Regents previous to their vote on the Mauna Kea Science Reserve Master Plan. 15 June 2000. Available at http://www.mauna-a-wakea.info/maunakea/K_kingdom.html. Accessed 20 December 2012.

Tohono O’odham Nation reveal the primacy of science: once tribal members understood the scientific merits of the observatory, the story goes, they were eager to sign a perpetual lease of their sacred mountain to the astronomers.

Later, when opposition to observatories at Kitt Peak and Mauna Kea prompted astronomers associated with those sites to gradually renegotiate their scientific narratives about the use and meaning of the mountain, astronomers placed new emphasis on the values of celestial knowledge shared by both indigenous and astronomical communities. This narrative shift was both a rhetorical strategy and a reflection of the changing value commitments of astronomers. Astronomers still conceived of themselves as scientists who sought to make the universe comprehensible, and the mountains were still privileged as sites for telescopes, but many astronomers had become more inclusive of other knowledge systems and ways of valuing the mountain.

As a direct consequence of the telescope controversies, inspiring a sense of “wonder” and “awe” in the public and providing educational opportunities to underprivileged minority groups became a professional mandate for American astronomers by 2000, known formally as Education and Public Outreach (EPO).³⁶⁸ Although MGIO has developed an annual outreach program for San Carlos Apache youth, EPO activities have been far more successful at Kitt Peak and Mauna Kea. For astronomers at these sites, engaging with the indigenous communities is not only a rewarding form of community service; it is also a pragmatically motivated investment.

³⁶⁸ The National Aeronautics and Space Administration (NASA) Office of Space Science (OSS) Education and Public Outreach program (EPO) was formed in 2000, and by 2001, the Annual Report indicated that the program’s participation had more than doubled, with roughly one thousand OSS-affiliated scientists and engineers performing outreach in all 50 states. See The National Aeronautics and Space Administration Office of Space Science Education and Public Outreach Annual Report FY 2001, p. 3. Available at science.nasa.gov. Accessed 08 December 2012. All 50 states participate in NASA-funded EPO programs, including Native Americans in Science National Conference and the Space Science Institute’s EPO, which includes programs in Arizona and Hawai’i aimed at “building mutually respectful relationships that ensure the sustainability and success of NASA E/PO programs in Indigenous communities.” See *Science Mission Directorate Education and Public Outreach 2005 Annual Report. National Aeronautics and Space Administration*, p. 43; 69. Available at science.nasa.gov. Accessed 15 March 2013.

In 2000, Gemini Observatory astronomer Peter Michaud noted that Gemini's EPO priorities were set in large part by the conflict with Native Hawaiians.³⁶⁹ According to Michaud, "this reality has made local outreach in Hawaii a high priority seemingly disproportionate in magnitude to those unfamiliar with the seriousness of this issue for our long-term operations."³⁷⁰ Maintaining a positive public image through EPO efforts translated into long-term sustainability and support of astronomical research, which, in Michaud's estimation "relies heavily on public understanding and appreciation of astronomers' work."³⁷¹ Affirming that the observatory controversies had created an image problem for the discipline of astronomy, former University of Hawai'i at Hilo astronomer Michael J. West authored a 2009 article urging his colleagues to "Be the public face of astronomy," "Learn to be an effective communicator," and "Embrace new technologies and opportunities to connect with the public."³⁷²

Notably, these new narratives and corresponding EPO activities defining astronomers as public servants circulated well beyond the astronomy communities most directly affected by the observatory conflicts. The competing claims to Kitt Peak and Mauna Kea in particular engendered a sustained dialogue with concerned members of the public that fundamentally reshaped the way American astronomers described and defended their professional activities on the mountain. Astronomers across the country followed the telescope controversies at all

³⁶⁹ Peter Michaud, "Establishing an Effective Education and Public Outreach Program at Gemini Observatory-- A Case Study," in André Heck, *Organizations and Strategies in Astronomy* Vol. 7 (Springer, 2000): p. 477-493; p. 477.

³⁷⁰ Ibid, p. 483.

³⁷¹ Ibid, p. 477.

³⁷² Michael J. West, "Public Perception of Astronomers: Revered, Reviled, and Ridiculed," *Proceedings IAU Symposium No. 260* (2009): p. 1-8; p. 8. West's argument that the changing public perception of astronomers is also tied to the shift from astronomy's instrumental value as an applied science in ancient societies to its decreasing public value as a pure science is less convincing, since astronomers have enjoyed great public popularity until relatively recently. As West himself points out, American astronomers appeared on the cover of *Time* magazine in the 1930s, 1940s, and 1980s. See Ibid, p. 3.

three sites and became deeply concerned about restoring a positive public perception of astronomers.³⁷³ The new outreach programs funded by NASA and the NSF both shaped and reflected a renewed emphasis on bringing astronomy into the public sphere, and American astronomers increasingly began to envision themselves as public figures with a professional obligation to participate in outreach activities for minorities and other underrepresented groups within their local communities.

To cite one recent example, the 2012 meeting of the Astronomical Society of the Pacific (ASP) in Tucson was entirely devoted to communicating science across cultures, defined largely as Native American, Native Hawaiian, and Hispanic groups.³⁷⁴ Building upon the previous year's conference theme, "Connecting People to Science," the 2012 meeting focused on tailoring astronomers' education, public outreach, and science communication activities to culturally diverse audiences. In sessions titled "The Science of Storytelling: Indigenous Perspective in Environmental Change," "Sharing Our Stories: Project Evaluation from a Cross-Cultural Perspective," and "Suggestions from the Native American Community about Science/EPO Collaborations," Native American panelists sang traditional chants, recited poetry about seasonal change, and invited astronomers to join in storytelling through pottery.³⁷⁵ One of the key "conference threads" uniting the diverse series of panels and workshops posed the question "How do we know we are making a difference?"³⁷⁶ Given the ongoing nature of the conflicts over observatories built on sacred mountains, the 2012 ASP conference is not anomalous; it is

³⁷³ For an astronomer's discussion of the impact of the Mauna Kea and Mt. Graham controversies within the American astronomy community and the changing public perception of astronomers, see Michael J. West, "Public Perception of Astronomers."

³⁷⁴ Conference program, *Astronomical Society of the Pacific, Communicating Science: a National Conference on Science Education and Public Outreach*. August 4-8, 2012. Tucson, AZ. These observations are drawn from my attendance at the 2012 Astronomical Society of the Pacific meeting in Tucson.

³⁷⁵ *Ibid.*

³⁷⁶ *Ibid.*

emblematic of a major shift in the professional identities of American astronomers. For a large segment of the American astronomy community, engaging with the public and extending outreach to underrepresented groups has become an integral part of what it means to be a professional astronomer.

As astronomers' narratives were renegotiated over the years to acknowledge the mountains as scientifically, environmentally, and culturally valuable sites, trading zones gradually materialized at Kitt Peak and Mauna Kea. Sharon Traweek's ethnography of high-energy particle physicists working at the Stanford Linear Accelerator Center in the 1980s argues that physicists constructed images of themselves and their world, creating "an extreme culture of objectivity" that was central to their professional identities.³⁷⁷ Unlike Traweek's physicists, members of the astronomy communities examined in this dissertation clung to the conceptual life raft of "astronomy as culture" to carry them through the turbulent waters of environmental and indigenous opposition. The inclination toward "abiding in 'culture'" was observed by anthropologist Stefan Helmreich during fieldwork in the mid-1990s among Artificial Life scientists at the Santa Fe Institute for the Sciences of Complexity in New Mexico.³⁷⁸ As Helmreich noted, "When Artificial Life scientists understood their activity as 'cultural', they reinforced the stability and unity of culture, even and especially as they sought to bend it back to examine itself; culture was fractally reproduced as a system of ideas at all scales."³⁷⁹ For some of the scientists in his study, culture was defined in relation to language and worldviews, their understandings of culture as a fixed set of ideas derived largely from undergraduate

³⁷⁷ Traweek, *Beamtimes and Lifetimes: The World of High-Energy Physicists* (Cambridge: Harvard University Press, 1988), p. 162.

³⁷⁸ Stefan Helmreich, "After Culture: Reflections on the Apparition of Anthropology in Artificial Life, a Science of Simulation," *Cultural Anthropology* 16 (2001): p. 612-127.

³⁷⁹ *Ibid.*, p. 620.

anthropology coursework reflecting outmoded tropes in American anthropology.³⁸⁰ When astronomers invoked “culture” in the 1990s, they initially employed the term much in the same way as Helmreich’s Artificial Life researchers, with astronomical culture standing in stark contrast to indigenous culture, for example. Yet as trading zones organically formed through extended collaborations, the material, social, and cultural worlds of astronomers and Native communities merged in meaningful ways at Mauna Kea and Kitt Peak. Many members of the indigenous and astronomical communities invested in Mauna Kea and Kitt Peak came to see themselves as part of a mutually negotiated and shared hybrid culture.³⁸¹

Within these social and material regions of accommodation, astronomers and Native communities at Kitt Peak and Mauna Kea were able to develop a pidgin language of shared concepts that led to fruitful outreach collaborations, even when tensions remained high beyond the borders of the trading zones. At Mt. Graham, however, the astronomy community denied the mountain’s sacredness to the Apaches altogether, and Apaches rejected the astronomy community’s outreach offers as demeaning “bribes.” My comparison of the presence and absence of trading zones at these three sites of conflict shows that trading zones are dependent upon the mutability of narratives because these critical zones of accommodation do not appear if the parties are unwilling to form a new contact language. The Mt. Graham astronomy community insisted that the mountain’s purpose was to serve astronomical interests, not Apache religion. This intractable narrative about the mountain as a site for astronomy alone

³⁸⁰ Helmreich, “After Culture,” p. 613; 616-617.

³⁸¹ These chapters have discussed multiple instances of the merging of astronomical and indigenous cultures in mutually reinforcing ways. For example, language often forms an important bridge between Native and astronomical cultures. In 2002, the Institute for Astronomy headquarters at the University of Hawai’i at Hilo’s University Park was renamed after the cluster of cinder cones on the summit of Mauna Kea known in Hawaiian as Kūkahau’ula (“the god Kū of the red-hued dew”) as a gesture to the sacredness of the mountain. See *Ho’opano Mauna Kea Newsletter: Office of Mauna Kea Management and the Mauna Kea Management Board 7* (Summer 2002). Available at malamamaunakea.org. Accessed 13 January 2013.

essentially eliminated the possibility of establishing a trading zone where the disparate views of Apaches and astronomers might coexist.

In a candid moment ten years after construction began on the LBT on Mt. Graham, the observatory manager admitted that the mountain was sacred to the Apaches, but there is no formal equivalent to this isolated remark in individual astronomers' narratives or MGIO publications to date. As noted in the beginning of this chapter, the LBT manager's attempt to mitigate the spiritually damaging consequences of the telescope by adjusting its position is perhaps most revealing of how these controversies have shaped modern astronomical practice. Even at Mt. Graham, where the observatory's official stance is that the mountain has never been sacred to the Apaches, routine telescope operations are informed by the understanding that the scientific activities at the summit are under surveillance by groups with growing political and cultural authority.

Keeping tabs on the potential opposition is a two-way street: astronomy communities have learned that it is in their best interests to monitor the Native and environmental communities who may object to their development activities. Beginning in the mid-1980s, the weekly "Mt. Graham Routing Slip" regularly featured news clippings from environmentalist and Native organizations, with tribal politics on the San Carlos Apache reservation of particularly urgent interest.³⁸² The newsletters of major observatories at Mauna Kea have often included brief mention of observatory protests and contested case hearing updates, and the KPNO newsletter similarly covers Tohono O'odham tribal developments alongside its regular observatory news.³⁸³ Whether rooted in paranoia or pragmatism, it is clear that major

³⁸² See "Mt. Graham Routing Slip," January 1986-August 1996; "MGIO Distribution Slip," September 1996-January 2000. Courtesy of Doug Officer.

³⁸³ The KPNO Newsletter and newsletters of most of the major facilities on Mt. Graham and Mauna Kea are available online.

observatories have taken a cautious approach when dealing with the communities of concerned nonscientists who value the mountain.

Moreover, the histories of conflict considered in this dissertation reveal that Native and environmentalist groups have gained sufficient agency that they may be regarded as contributing to the 'bottom-up' making of science through their political mobilization. Considering the involvement of lay citizens in the formation of scientific policy, Sheila Jasanoff has concluded that the issue "is no longer *whether* the public should have a say in technical decisions, but *how* to promote more meaningful interaction among policy-makers, scientific experts, corporate producers, and the public."³⁸⁴ Though Jasanoff is primarily concerned with the "participatory turn" involving nonscientists at the 'top-down' level of policymaking, her analysis also speaks to the 'bottom-up' contributions of nonscientists who wish to influence scientific development. Whether activists or concerned citizens, this dissertation has shown that nonscientists have increasingly come to insist upon the democratization of scientific decision making. By actively participating in the Environmental Impact Statement process, attending observatory board meetings, or filing lawsuits and contested cases, nonscientists have demanded to be heard, often resulting in delayed or restricted observatory development.

In different ways, astronomers at all three observatories considered in this dissertation reached the understanding that nonscientists could exert a claim on the mountain with the power to seriously jeopardize astronomical development. The realization that astronomically valuable mountains might also be judged environmentally and culturally valuable mountains was hard-won knowledge at Kitt Peak, Mauna Kea, and Mt. Graham, and the lessons of these controversies had a ripple effect within the broader community of American astronomers that

³⁸⁴ Sheila Jasanoff, "Technologies of Humility: Citizens Participating in Governing Science," *Minerva* 41 (2003): p. 223-244; p. 238.

has largely rendered 'painting the dome' notions of accommodation an obsolete relic of a different era of astronomical practice.

Observatories would never again be justified exclusively as projects with great scientific promise; these Big Science ventures are now squarely in the public domain, and American astronomers must carefully construct their scientific narratives to establish cultural and environmental awareness when proposing new telescope projects. Trevor Weekes, the chief VERITAS scientist interviewed for a story on the filing of the Tohono O'odham lawsuit in 2005, relayed his concern that tribal and environmental concerns posed significant barriers to conducting scientific research in the United States, claiming that "scientists more and more are turning toward Mexico, Canada or Europe to do their work."³⁸⁵ Reinforcing this viewpoint, an op-ed in the *Arizona Daily Star* declared that "science stands to suffer unless those who would pursue it demonstrate new and extraordinary levels of respect and accommodation for American Indian beliefs."³⁸⁶

"We all have to give a little"

This dissertation has charted the conflict over observatories built on mountains valued for scientific, cultural, and environmental resources in the second half of the twentieth century. During this tumultuous period, the cultural worlds of scientists and nonscientists produced a multiplicity of narratives reflecting a wide range of understandings and beliefs about the proper use of the mountains. Ultimately, the controversies over observatories at Kitt Peak, Mauna Kea, and Mt. Graham have had an enduring impact on the identities, values, and practices of the astronomy, environmentalist, and Native communities. As I have shown, the same mountain

³⁸⁵ Medrano, Lourdes, "Construction of Kitt Peak telescope complex halted," *The Arizona Daily Star*. 17 June 2005.

³⁸⁶ "Ruling settles little about Kitt Peak's future," *The Arizona Daily Star*. 01 August 2005.

may be culturally constructed as an ideal observing site, a pristine ecosystem, or a spiritual temple.

In the beginning of this dissertation, I presented a question derived from Michael F. Brown's *Who Owns Native Culture?*: are sacred places truly "rivalrous resources" in which one group's use limits another's?³⁸⁷ Scholars who have grappled with this question have frequently drawn contradictory conclusions. David Chidester and Edward Linenthal argue that sacred landscapes are, by definition, contested landscapes.³⁸⁸ In his study of competing cultural constructions of urban and agricultural sites among Jewish Zionist culture and the Arab Moslem cultures in Israel, Irit Amit-Cohen finds that "two cultures can exist side by side in the same area and relate to the same landscape with different interpretations. This shows that one interpretation of the landscape does not of necessity lead to the delegitimization of the other interpretation."³⁸⁹ Now that I have traced the independent histories of conflict at Kitt Peak, Mauna Kea, and Mt. Graham to evaluate how and why these mountains became contested landscapes, I am prepared to suggest that the answer is contingent upon the production and translation of narratives across different sites and historical moments. Landscapes are transient cultural constructions, defined by changing economic, spiritual, scientific, environmental, and political visions. When multiple stakeholders conceptualize the spiritual geography of the landscape in radically divergent ways, sacred sites may indeed be reduced to rivalrous resources if competing narratives are delegitimized, which explains the bitter absence of trading zones at Mt. Graham. Yet the establishment of regions of local coordination at Kitt Peak and Mauna Kea

³⁸⁷ Brown, *Who Owns Native Culture?* (Harvard University Press, 2003), p. 9.

³⁸⁸ David Chidester and Edward Linenthal, eds., *American Sacred Space* (Bloomington: Indiana University Press, 1995).

³⁸⁹ Irit Amit-Cohen, "Contested Landscape and the Spirit of Place, the Case of Olive Trees and Urban Neighborhood in Israel," 16th ICOMOS General Assembly and International Symposium: 'Finding the spirit of place – between the tangible and the intangible', 29 September – 04 October 2008, Quebec, Canada.

clearly demonstrates that refashioning narratives on the meaning of the landscape can stimulate collaboration and communication across cultural boundaries. Though tensions remain, when astronomers began to produce narratives recognizing the sacrality of the mountains to the Native communities at Kitt Peak and Mauna Kea, the claims to the mountain were validated for members of both scientific and nonscientific communities. As Sarah Jacoby, the daughter of two astronomers who grew up immersed in Kitt Peak lore, acknowledged, “even though we may have different names for The Mountain, it’s sacred to all of us. It may not be sacred in the same way or for the same reasons, but it means something significant and awe-inspiring.”³⁹⁰

* * *

At the 2012 Astronomical Society of the Pacific conference in Tucson, a panel of Native American speakers sits before an auditorium of astronomers who have come to learn about making “cross-cultural connections” between cultural and scientific activities. Addressing the audience, one panel member queries, “So, what does ‘cross-cultural’ mean to you?” One astronomer stands up and somewhat sheepishly admits that although it’s common to correlate different cultures with different ethnic groups, “My scientific perspective is more important than being a white American male.” His response solicits a collective sigh of agreement from much of the crowd. For this group and many like it, their science *is* their culture, and indigenous perspectives on science are both alien and alienating. But a Native American panelist acknowledges a similar frustration, noting that “when you engage in a science, you have to put *spirituality* away. You can’t say we’re related when you speak of water as hydrogen—you have to objectify it and tear down your language, and you give a part of yourself away.” But maybe, he adds, that’s the key to forging these kinds of relationships between science and Native ways of knowing: “If you can connect to a place of mutual respect and understanding, you don’t diminish the integrity of Western scientific discipline. At the same time, you don’t diminish the cultural knowledge. We all have to give a little bit.”

³⁹⁰ Sarah Jacoby, “Tales from the Outskirts: Kitt Peak. The daughter of astronomers returns to ‘The Mountain’ to see what others see.” *Tucson Weekly*. 16 July 2009.

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