MANATEES AND MARGARITAS:

TOWARD A STRANGE NEW PARADISE

A Thesis Submitted to the Department of Landscape Architecture,

Harvard University Graduate School of Design

by

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In Partial Fulfillment of the Requirements for the Degree of

MASTER IN LANDSCAPE ARCHITECTURE

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Kevin Robishaw

Student

Thesis Advisor

Manatees & Margaritas

Toward a Strange New Paradise



Kevin Robishaw

Advisor: Craig Douglas

Table of Contents

Abstract	1
Acknowledgments	2
Exhibit and Presentation	3
Images Exhibited on the Wall	5
Model Photographs	15
Digital Presentation with Captions	18
Text References	166
Image References	167

Abstract

Florida manatees gather in the warm water discharged from power plants, which they have come to rely on during cold winters. The “55 and better” also seek warmth - and a life of leisure - at the state’s booming “active adult” communities. As populations increase, human waste leaks into the lagoon and seagrass dies. Manatees starve in record numbers and are fed romaine lettuce in a last-ditch effort to keep them alive.

This project probes the strange ecologies of Eden in the Anthropocene – that of romaine lettuce and power plants, manatees and margaritas. It finds, in landscapes of paradise, spaces where one can love nature, while killing it at the same time, where the “obscene” realities of the body – waste, aging, death – are kept concealed outside the figurative garden wall - to deleterious effects. This thesis proposes new visions of paradise for a world where this separation can no longer stand, where no ‘elsewhere’ remains and entanglement is unavoidable. A series of gardens – or, more accurately, anti-gardens – serve as prototypes for a strange new Florida paradise, where the obscene enters and new forms of coexistence – between the retiree and manatee, the human and the nonhuman – emerge.

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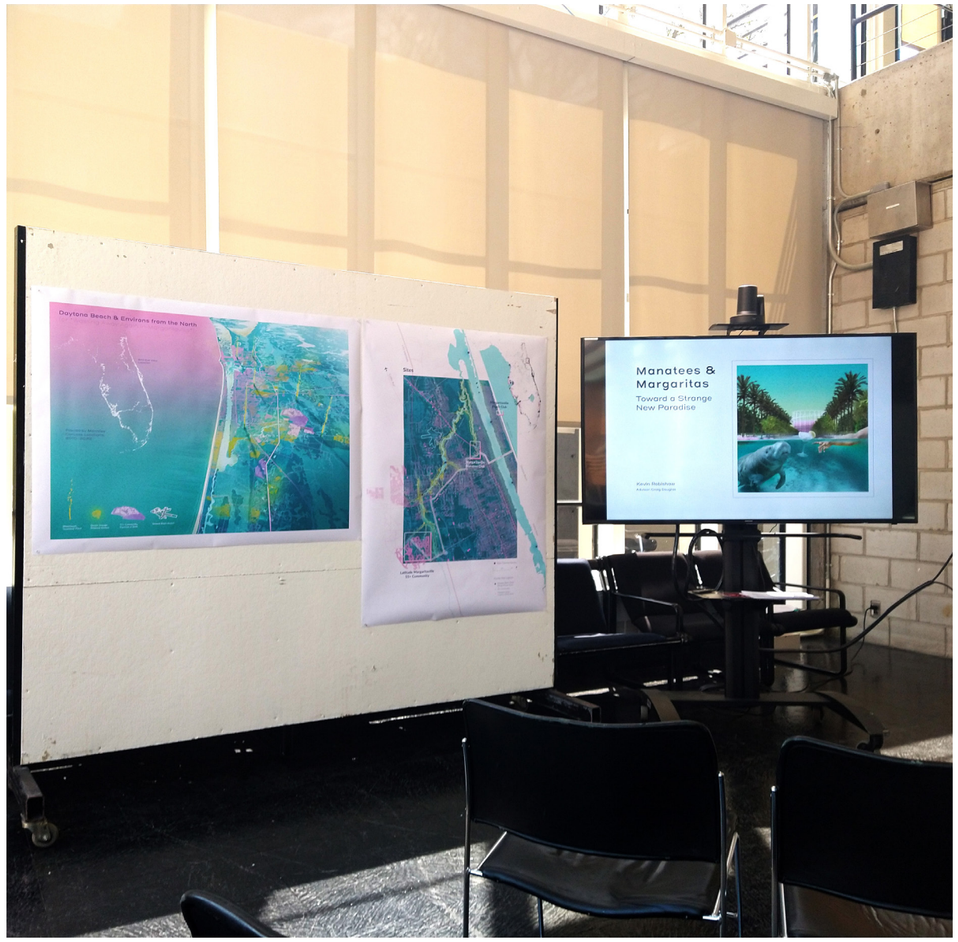
Rebecca Shen
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Jingyuan “Loki” Zhu
Austin Sun
Peter Sikorsky
Elle Li

Exhibit and Presentation

The Pit, May 12, 2023













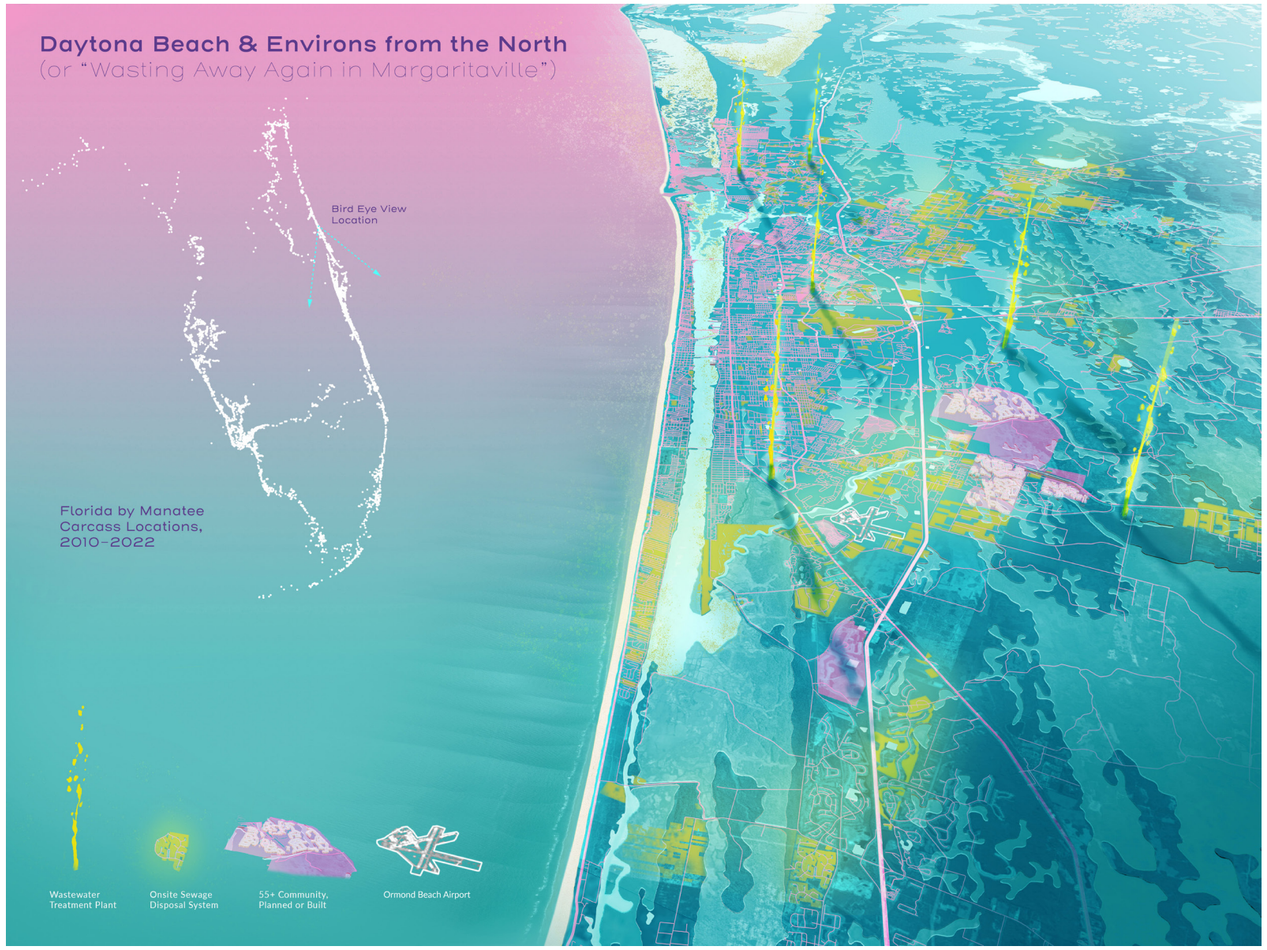


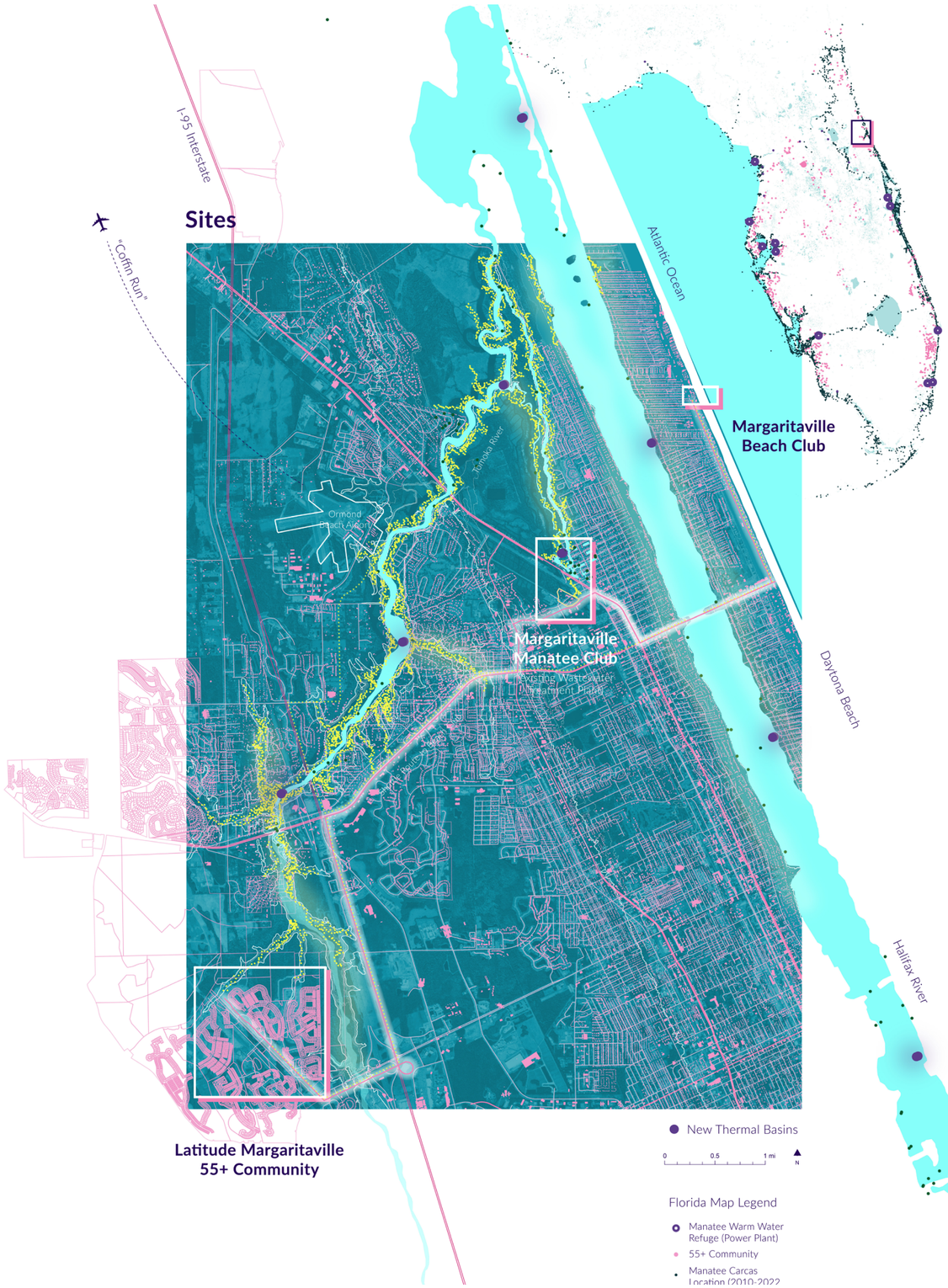


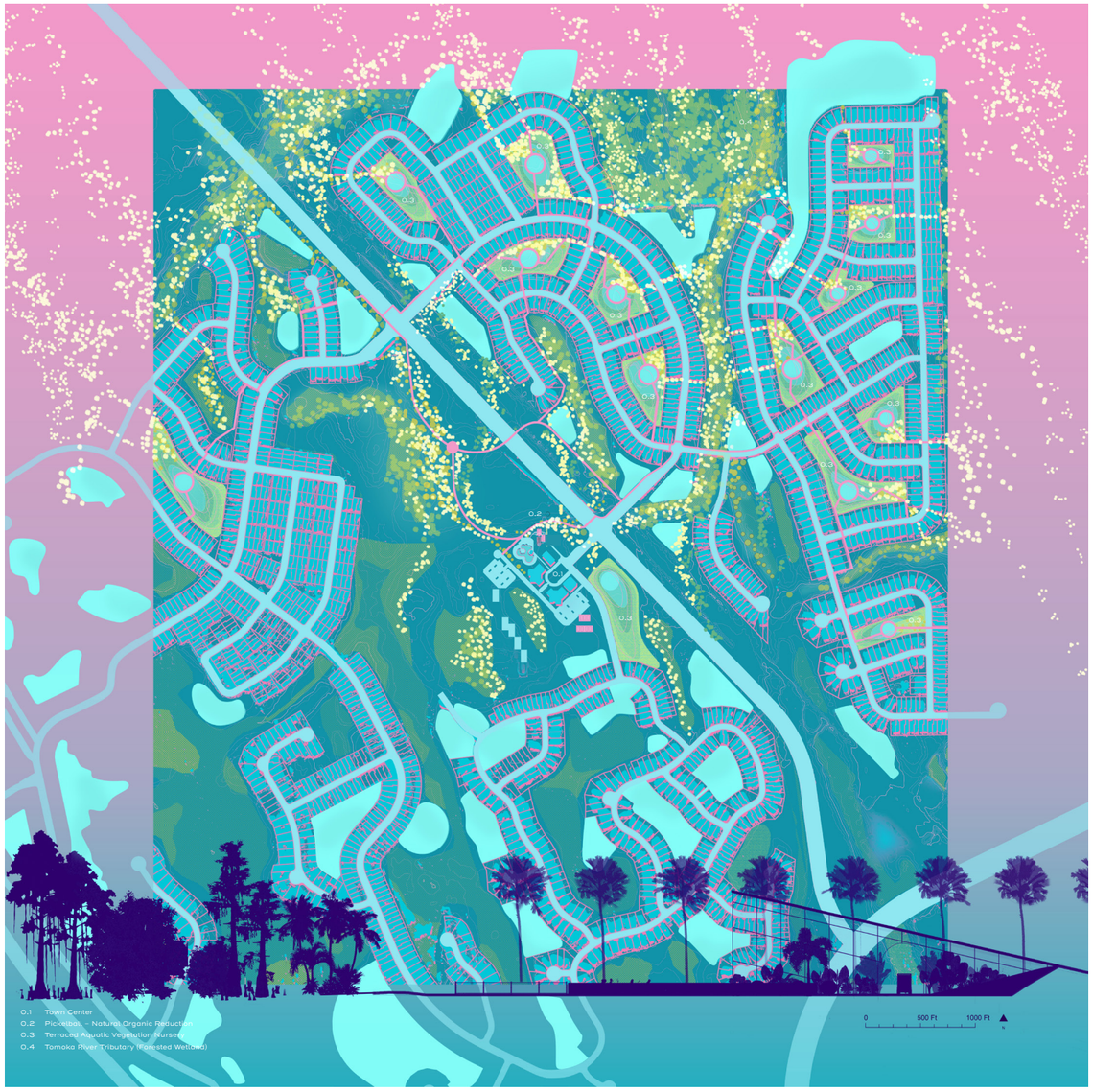


Images Exhibited on the Wall

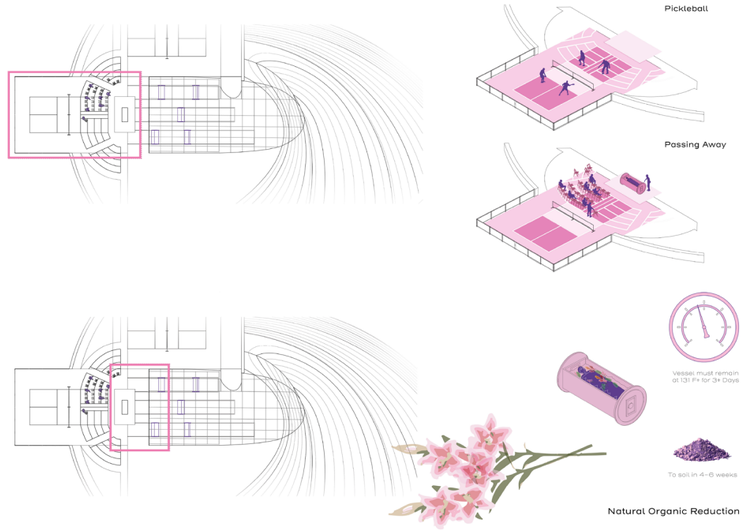
The Pit, May 12, 2023

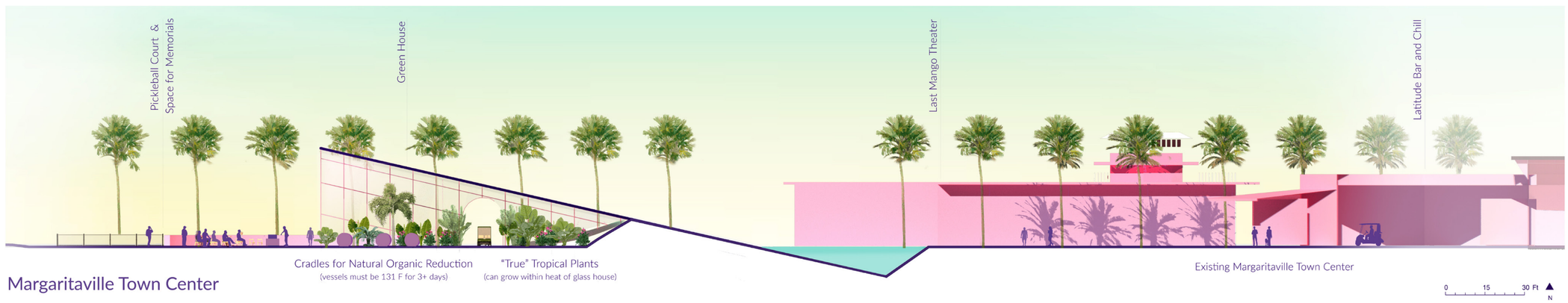






Latitude Margaritaville 55+ Community



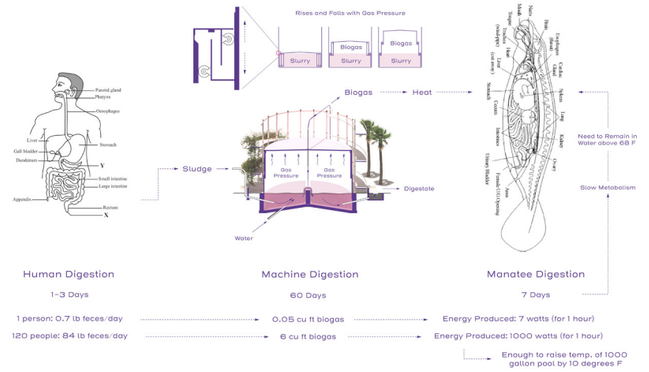


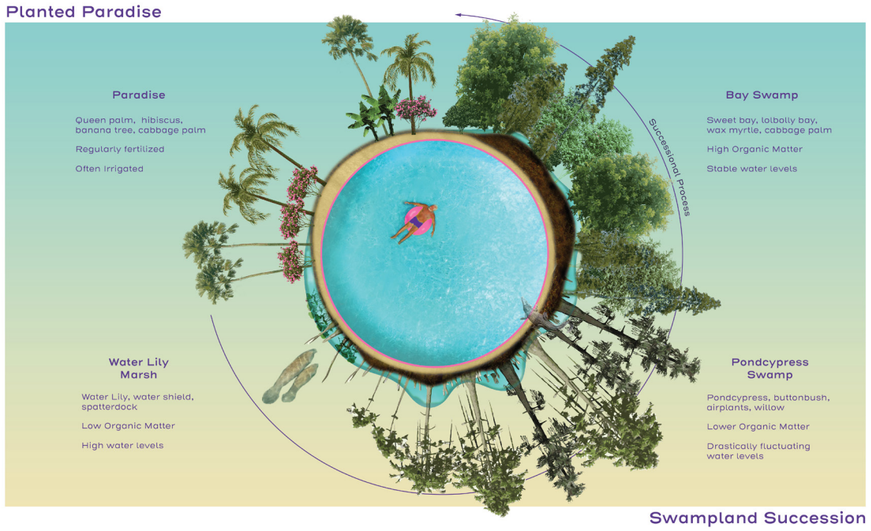
Margaritaville Town Center

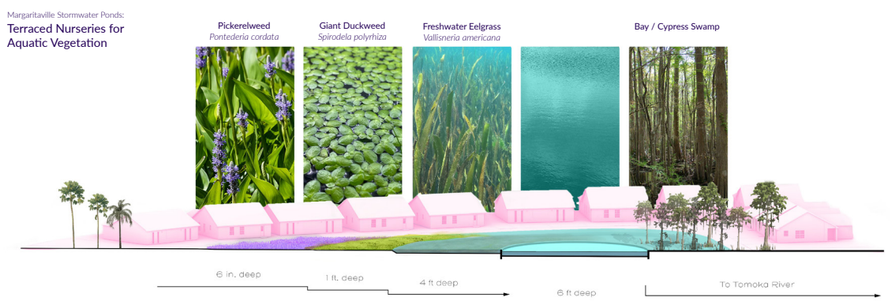




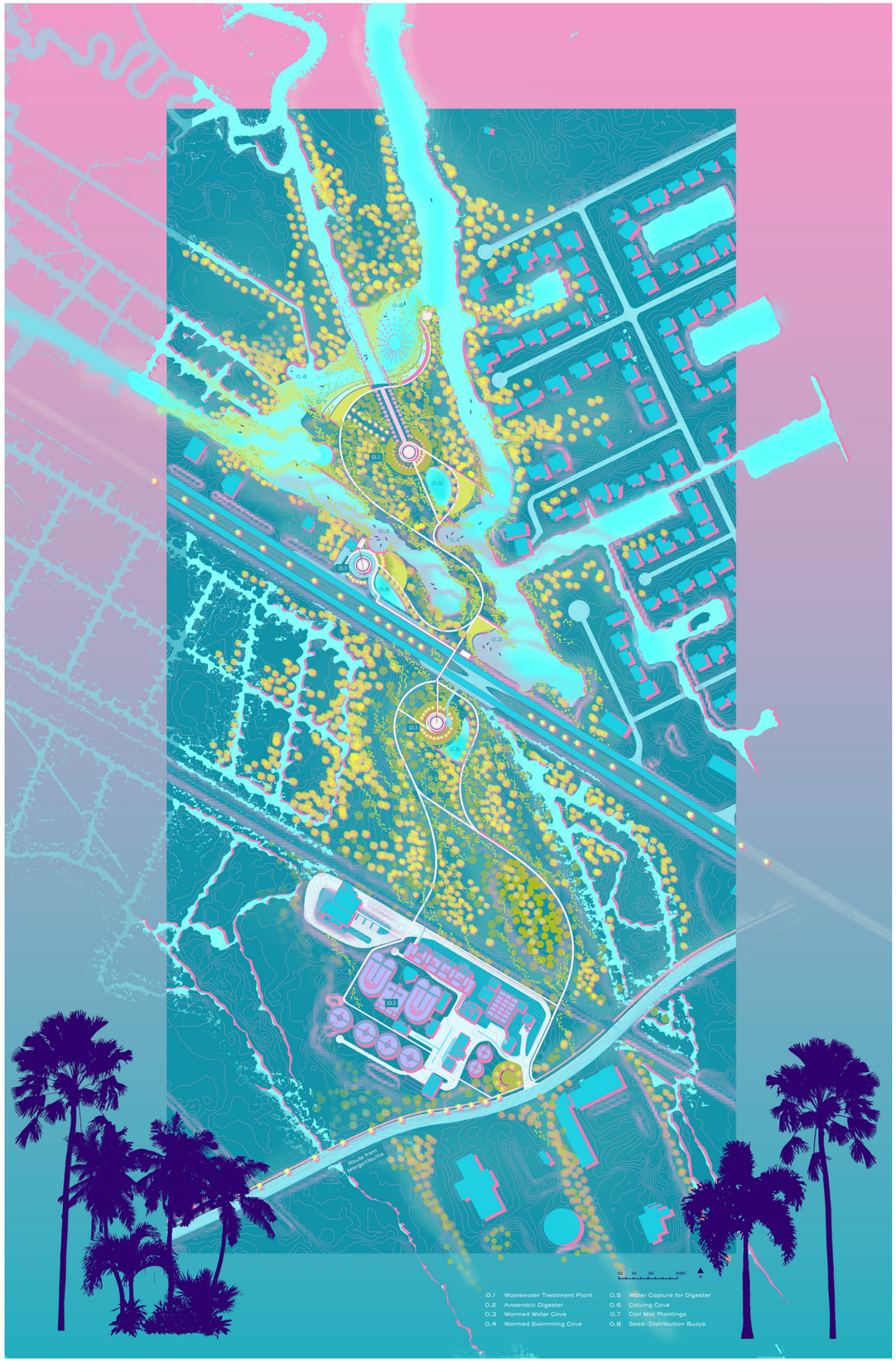



Rises and Falls with Gas Pressure
Slurry
Biogas
Biogas → Heat
Sludge
Gas Pressure
Digestate
Water
Need to Remain in Water above 68 F
Slow Metabolism
Human Digestion
1-3 Days
Machine Digestion
60 Days
Manatee Digestion
7 Days
1 person: 0.7 lb feces/day
120 people: 84 lb feces/day
0.05 cu ft biogas
6 cu ft biogas
Energy Produced: 7 watts (for 1 hour)
Energy Produced: 1000 watts (for 1 hour)
Enough to raise temp. of 1000 gallon pool by 10 degrees F

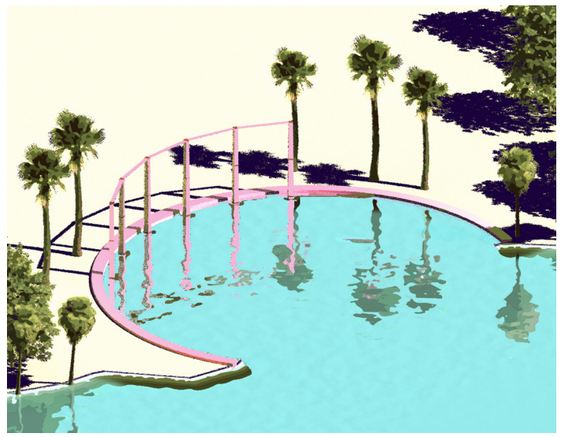

Planted Paradise
Paradise
Queen palm, hibiscus, banana tree, cabbage palm
Regularly fertilized
Often irrigated
Bay Swamp
Sweet bay, loblolly bay, wax myrtle, cabbage palm
High Organic Matter
Stable water levels
Successional Process
Water Lily Marsh
Water Lily, water shield, spatterdock
Low Organic Matter
High water levels
Pondcypress Swamp
Pondcypress, buttonbush, airplants, willow
Lower Organic Matter
Drastically fluctuating water levels
Swampland Succession

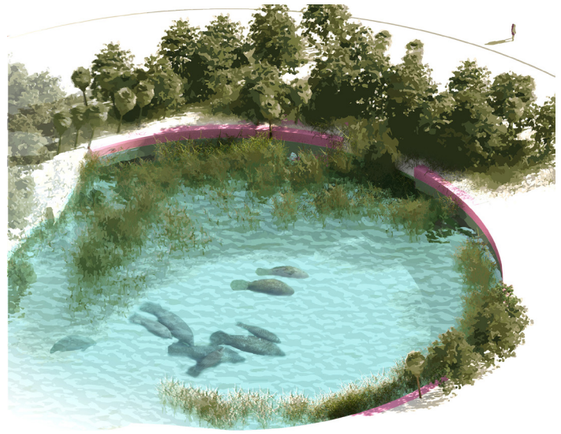

Margaritaville Stormwater Ponds:
Terraced Nurseries for Aquatic Vegetation
Pickerelweed
Pontederia cordata
Giant Duckweed
Spirodela polyrhiza
Freshwater Eelgrass
Vallisneria americana
Bay / Cypress Swamp
6 in. deep
1 ft. deep
4 ft deep
6 ft deep
To Tomoka River





Margaritaville Manatee Club





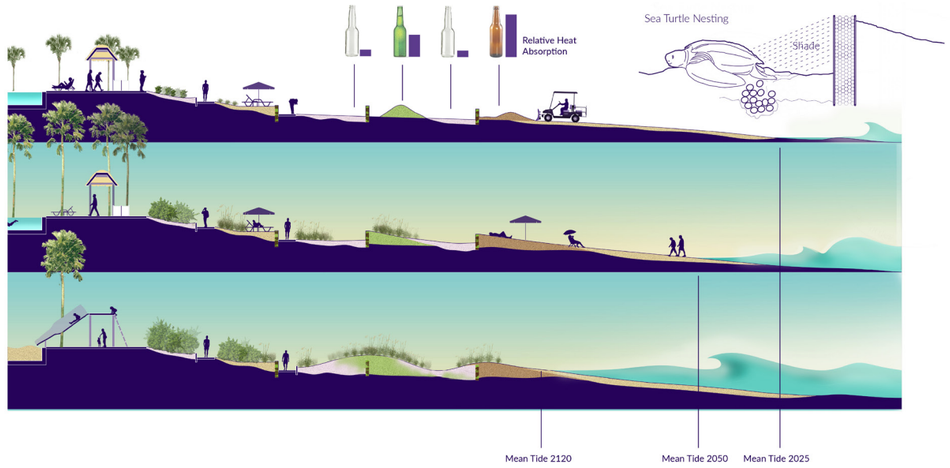


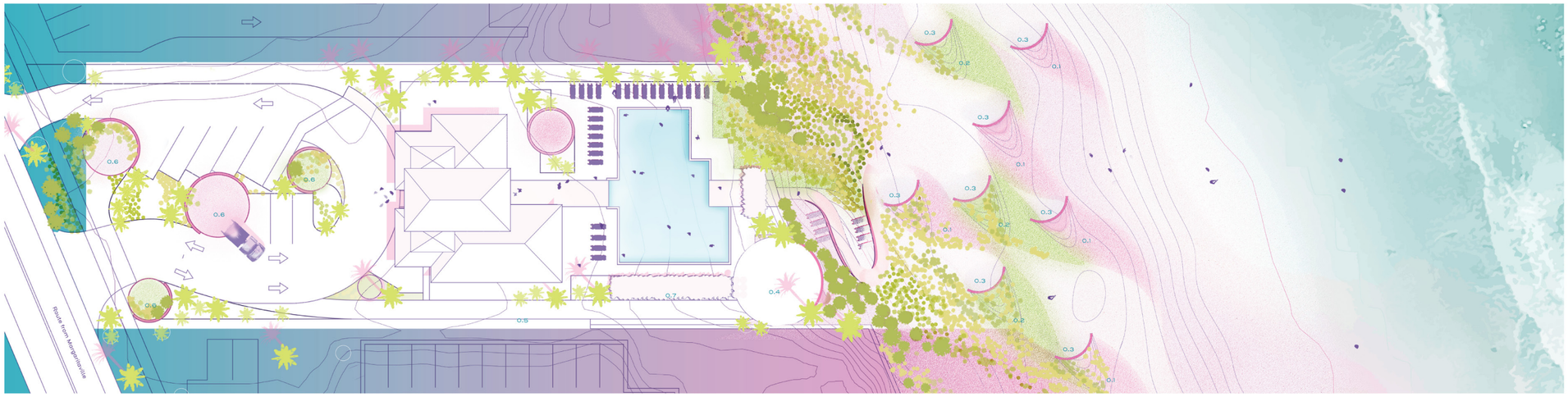




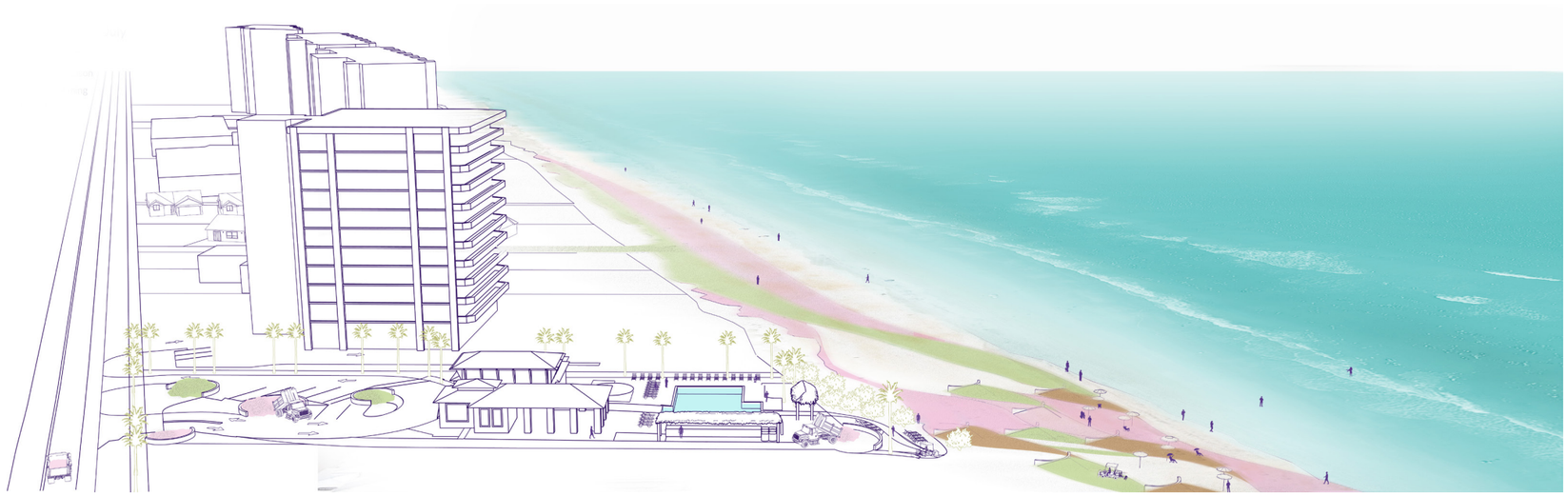


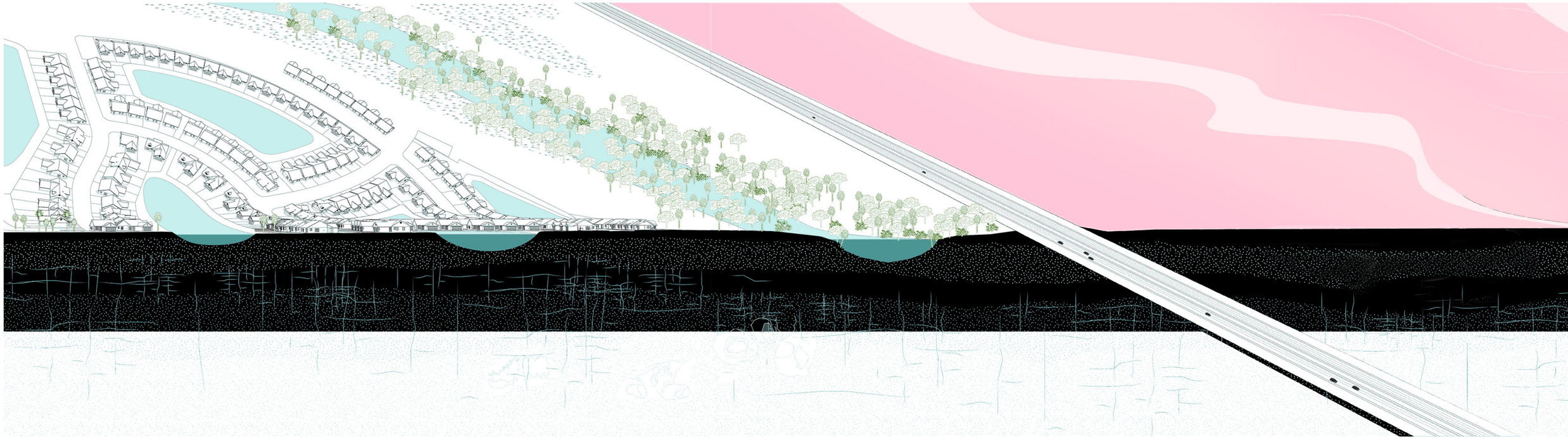


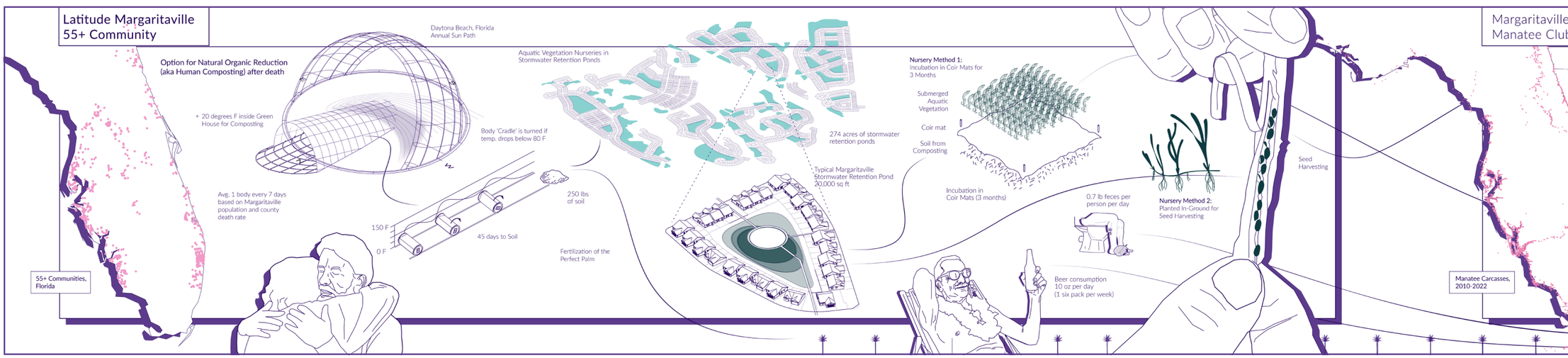


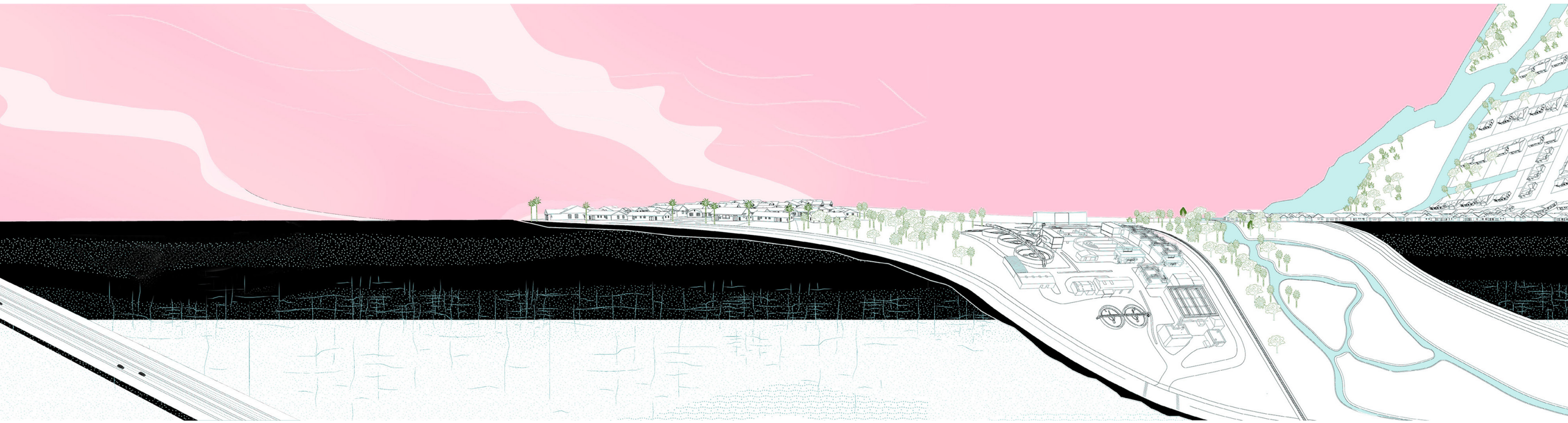


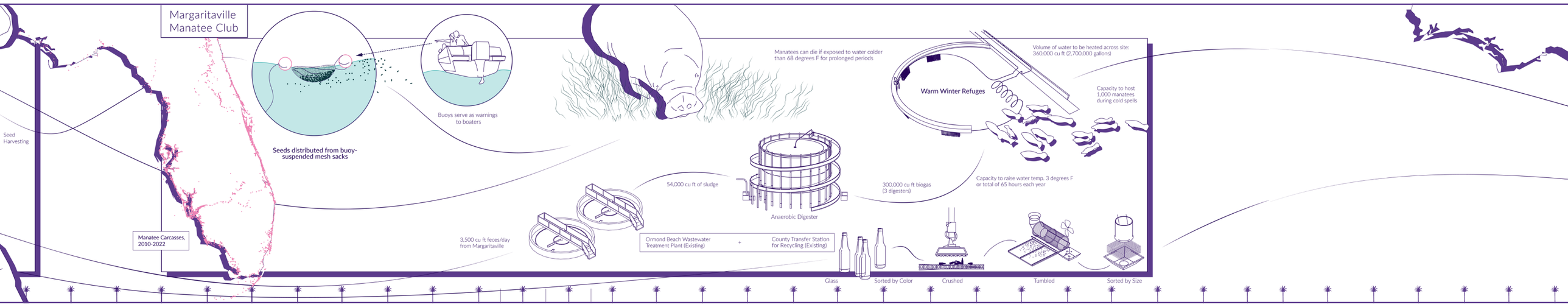
Margaritaville Beach Club






Latitude Margaritaville
55+ Community
Option for Natural Organic Reduction
(aka Human Composting) after death
+ 20 degrees F inside Green
House for Composting
Avg. 1 body every 7 days
based on Margaritaville
population and county
death rate
Daytona Beach, Florida
Annual Sun Path
Body 'Cradle' is turned if
temp. drops below 80 F
150 F
0 F
250 lbs
of soil
45 days to Soil
Fertilization of the
Perfect Palm
Aquatic Vegetation Nurseries in
Stormwater Retention Ponds
274 acres of stormwater
retention ponds
Typical Margaritaville
Stormwater Retention Pond
20,000 sq ft
55+ Communities,
Florida
Nursery Method 1:
Incubation in Coir Mats for
3 Months
Submerged
Aquatic
Vegetation
Coir mat
Soil from
Composting
Incubation in
Coir Mats (3 months)
0.7 lb feces per
person per day
Beer consumption
10 oz per day
(1 six pack per week)
Nursery Method 2:
Planted In-Ground for
Seed Harvesting
Seed
Harvesting
Margaritaville
Manatee Club
Manatee Carcasses,
2010-2022




Margaritaville
Manatee Club
Seed
Harvesting
Seeds distributed from buoy-
suspended mesh sacks
Buoys serve as warnings
to boaters
Manatees can die if exposed to water colder
than 68 degrees F for prolonged periods
Volume of water to be heated across site:
360,000 cu ft (2,700,000 gallons)
Warm Winter Refuges
Capacity to host
1,000 manatees
during cold spells
54,000 cu ft of sludge
300,000 cu ft biogas
(3 digesters)
Capacity to raise water temp. 3 degrees F
or total of 65 hours each year
Anaerobic Digester
Manatee Carcasses,
2010-2022
3,500 cu ft feces/day
from Margaritaville
Ormond Beach Wastewater
Treatment Plant (Existing)
+
County Transfer Station
for Recycling (Existing)
Glass
Sorted by Color
Crushed
Tumbled
Sorted by Size

Network of Thermal Basins

Power Plant Refuge

Other Winter Refuge

Manatee Winter Refuges

Birthing

Heat

July

October

January

Mating

Calf ventures out on its own

2 Years Later

Warming

Dredging to create 'Passive Thermal Basins'

Sun

Day

Night

Deeper water retains daytime heat during cool nights

Latitude Margaritaville 55+ Community

Margaritaville Manatee Club

Beach Club

Passive Thermal Basins

Critical Beach Erosion Sites

Margaritaville Beach Club

Increasing Temperatures

Sea Turtle Egg

Sand Temperature

95 F

77 F

Female

Male

Absorption (1/mm)

2000

1500

1000

500

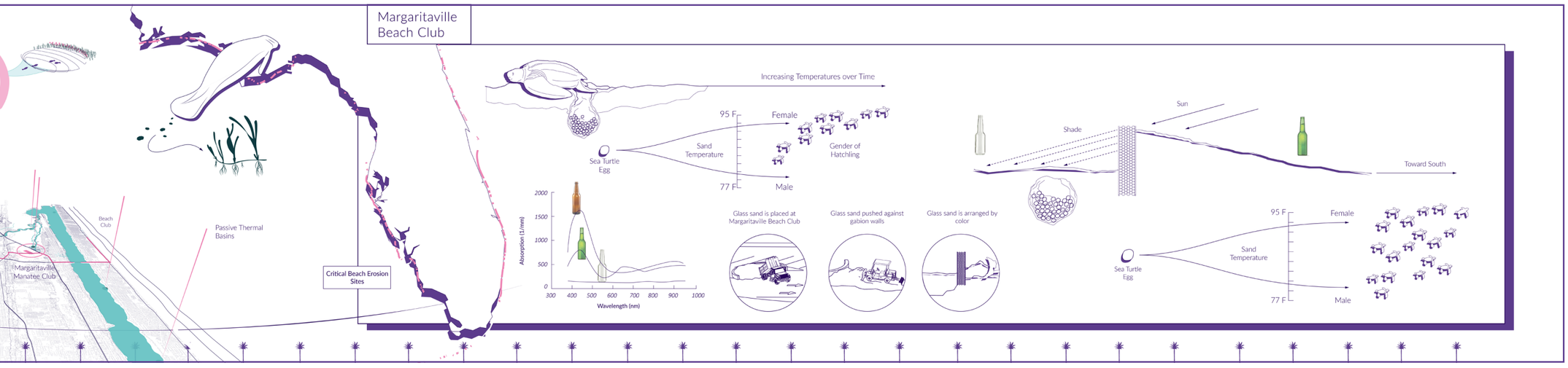
0

300 400 500 600 700 800 900 1000

Wavelength (nm)

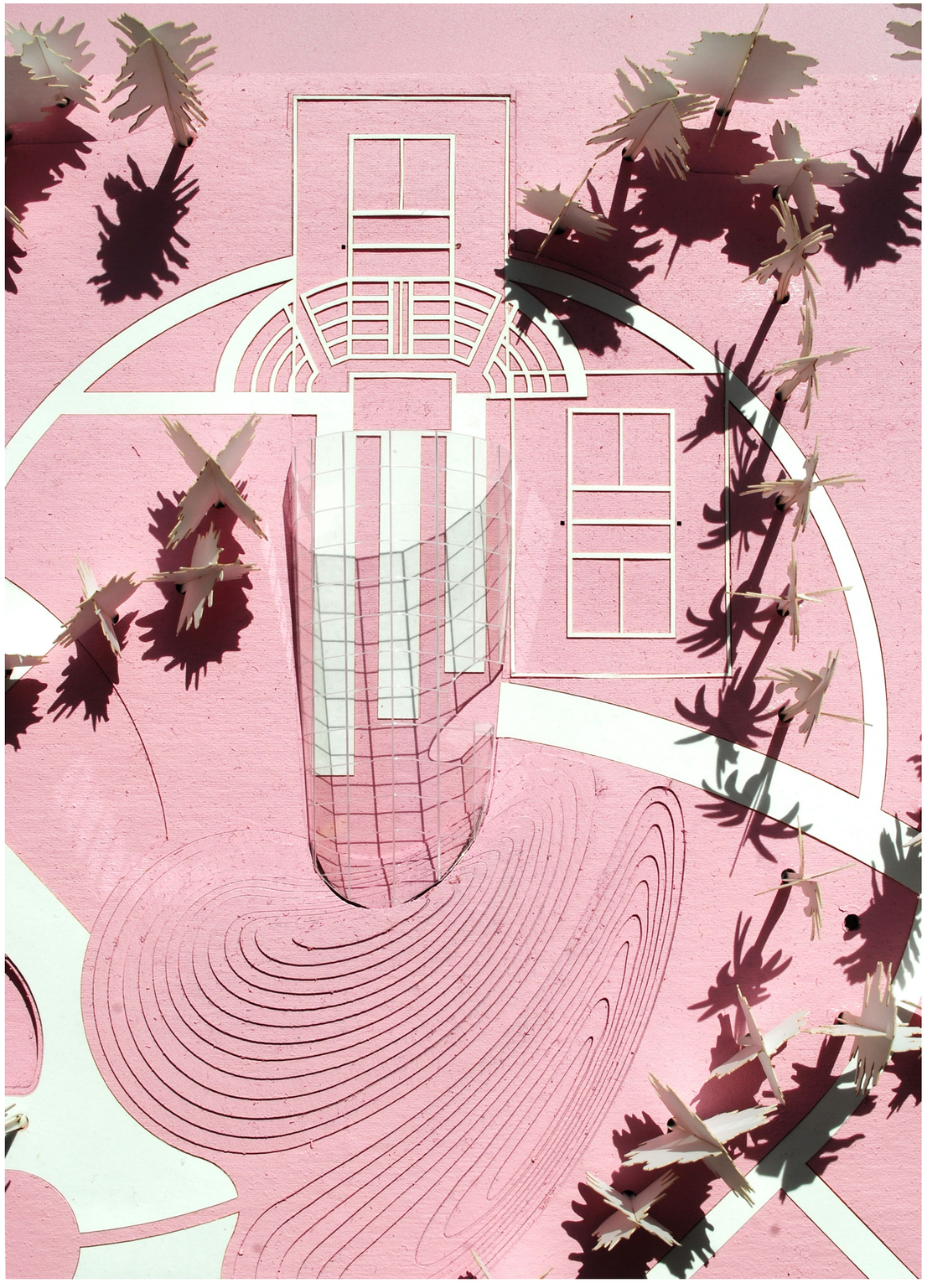
Glass sand is placed at Margaritaville Beach Club



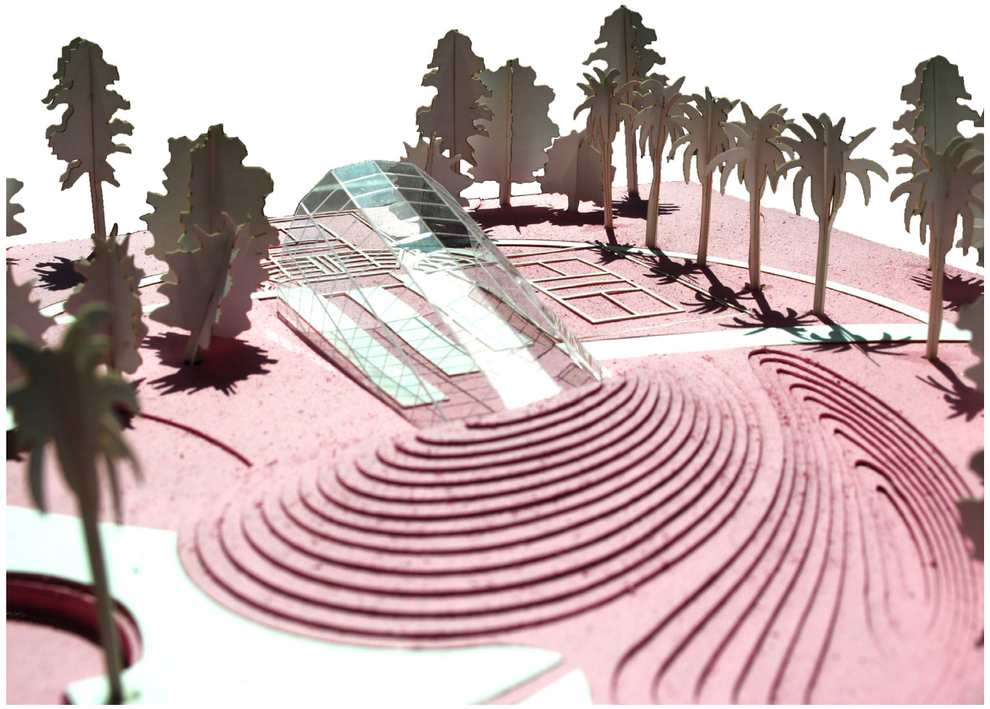

Margaritaville
Beach Club
Beach
Club
Passive Thermal
Basins
Margaritaville
Manatee Club
Critical Beach Erosion
Sites
Increasing Temperatures over Time
95 F
Female
Sand
Temperature
Sea Turtle
Egg
Gender of
Hatchling
77 F
Male
Absorption (1/mm)
2000
1500
1000
500
0
300
400
500
600
700
800
900
1000
Wavelength (nm)
Glass sand is placed at
Margaritaville Beach Club
Glass sand pushed against
gabion walls
Glass sand is arranged by
color
Sun
Shade
Toward South
95 F
Female
Sand
Temperature
Sea Turtle
Egg
77 F
Male

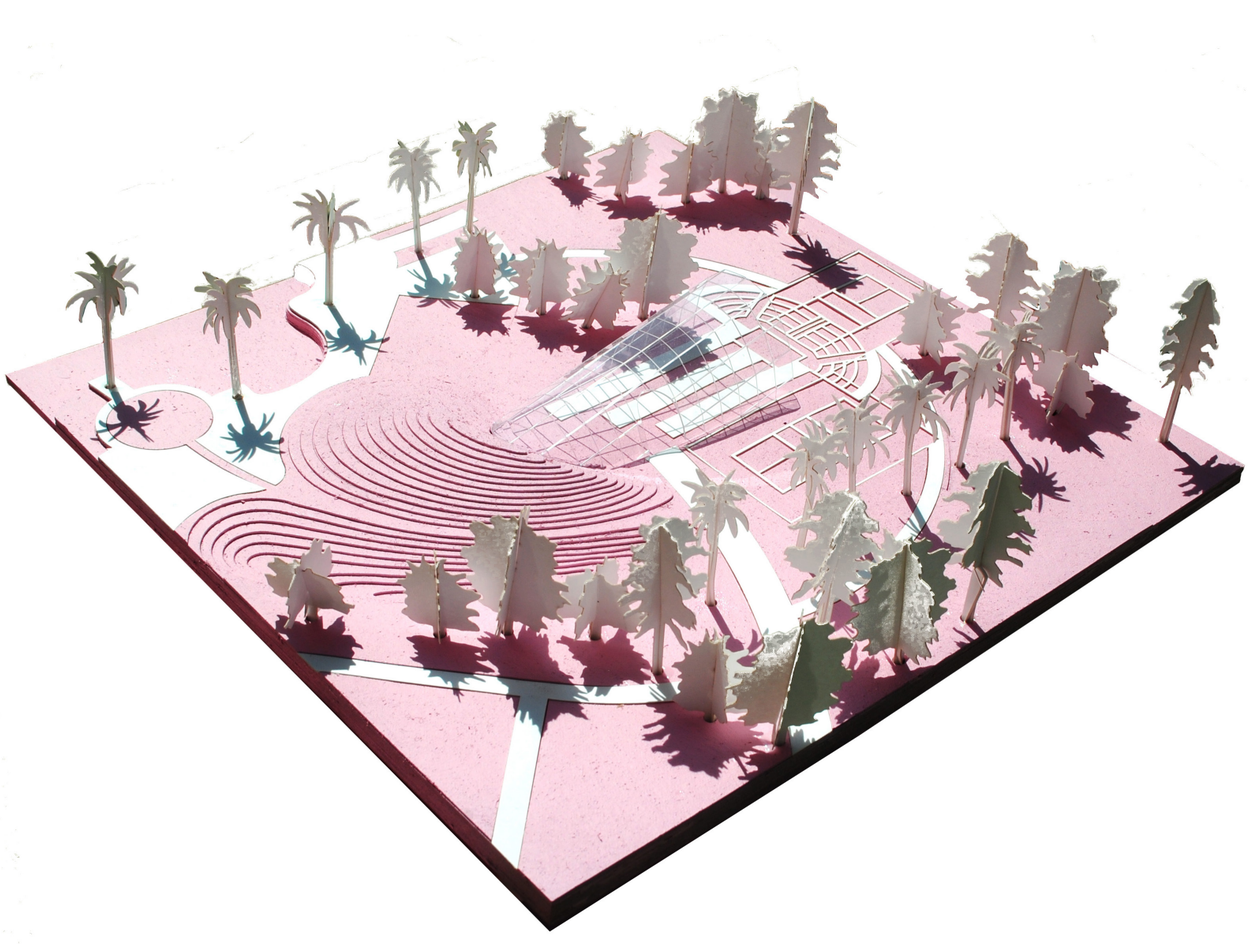
Model Photographs

Margaritaville Town Center



Pickleball Courts and Glass House for Natural Organic Reduction (Human Composting)



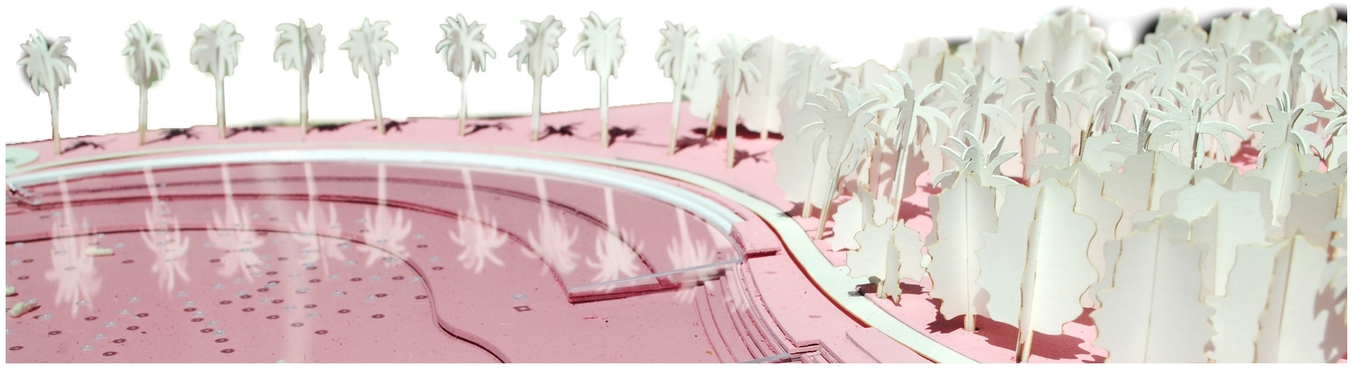


Model Photographs

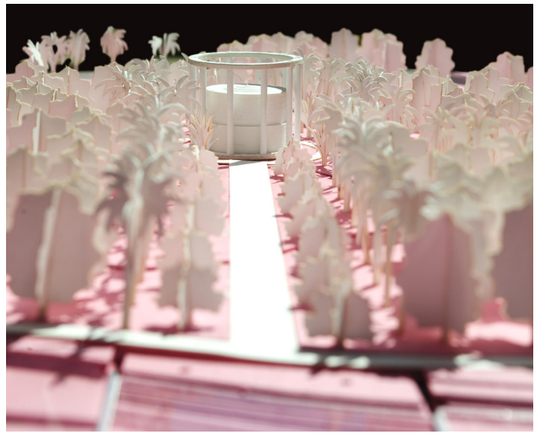
Margaritaville Manatee Club



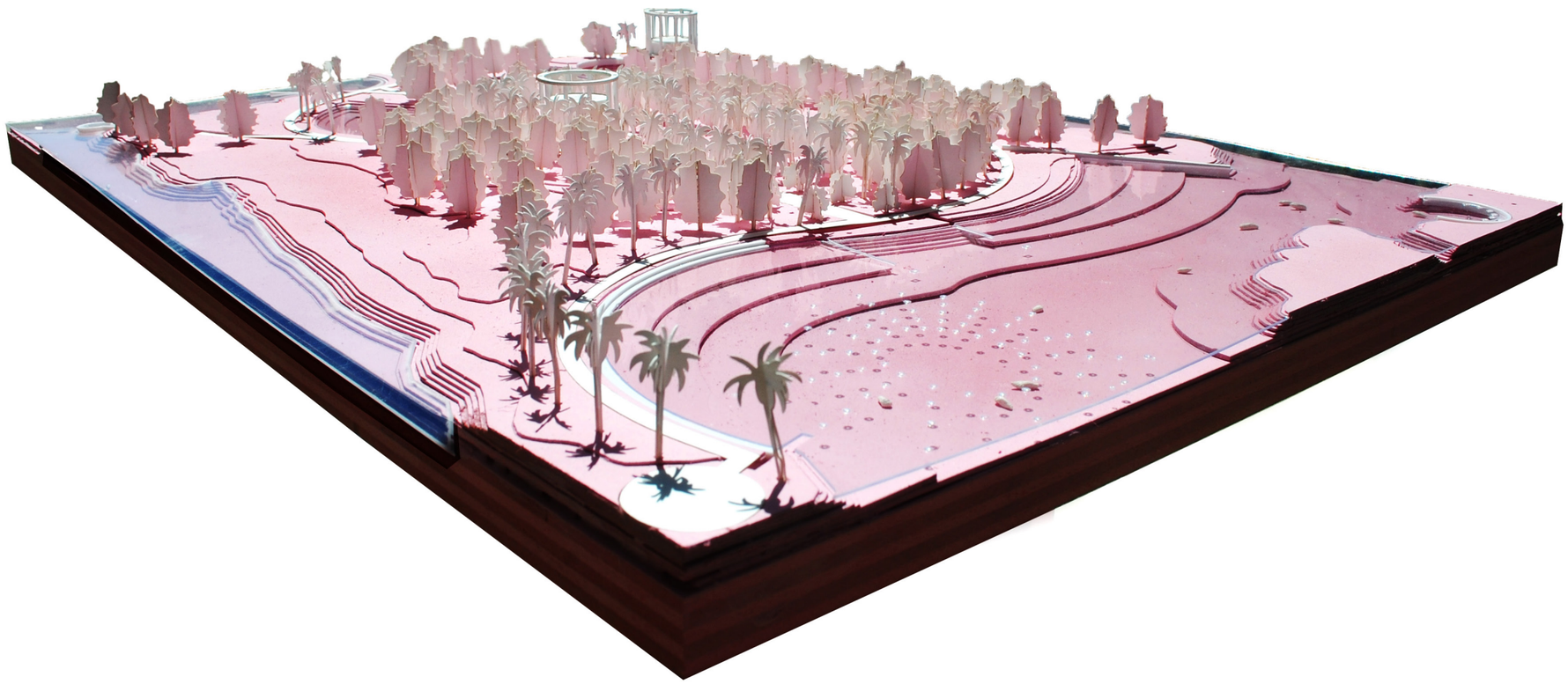








Allee leads to anaerobic digester (machine for human waste-to-heat conversion)







Manatees gather in heated water

Model Photographs

Glass Sand



Sand for beach nourishment - from crushed and smoothed glass



Heineken glass (fine)



Heineken glass (course)



Bombay Saphire Gin glass (medium grain)



Clear glass (fine)





Digital Presentation with Captions

Manatees & Margaritas

Toward a Strange New Paradise



Kevin Robishaw

Advisor: Craig Douglas

Manatees & Margaritas

Toward a Strange New Paradise



Kevin Robishaw

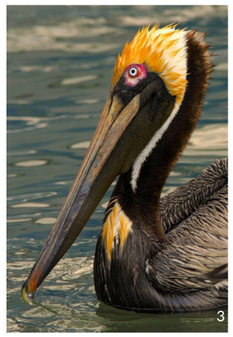
Advisor: Craig Douglas



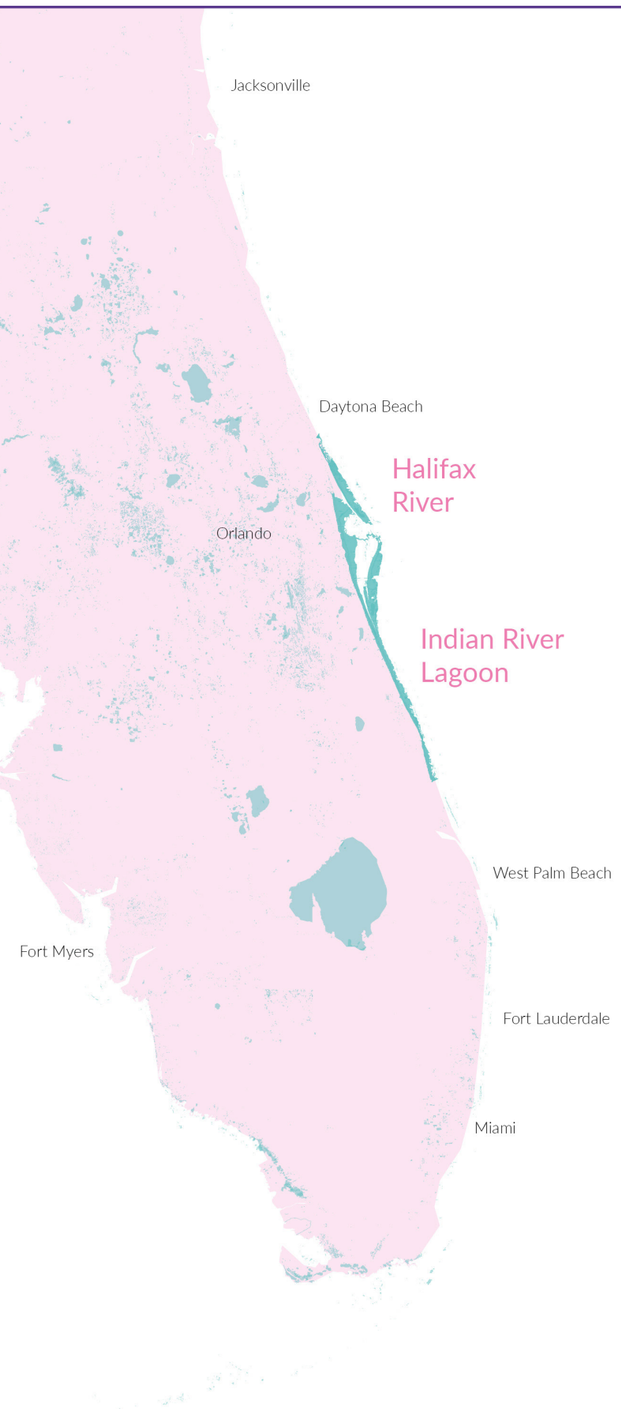
1



2



3



The lagoons on the east coast of Florida support more species of flora and fauna than any other estuary in North America.[1]



1



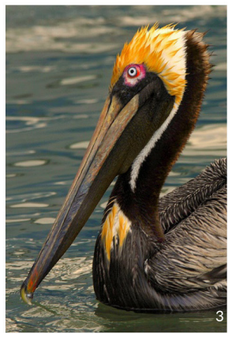
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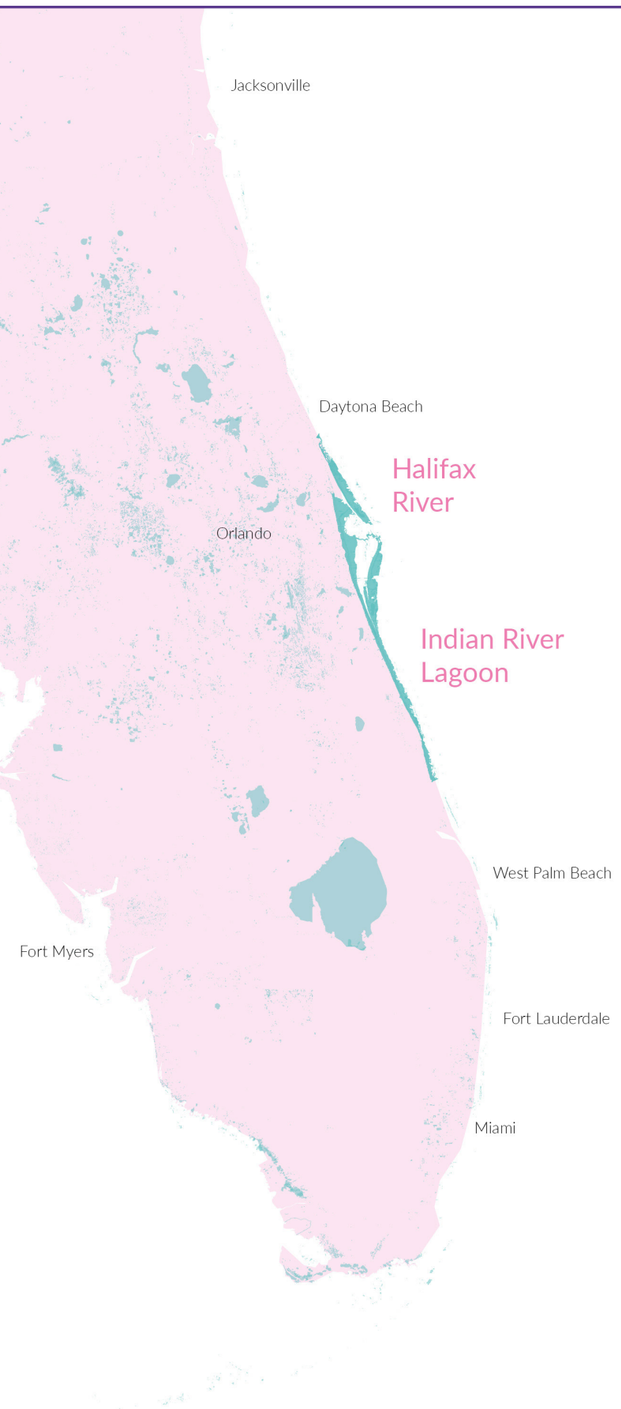
2



5



3



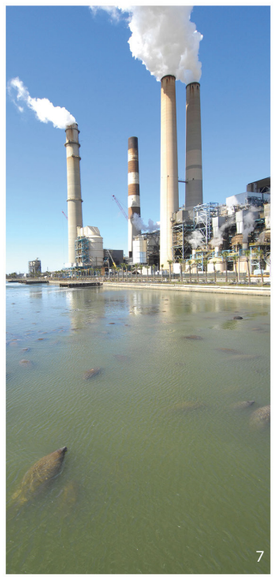
Manatees gather there…



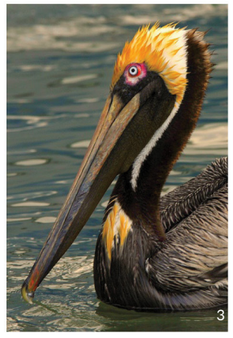




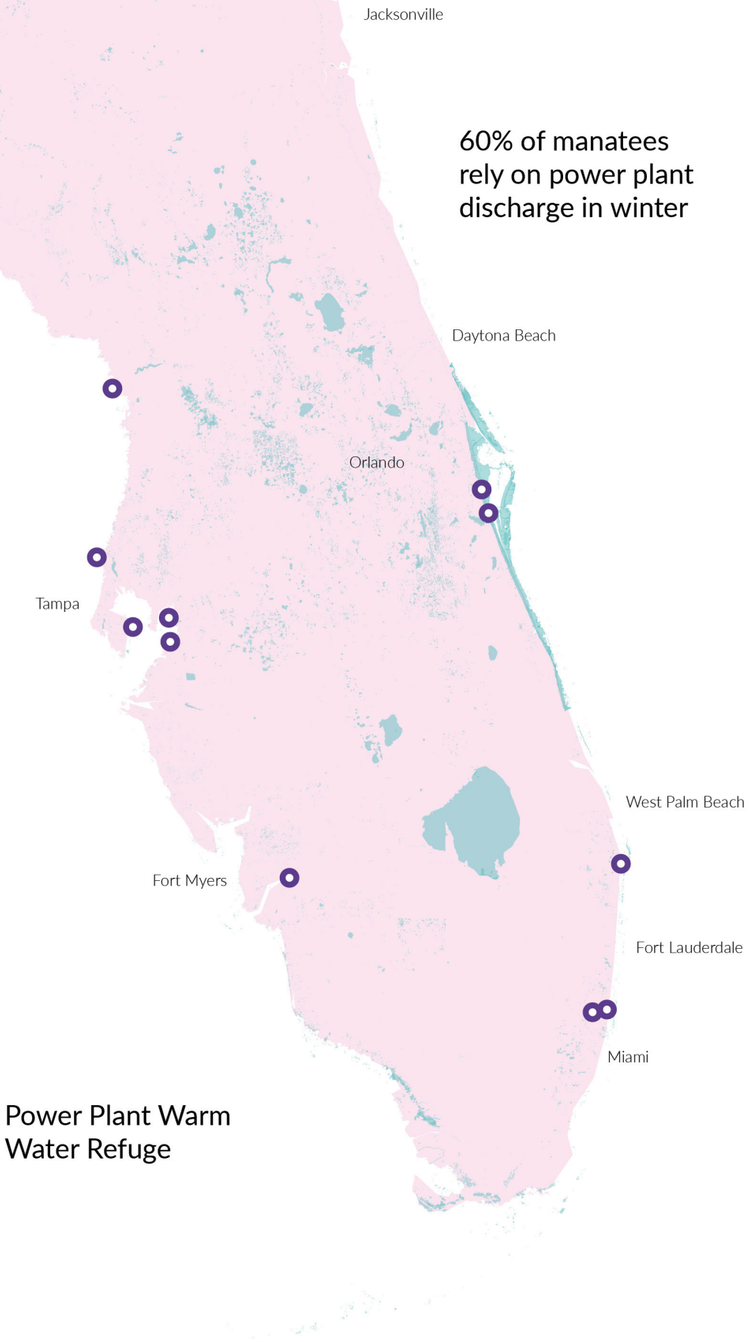












60% of manatees rely on power plant discharge in winter

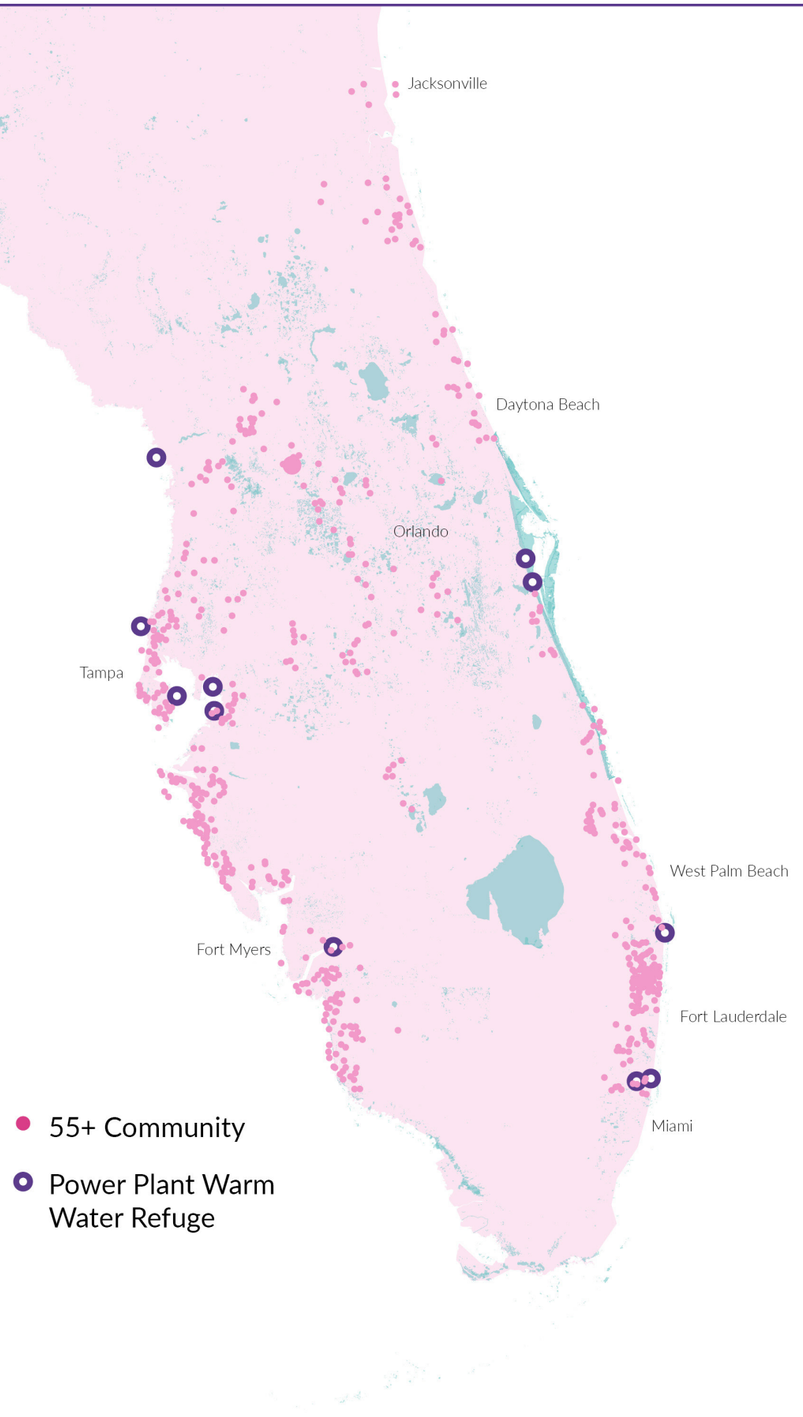
Power Plant Warm Water Refuge

in the warm water discharged from power plants, which provide a lifeline during cold winters. Manatees can die with prolonged exposure to water under 68 degrees F.[2]









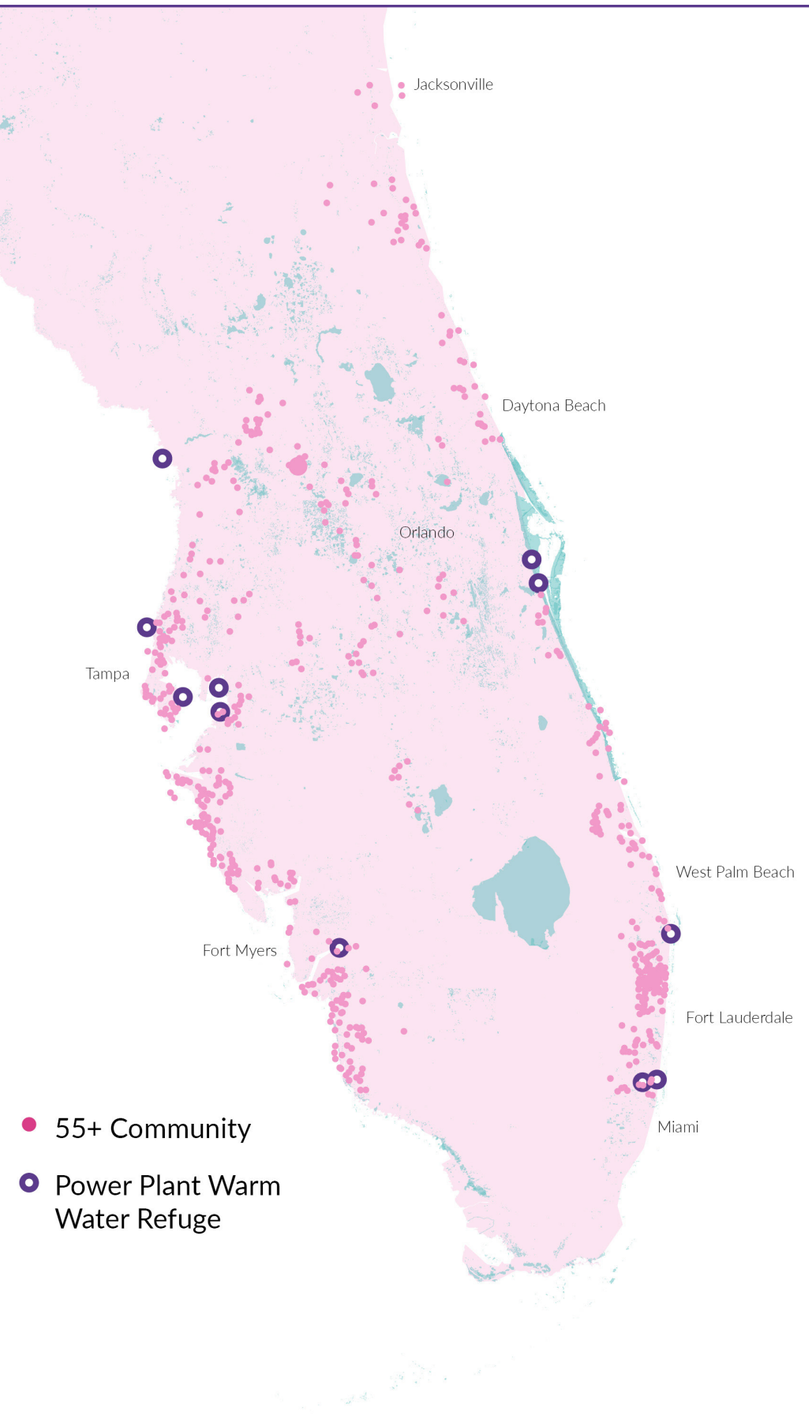
The “55 and better” also seek warmth - and a life of leisure – at the state’s rapidly growing “active adult” communities.[3]


8




10


11



As populations increase, human waste leaches into the lagoon and seagrass dies.[4]



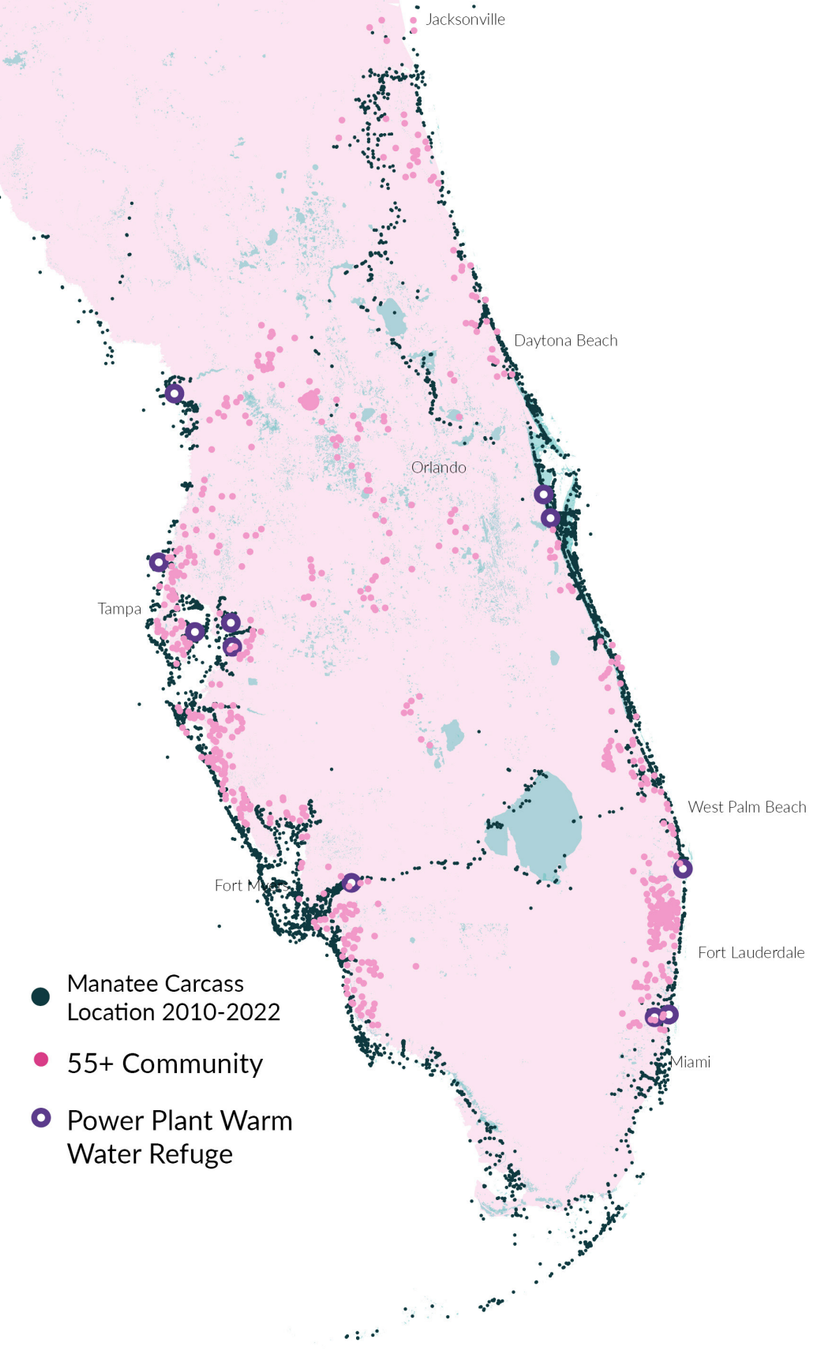












Manatees starve in record numbers, and are fed romaine lettuce in a last-ditch effort to keep them alive.[5]


8




10


11

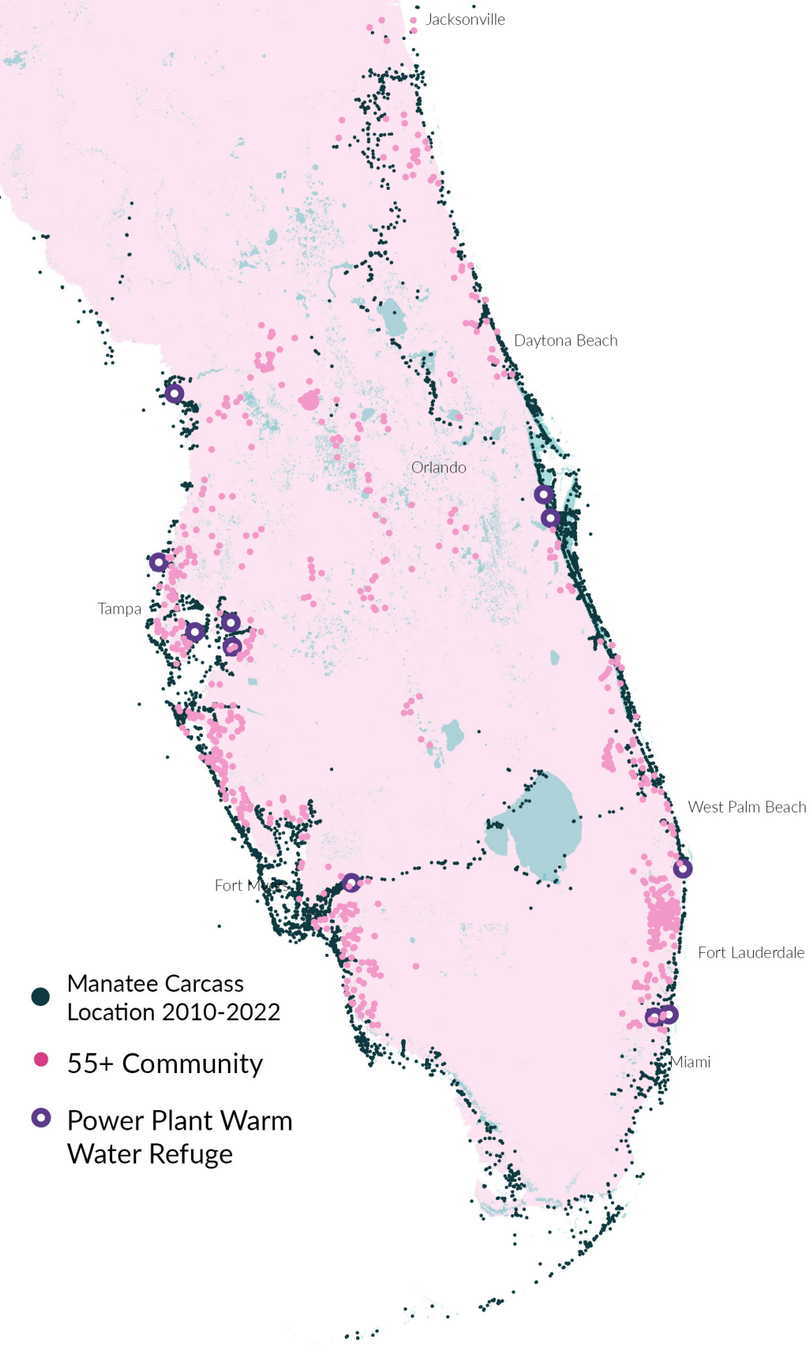

12


13


14


16


15



This project probes the strange ecologies of Eden in the Anthropocene – of romaine lettuce and power plants, manatees and margaritas.



Fairchild Botanical Garden, Coral Gables, Florida.
Designed by William Lyman Phillips, Harvard GSD Graduate, 1936

It locates itself in the tension – at the heart of landscape architecture – between celebrating the natural landscape...



Construction of Latitude Margaritaville 55+ Community, Daytona Beach, Florida, 2020

and ‘perfecting’ it,



Construction of Latitude Margaritaville 55+ Community, Daytona Beach, Florida, 2020



Tropical Garden, Miami, Florida, Raymond Jungles

between visions of paradise – the yearnings of generations of middle-class Americans for the ‘good life’ -



Construction of Latitude Margaritaville 55+ Community, Daytona Beach, Florida, 2020



Florida Hammock

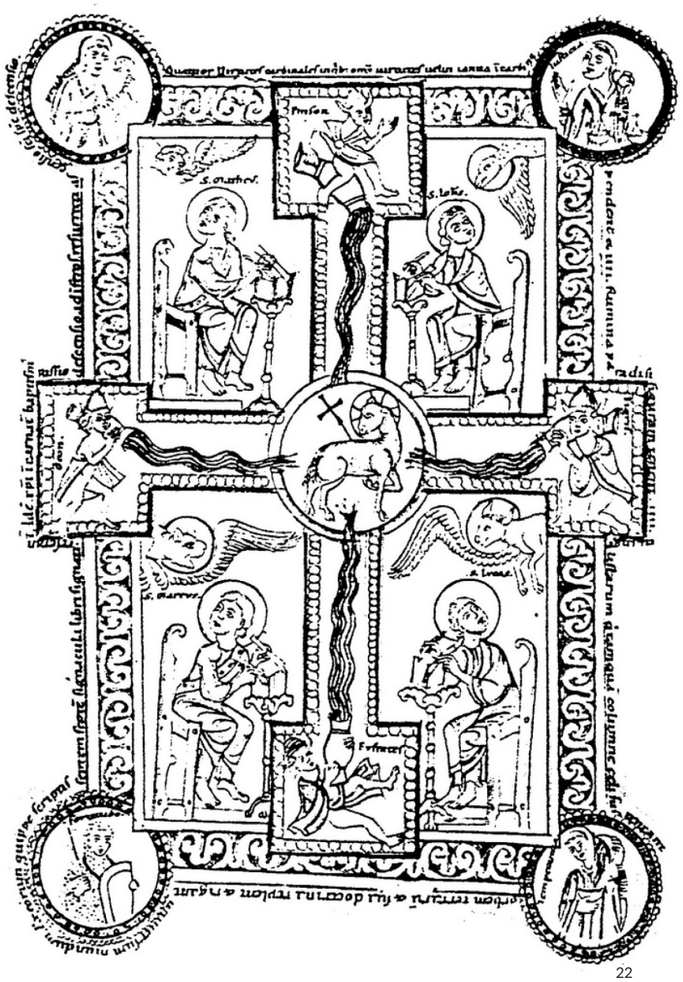
and the actual ecologies of the subtropic.



Paradise. A painting by Lukas Cranach the Elder (1530).

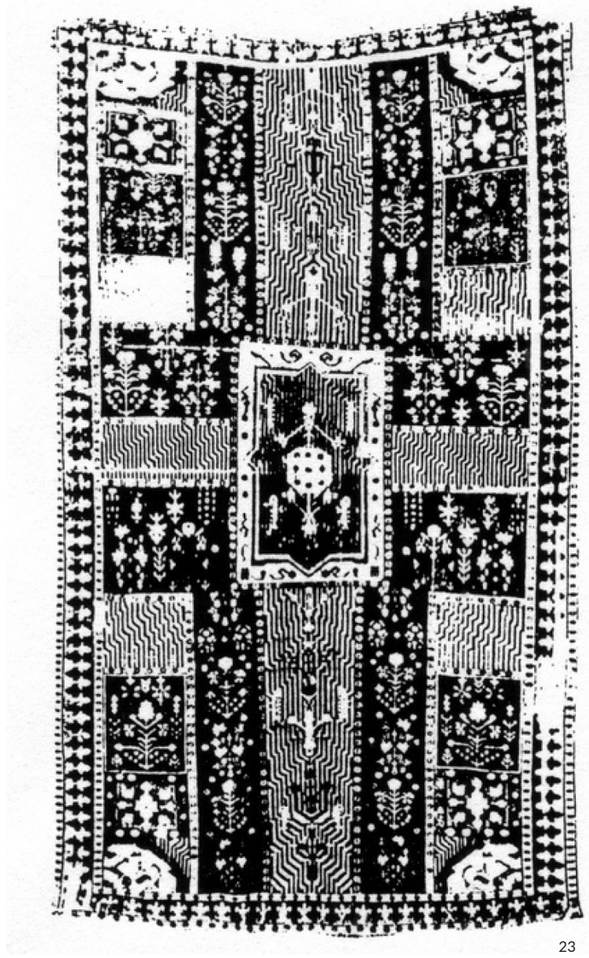
21

Ideas of paradise have long history in landscape architecture.



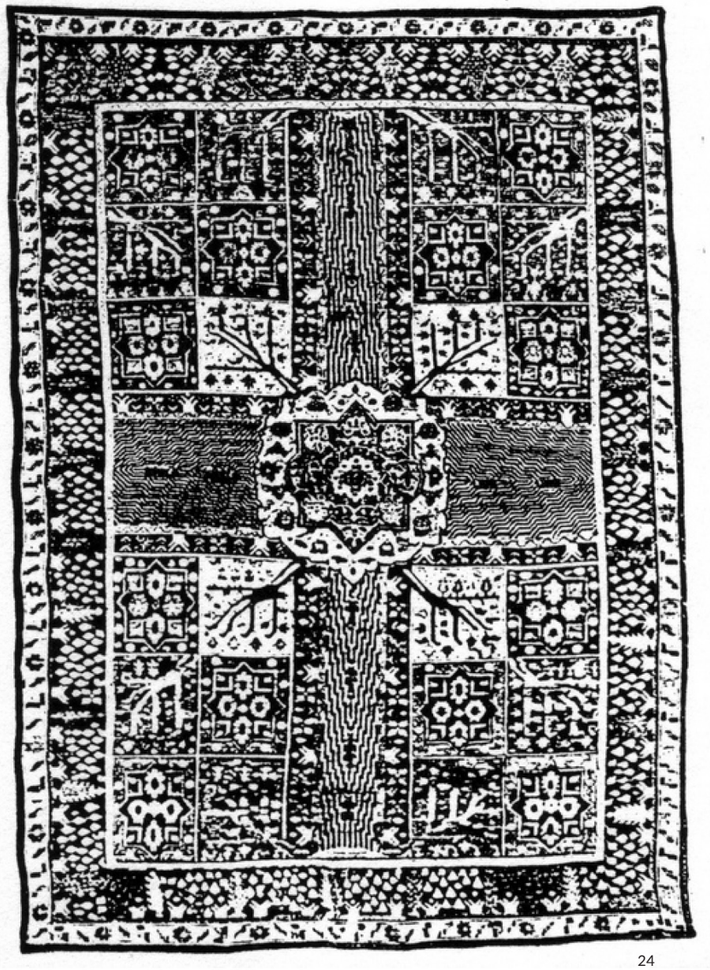
22

The quadpartite garden with the “four rivers of the world” converging (image from a twelfth century breviary in the monastery of Zwiefalten, Germany, right)



23

Persian carpet with a garden and four rivers of paradise. Metropolitan Museum of Art, Collection James F. Ballard. In: ARDALAN & BAKHTIAR (1973).



24

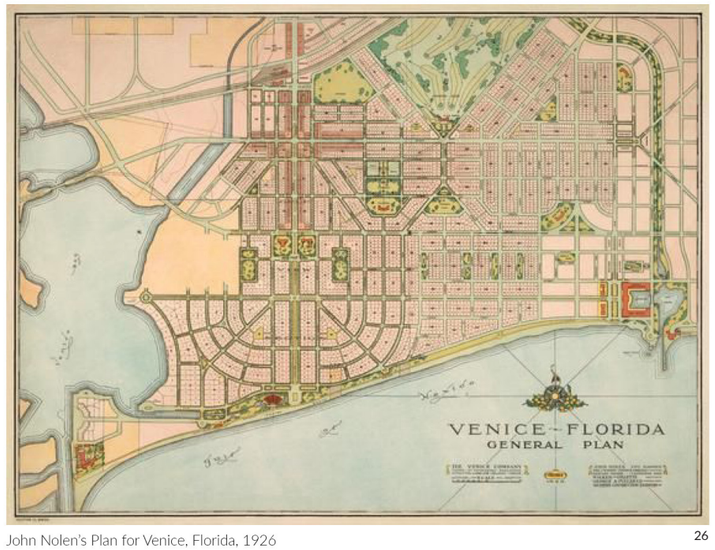
Persian carpet with a garden and four rivers of paradise. Victoria and Albert Museum, London; around 1700. In: THACKER (1979).

The medieval pleasure garden and Persian carpets carry the tradition.



William Lyman Phillips, McGee Jungle Garden, Vero Beach

25



John Nolen's Plan for Venice, Florida, 1926

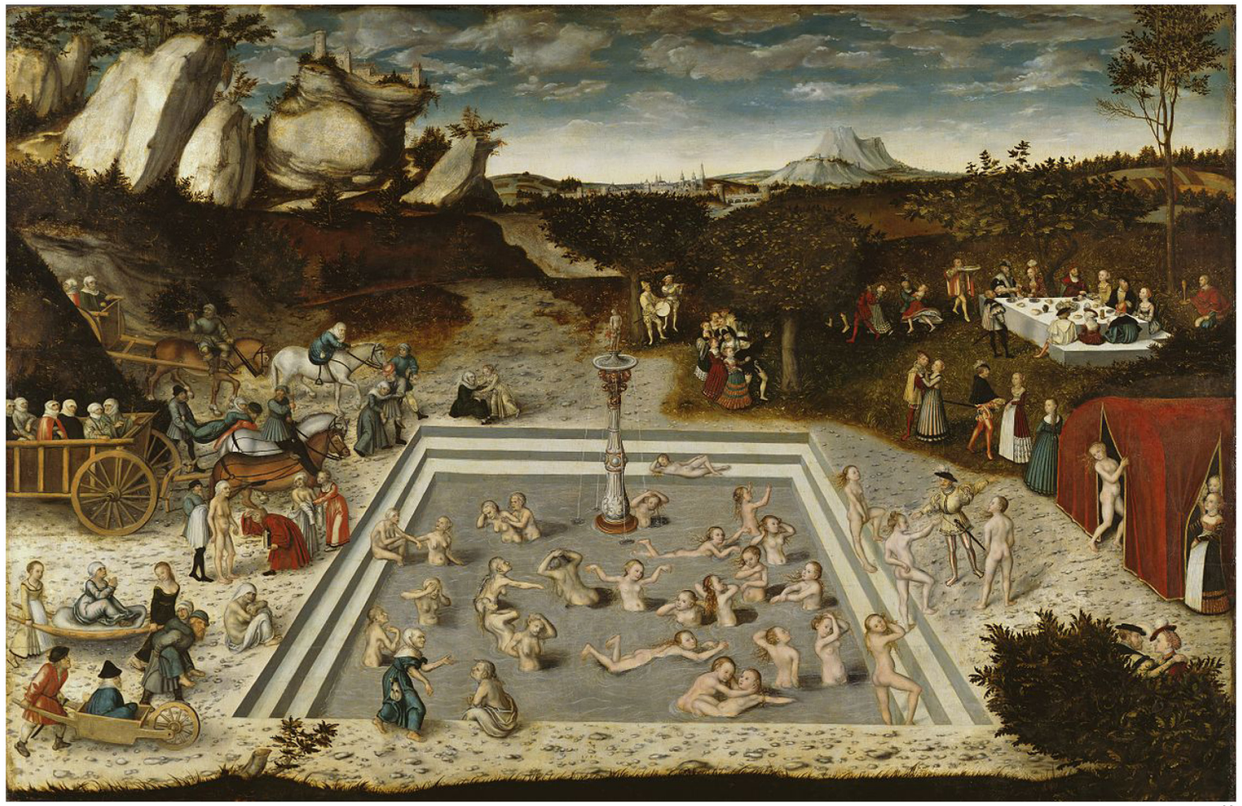
26



William Lyman Phillips, McGee Jungle Garden, Vero Beach

27

A certain version of paradise come to life in Florida...



28

The Fountain of Youth, 1546 painting by Lucas Cranach the Elder



29

Postcard: “Fountain of Youth” in Waterfront Park - Saint Petersburg, Florida.

...where Ponce de Leon claimed to discover the fountain of youth (or so the myth goes).[6]



30

Advertisement, Mackle Brothers, homebuilders



31

Dredging and Filling, Marco Island, Florida, 1970

Florida as paradise is a work of salesmanship and design.[7]







32



Jimmy Buffet's Latitude Margaritville, Daytona Beach
Winner of National Assn of Home Builders "Best Landscape Design" Award
(Landscape Architect: Heidt Design)

It's exemplified and commodified today in the booming 55+ community.



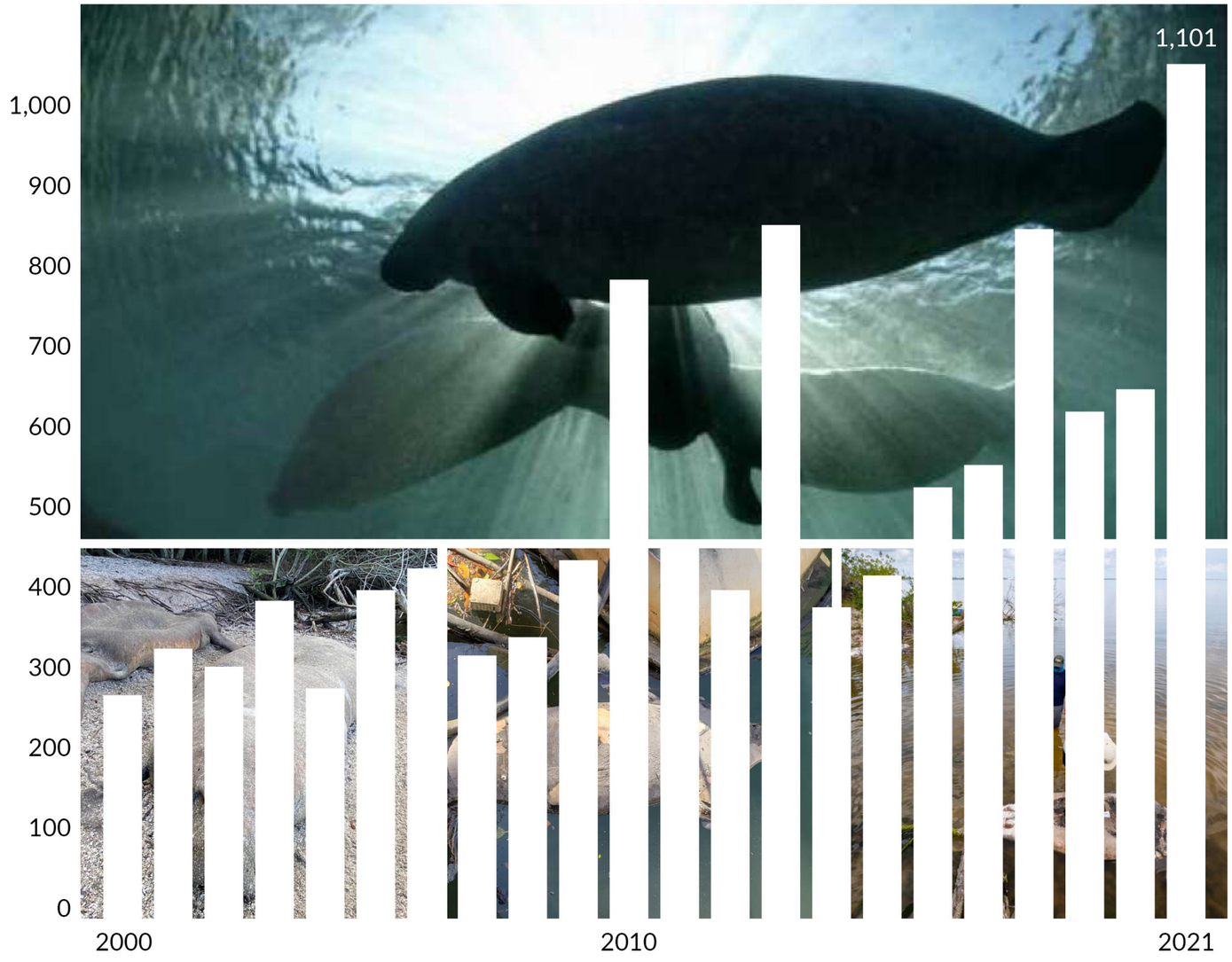






Meanwhile, the manatee – the large sea mammal so emblematic of Florida, so tied to ideas of languid ease – dies at alarming rates. Algal blooms, tied to the leaching of nutrients from human waste, have decimated their food sources.[8]

Annual Manatee Deaths in Florida



The animal, which has occupied Florida's waters for over 1 million years, lost 10% of its population in just one year.[9]

The Garden











The Garden Wall









The Obscene

The manatees' deaths are linked to those very things we had hoped to keep outside the garden walls – what I am calling the **obscene**: waste, aging, death – the painful realities of a bodily existence – and the things we hide outside the garden but that allow it to happen. All are distanced and concealed by landscape architecture, such that those seeking paradise can proclaim…

The Garden





To Love...







The Garden Wall









The Obscene

...to love nature

The Garden





To Love...







The Garden Wall





And to Kill...





The Obscene

...while killing it

The Garden





To Love...







The Garden Wall





And to Kill...





at the same time

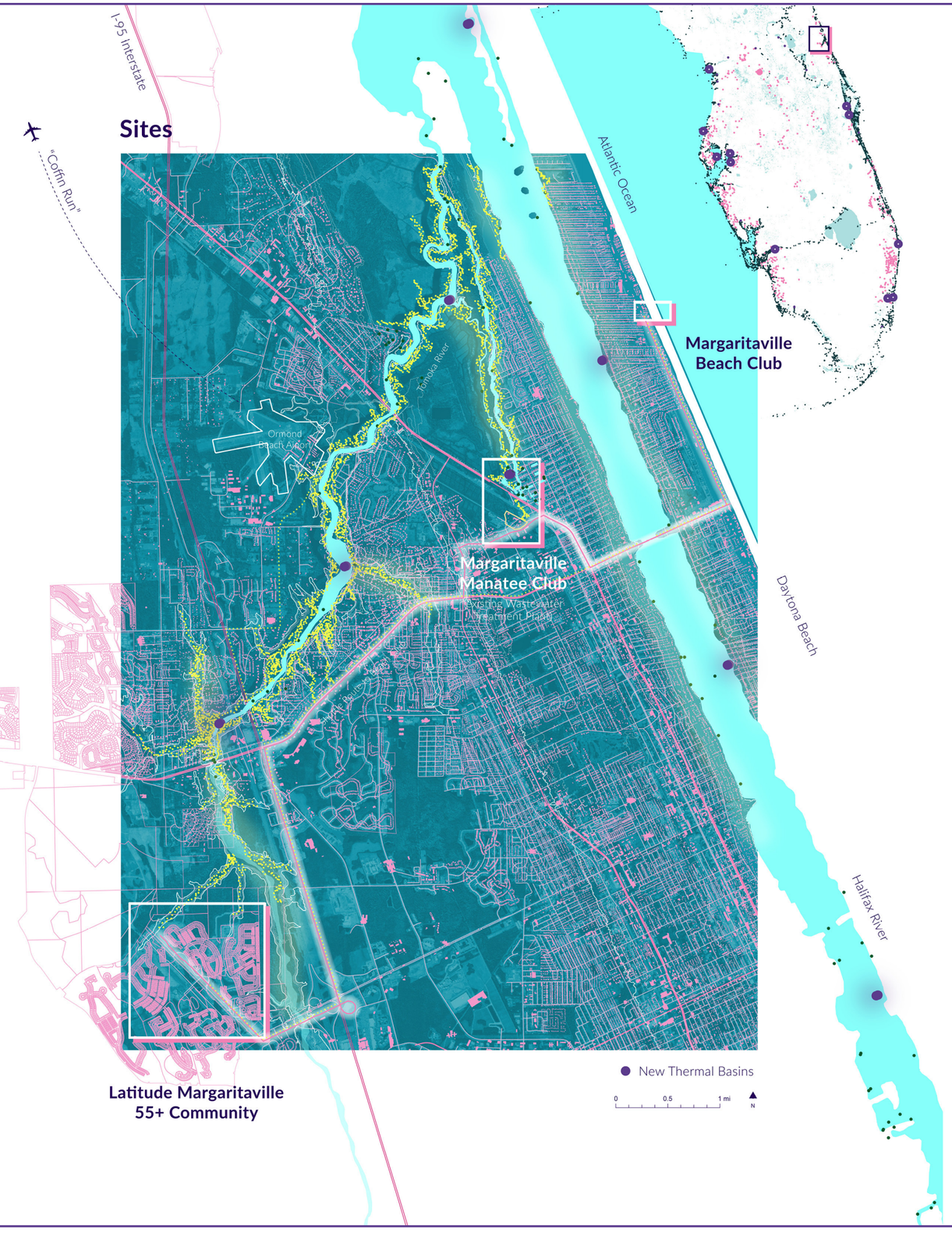
The Obscene







...at the same time



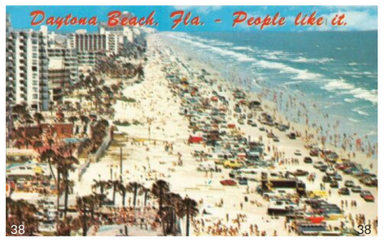
This thesis proposes a series of connected gardens – or, more accurately, anti-gardens – as prototypes for a strange new paradise. They are anti-gardens in that they reject the enclosure that has defined the garden historically. In the first – an existing 55 + community - the obscene enters the garden. By the time we get to the last – the beach - the obscene ***is*** the garden itself.



As the obscene enters, a much stranger type of coexistence emerges - one that moves beyond simply loving nature. And a strange new Florida paradise emerges with it.



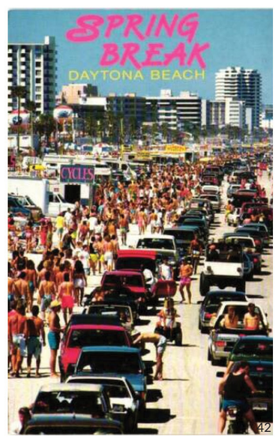




















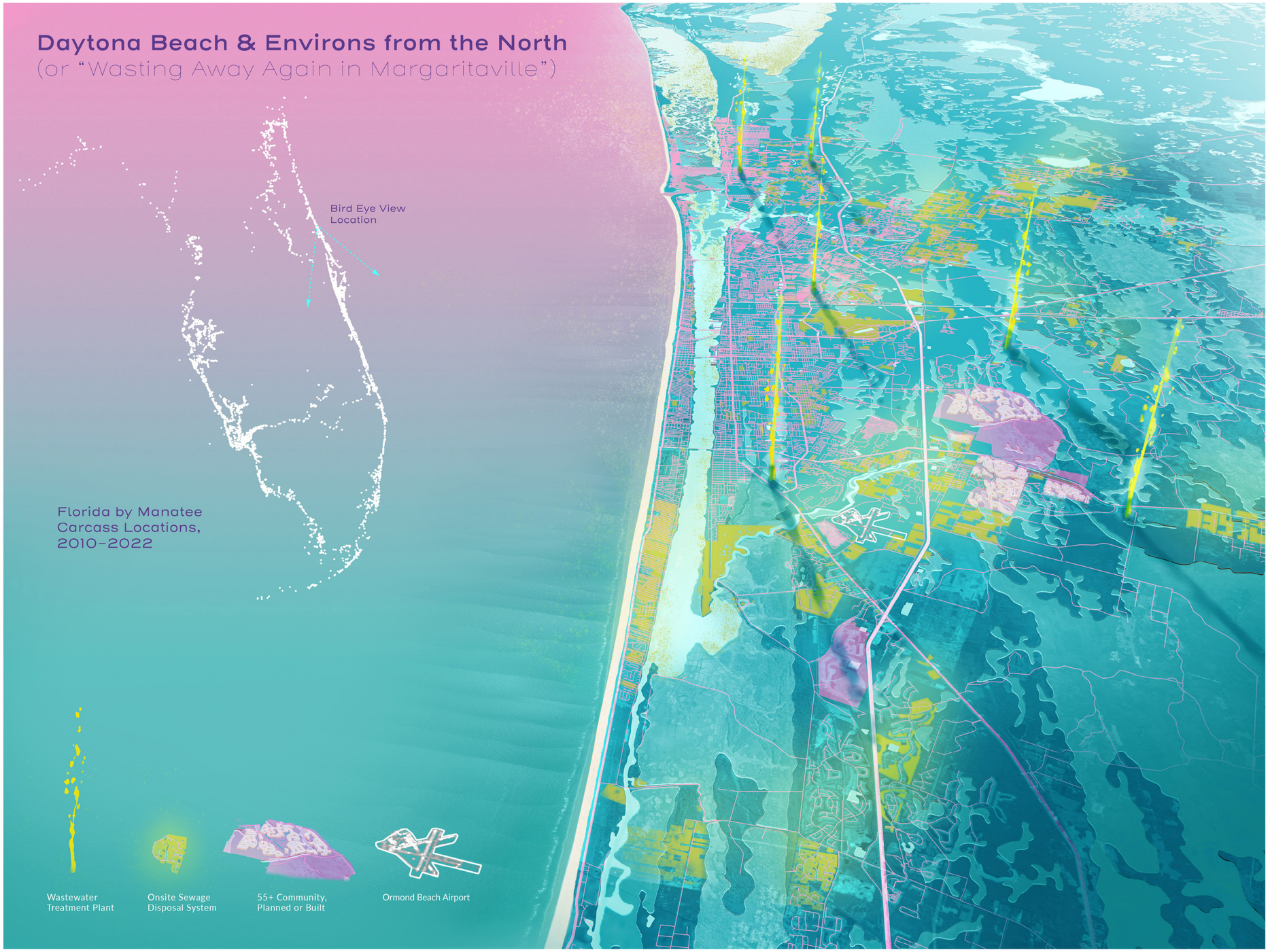




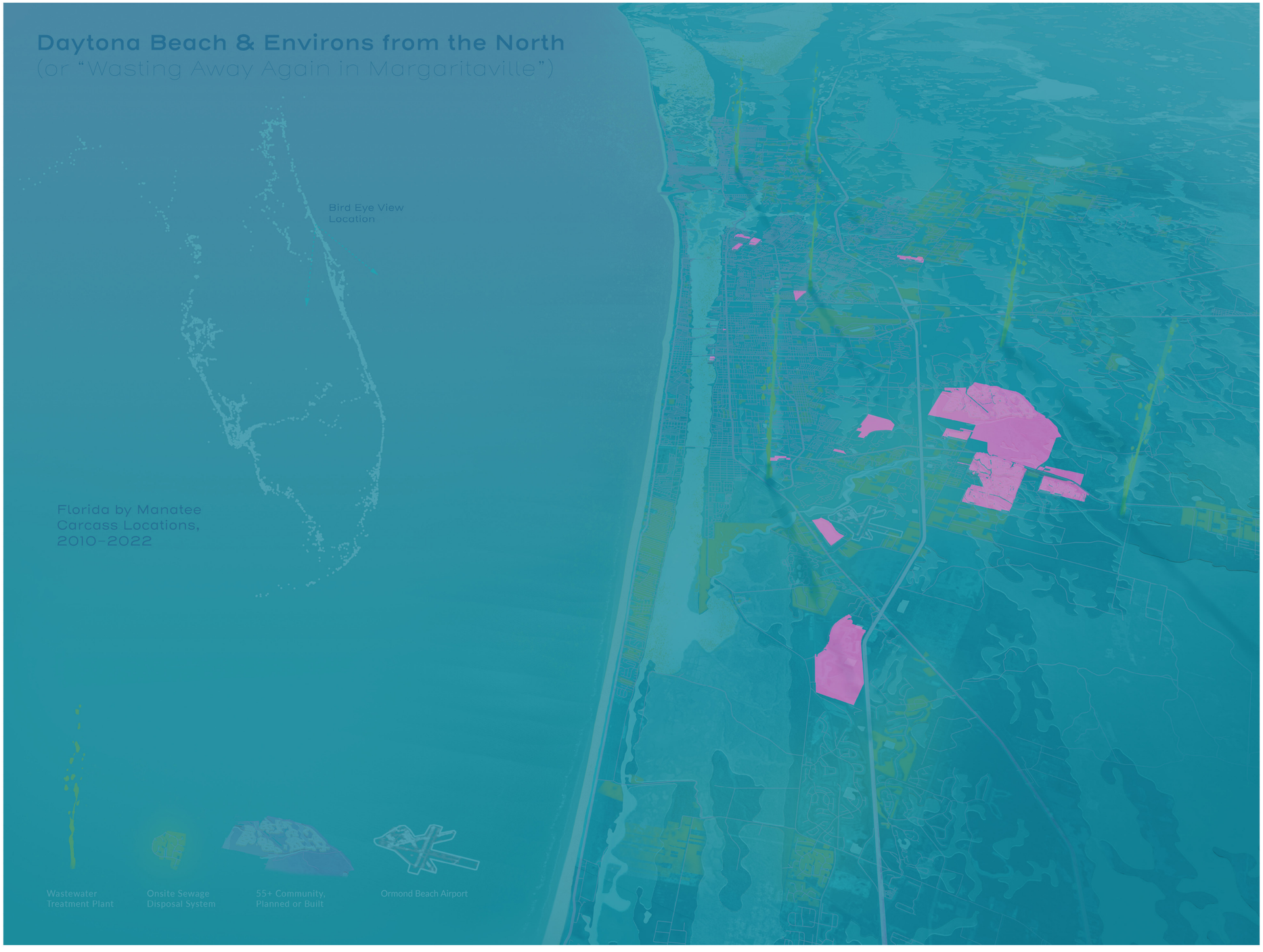




This strange new paradise is sited in the area around Daytona Beach, Florida.



Here we see the region around Daytona Beach from the north.



Rapidly growing 55+ communities sit on one side – with more than 10,000 houses for the 55 and older recently built or planned.[10]



The beach sits on the other.



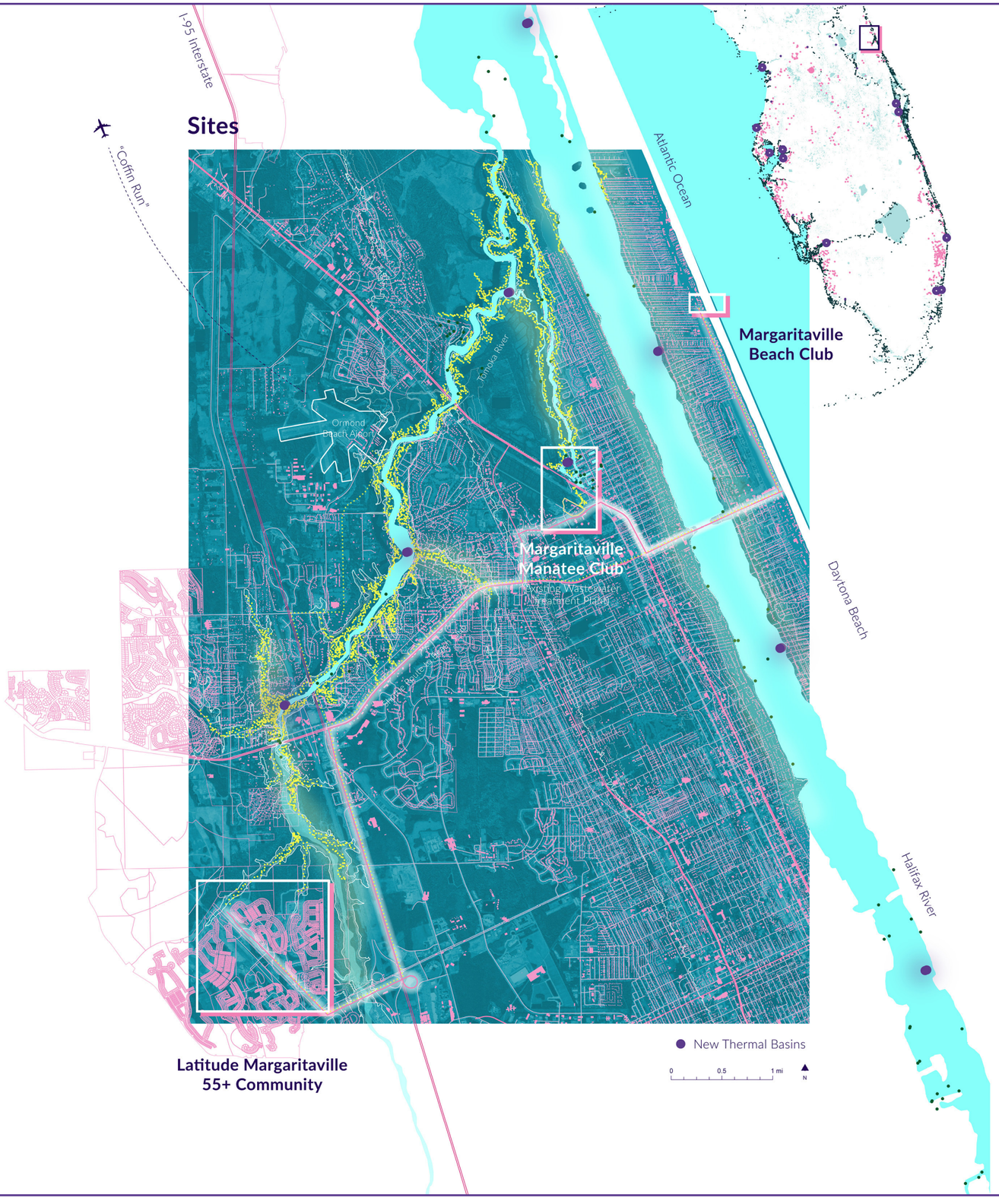
Between sit wastewater treatment plants, stretched to capacity,[11]



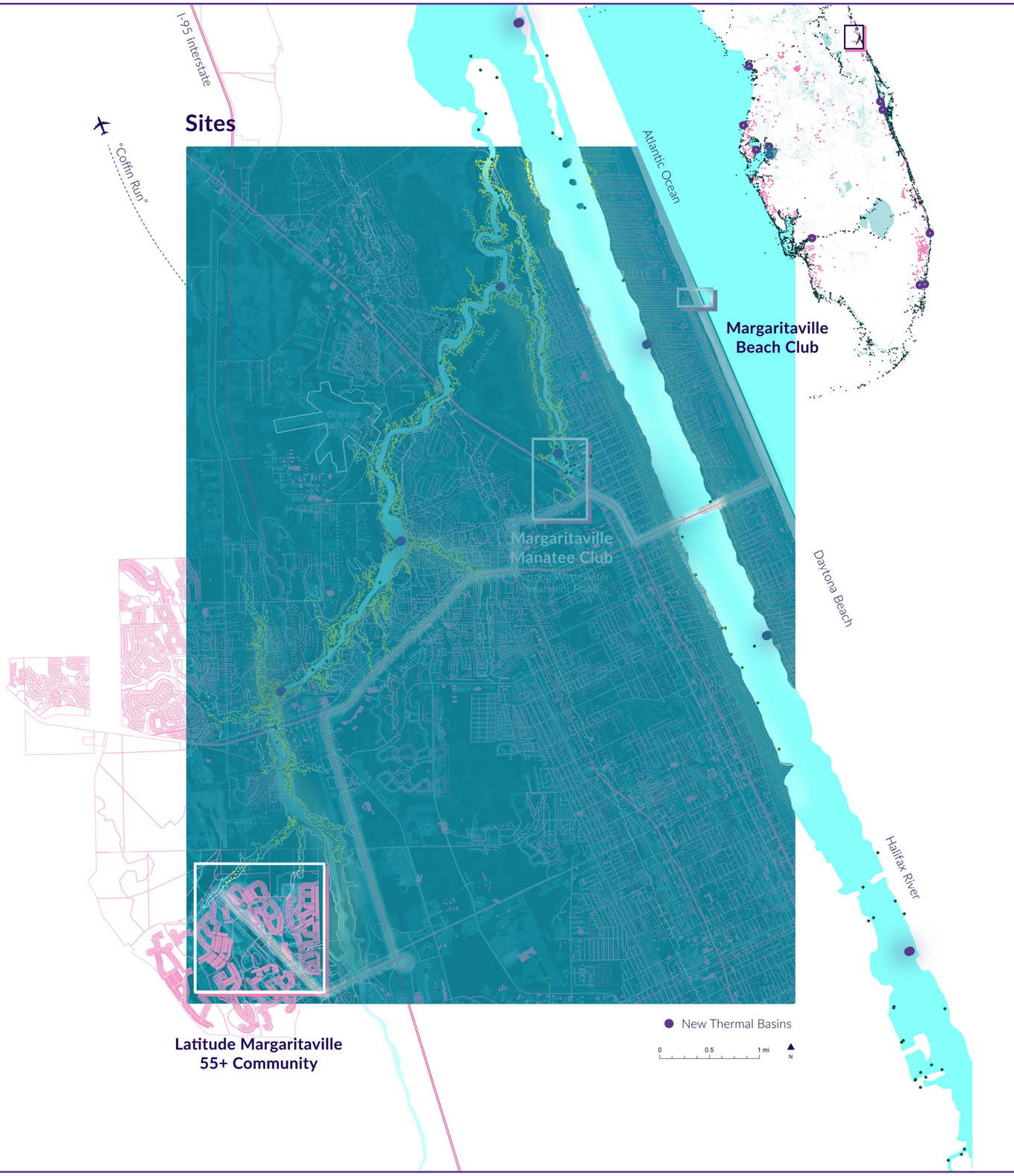
thousands of parcel on their own septic systems, many leaching nutrients,[12]



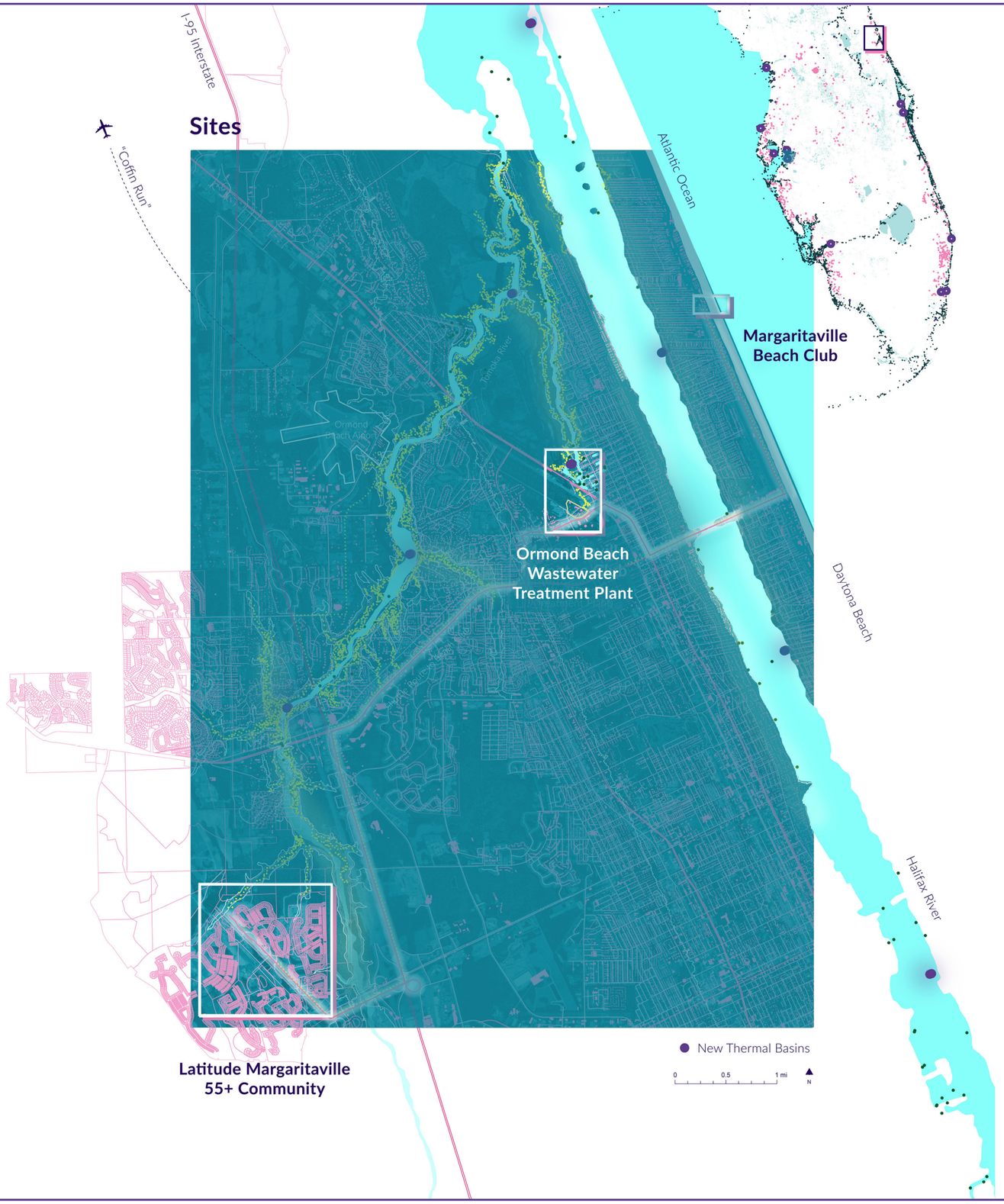
And the local airport. The shipment of retirees' bodies "back home" to the north after death is so common it has a name: the coffin run.[13]



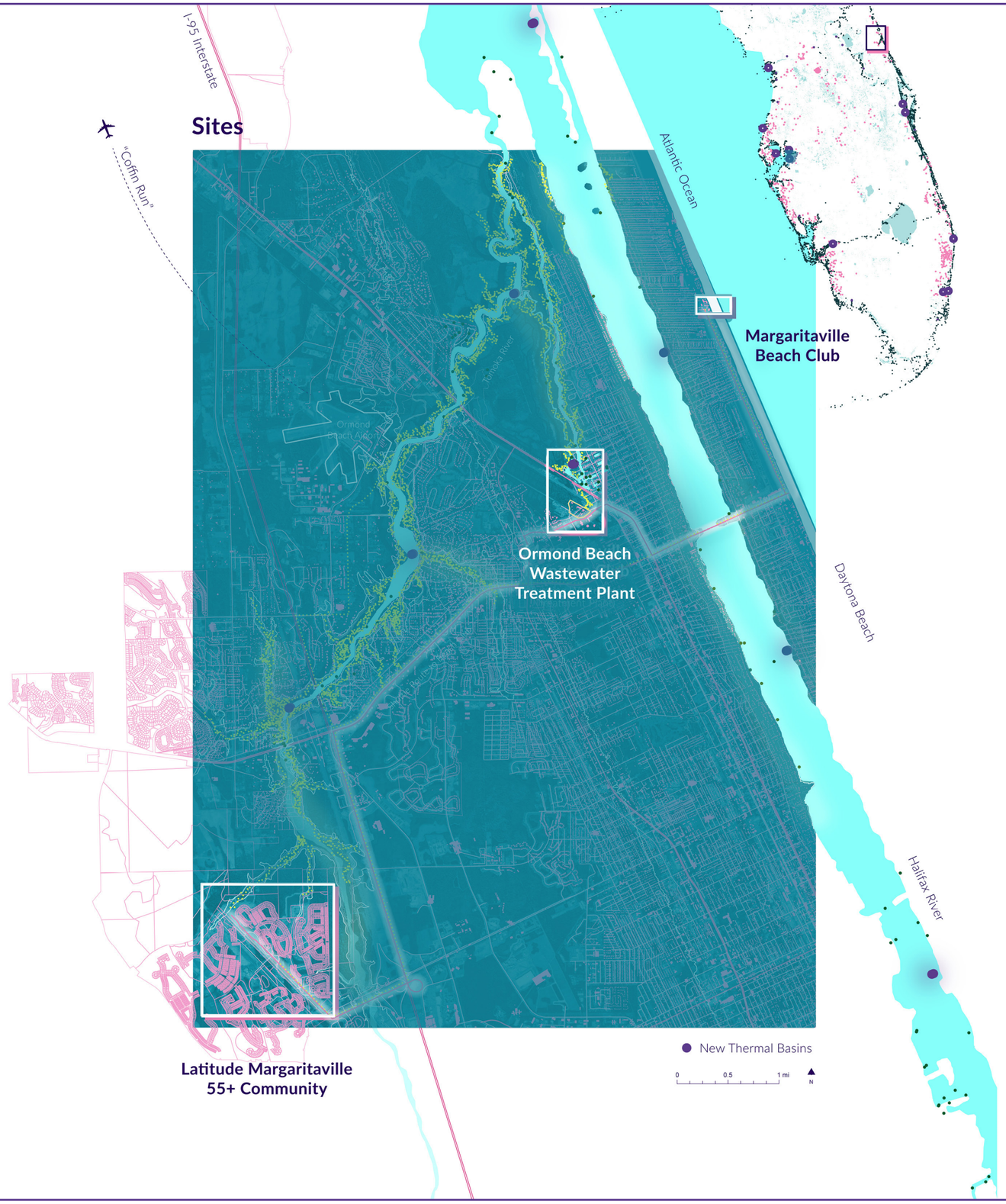
It is in this context that this project proposes a new vision of paradise. Specifically, it is sited at:



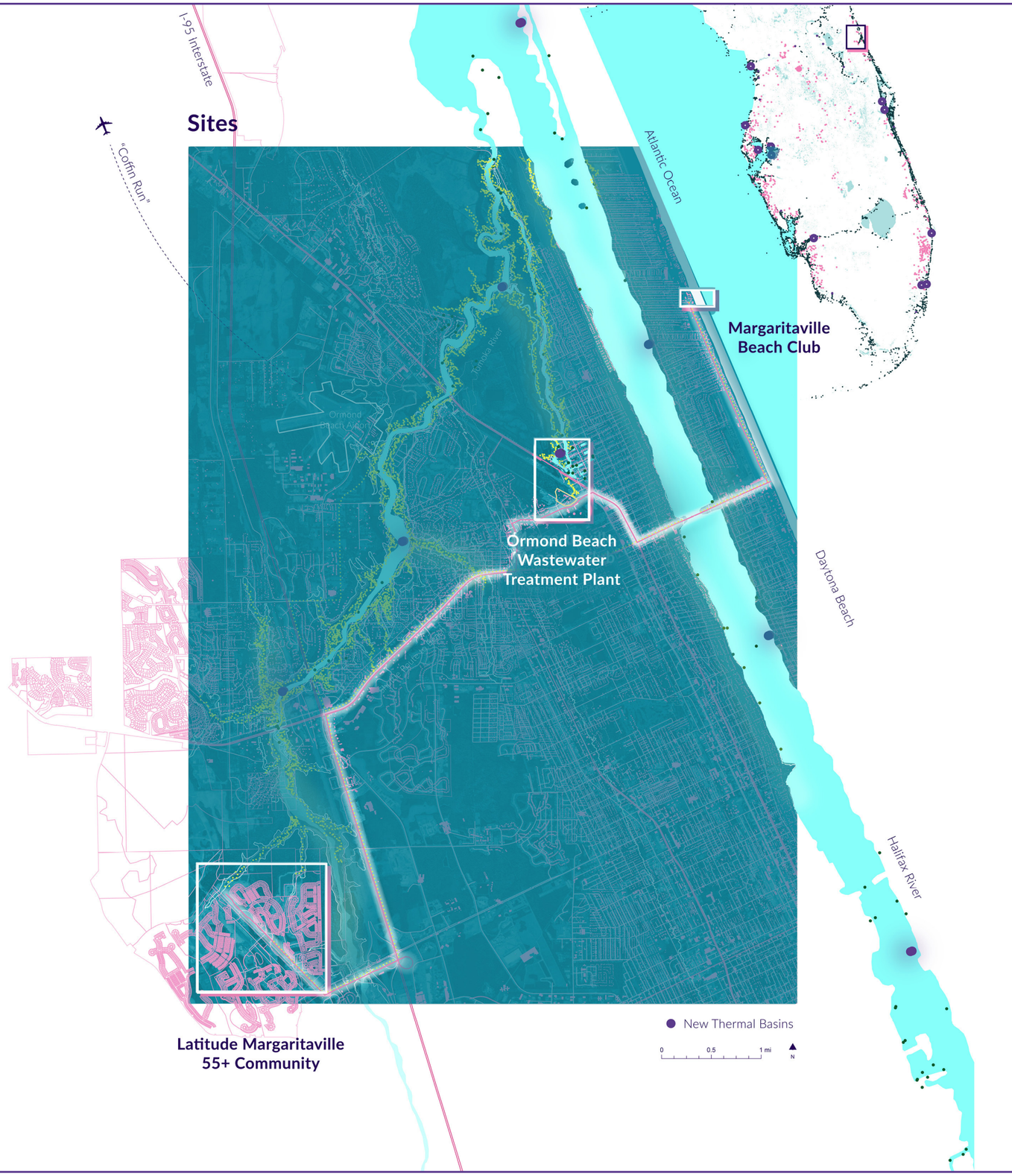
1) Latitude Margaritaville 55+ community



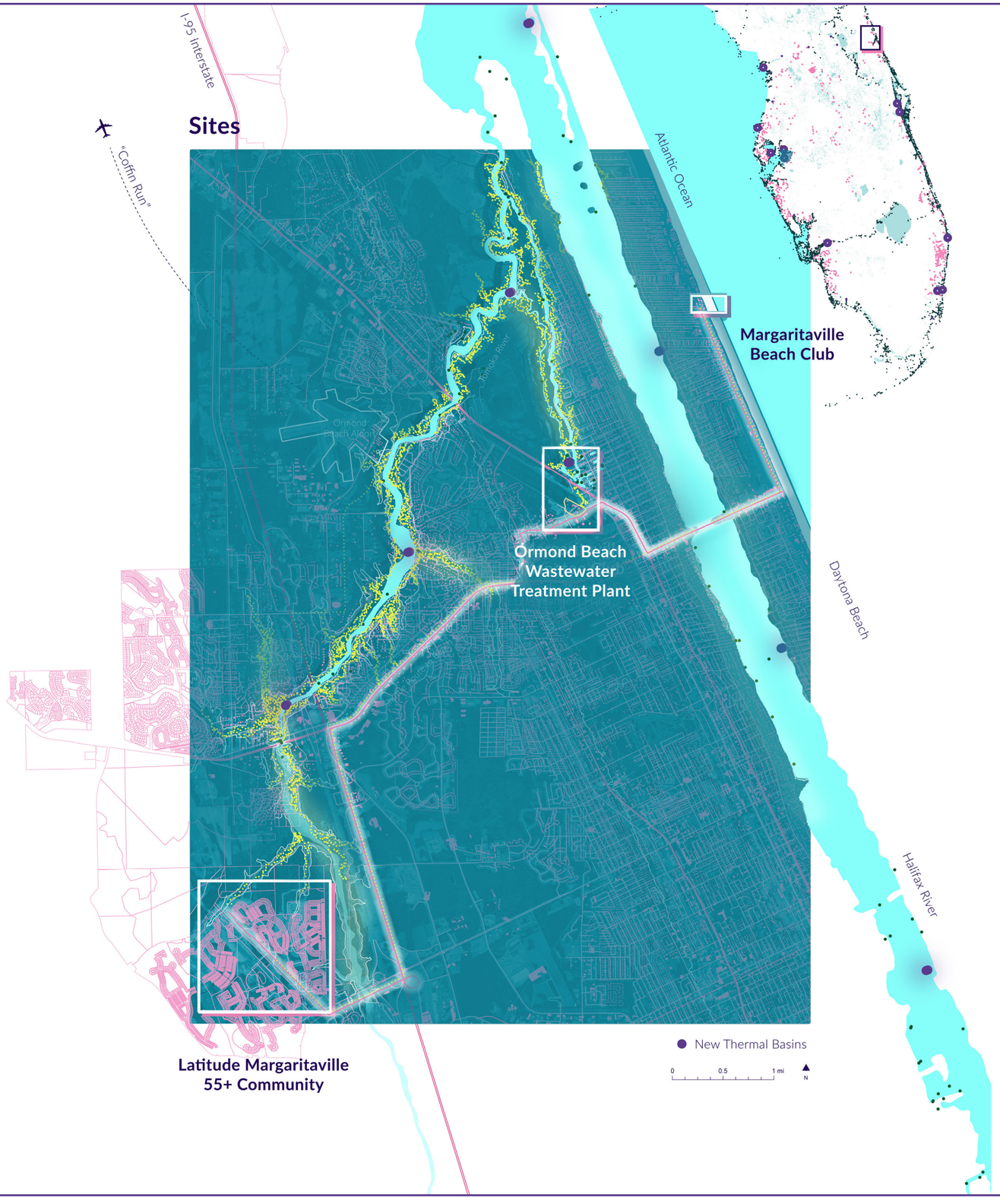
2) the wastewater plant which receives its waste



3) the beach where Margaritaville's Beach Club is located.

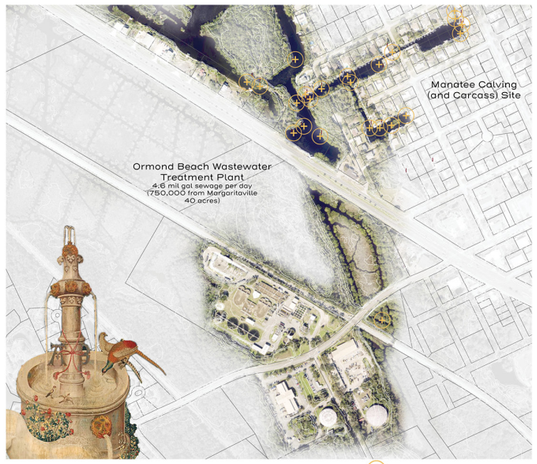


A daily shuttle route runs between them,[14]



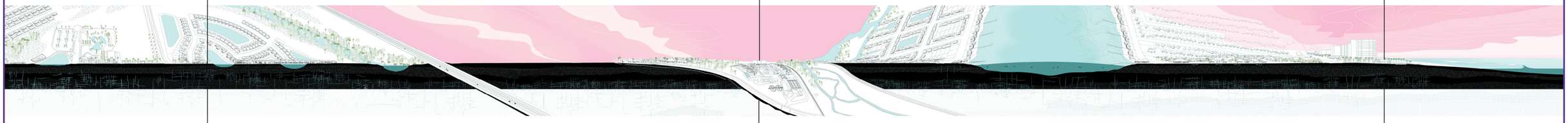
as does the Tomoka and Halifax Rivers.





Manatee Carcass Location



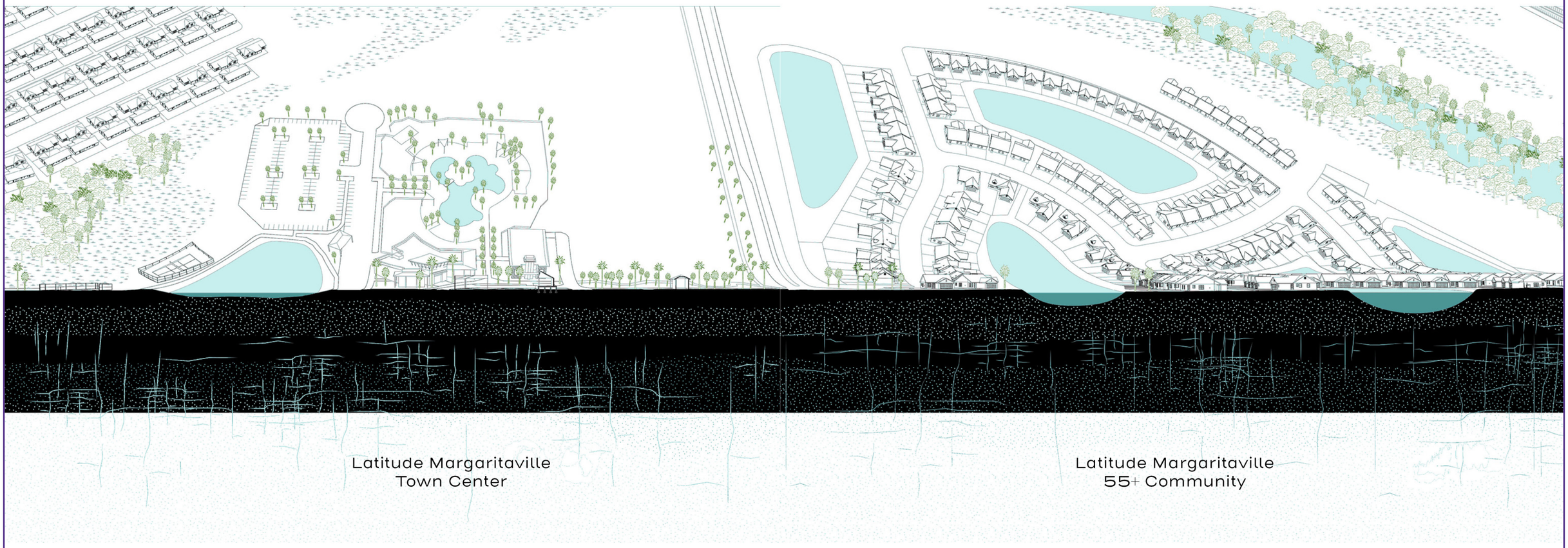


Latitude Margaritaville
55+ Community

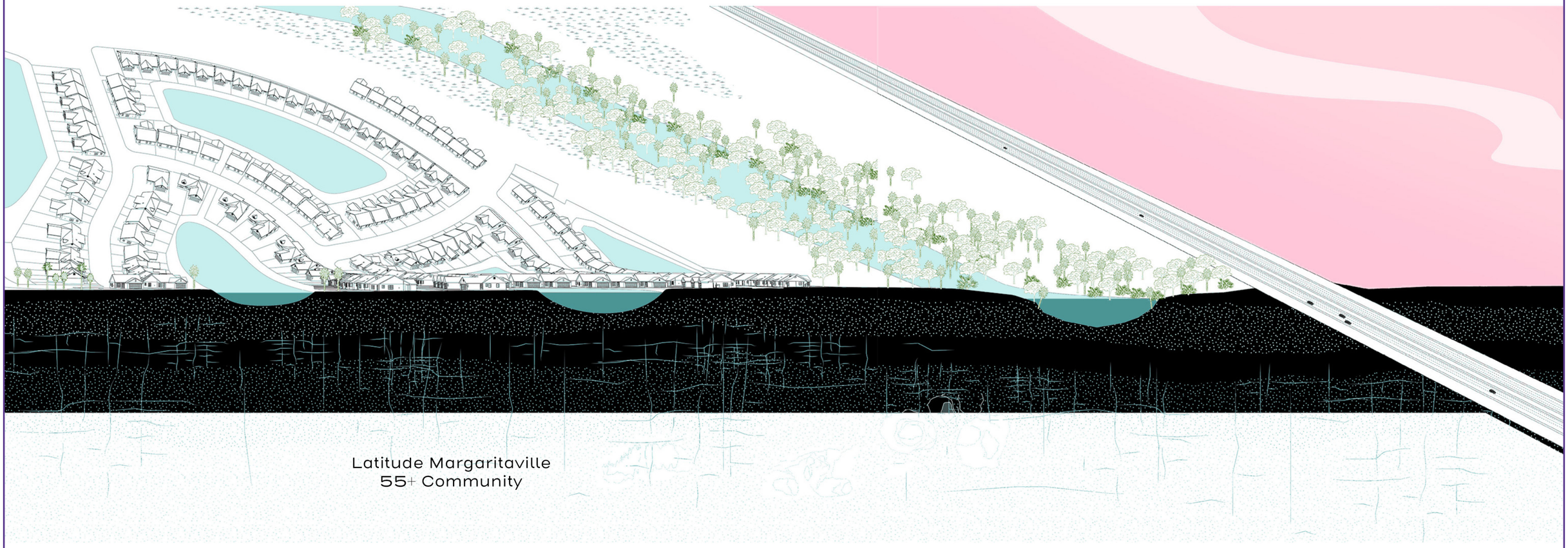
Ormond Beach Wastewater
Treatment Plant

Latitude Margaritaville
Beach Club

Together, these three sites form a transect.



This transect stretches from Margaritaville in the west, with town center, pool, water retention ponds...



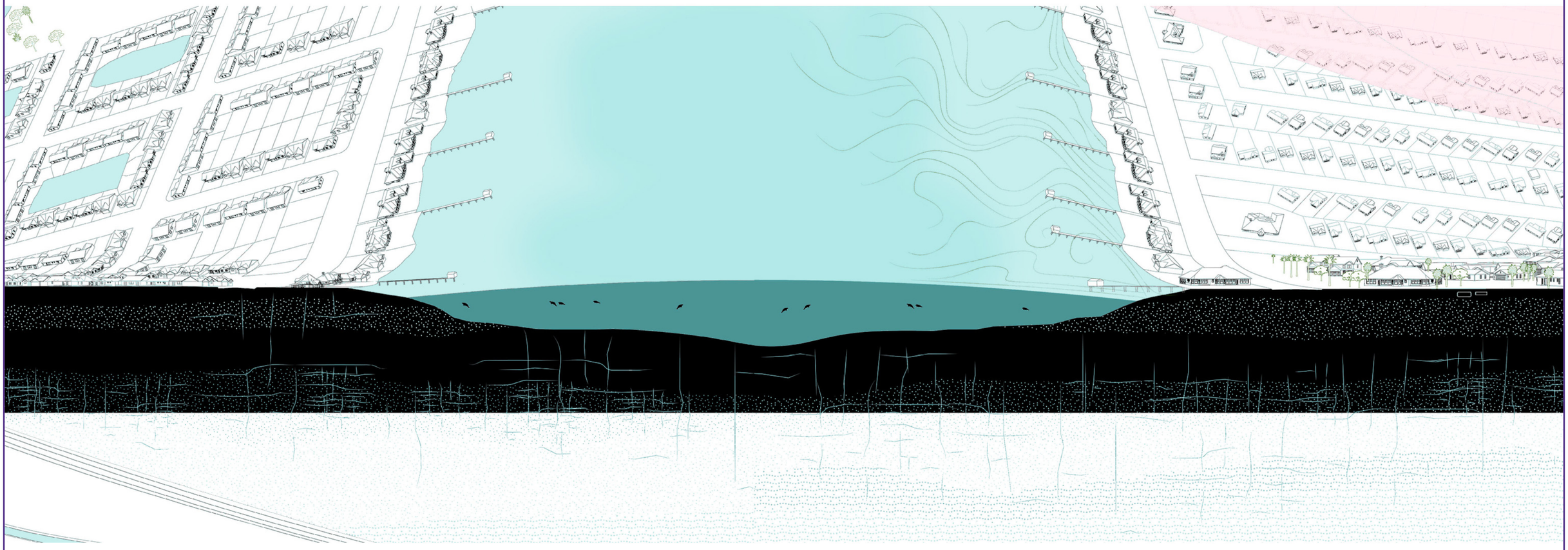
... past the adjacent forested wetland



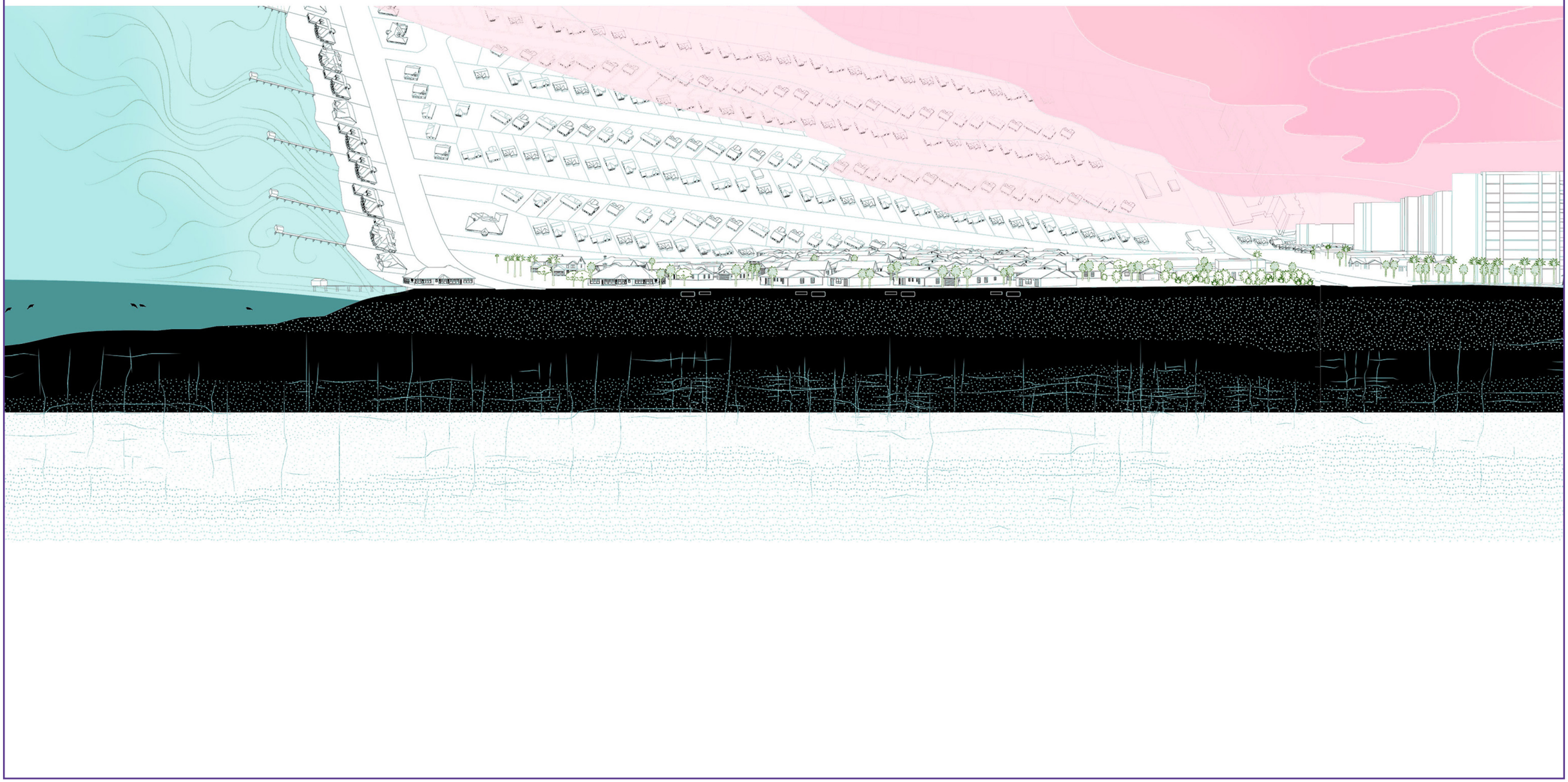
... and I-95 bringing snowbirds from the north



… the wastewater plant that receives Margaritaville's sewage



... and the canals and Halifax River where manatee swim.



.... and, finally,...



...to the beach itself.

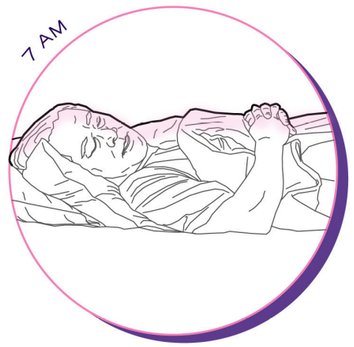


Latitude Margaritaville
55+ Community

Ormond Beach Wastewater
Treatment Plant

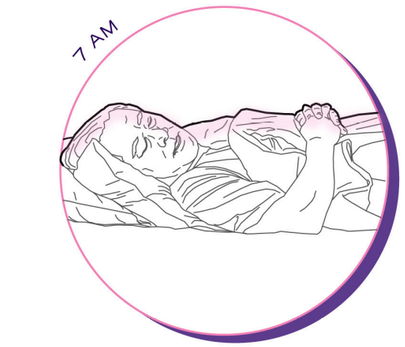
Margaritaville
Beach Club

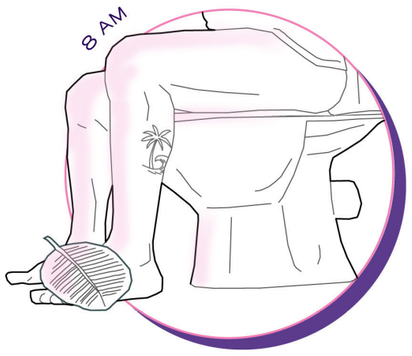
Now imagine this day in the life of a future paradise...





7am – The Florida sun beams into a window at Latitude Margaritaville, onto Bob, a retiree's, face.





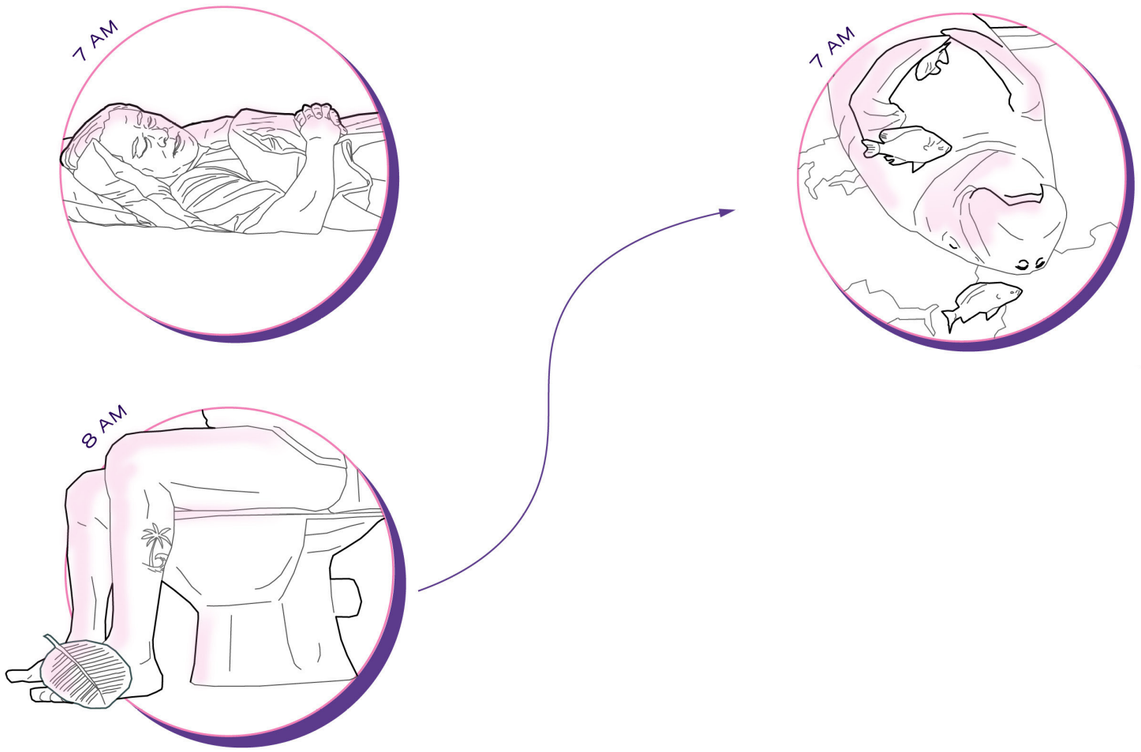


Latitude Margaritaville
55+ Community

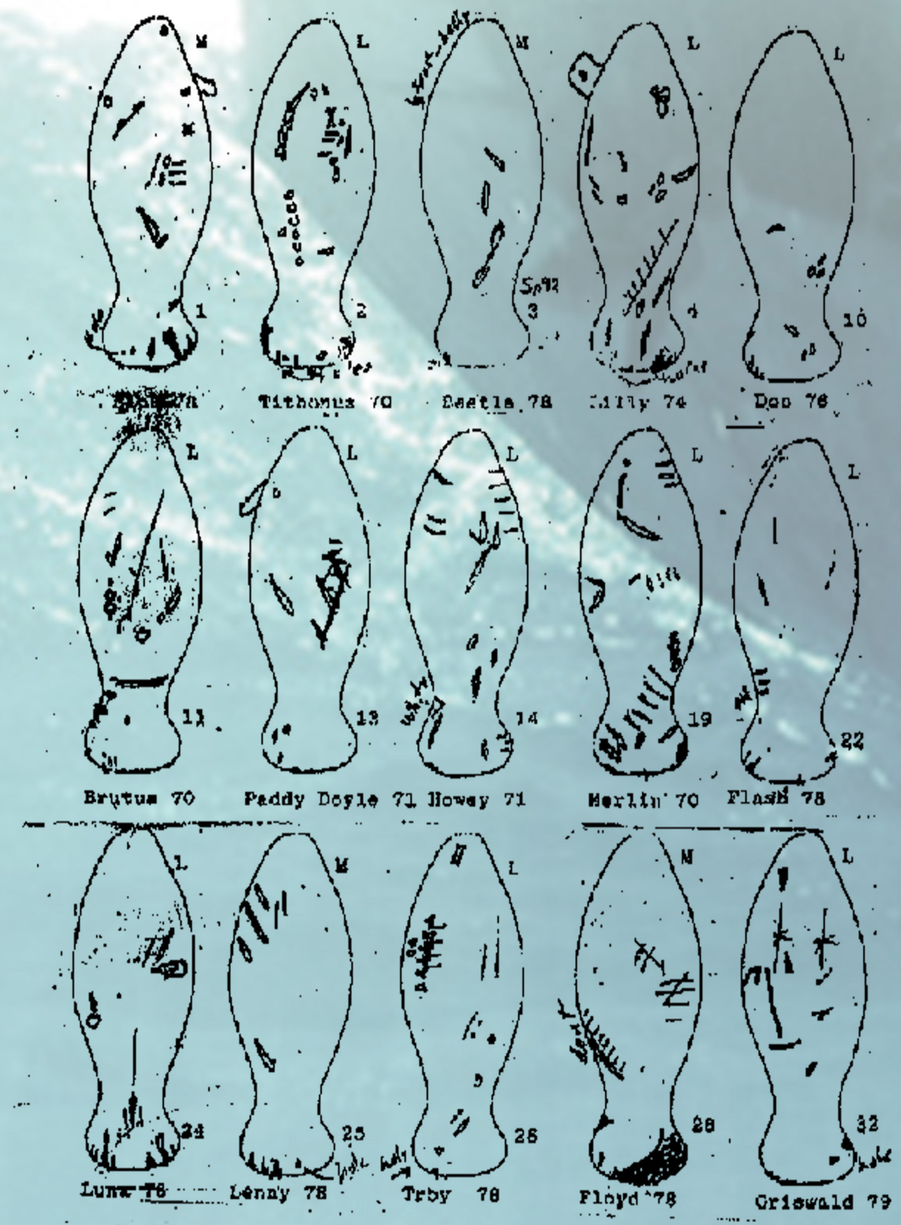
Ormond Beach Wastewater
Treatment Plant

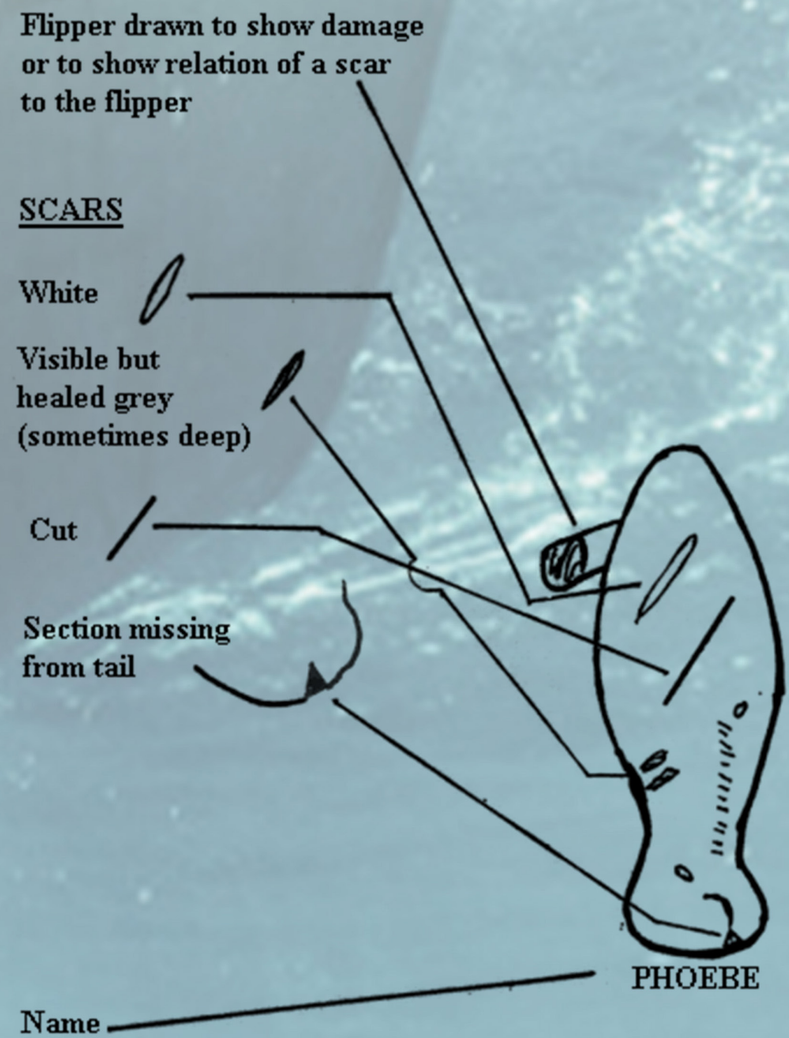
Margaritaville
Beach Club

Bob wakes up and heads to the bathroom, his waste sent to the Ormond Beach Wastewater Plant. There, it is converted to heat.



A flush of warm water. Mandy, a Florida manatee, wakes up.





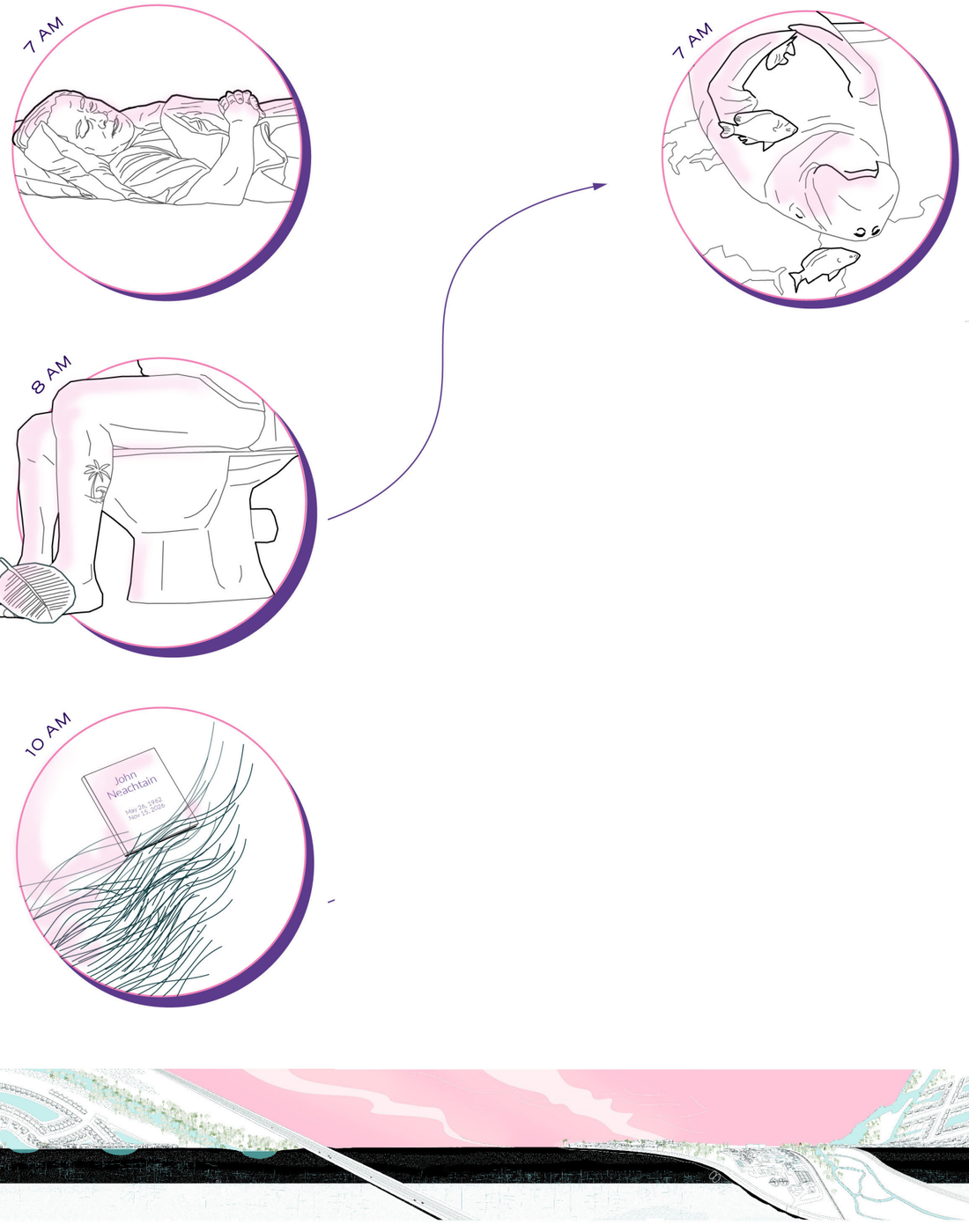
She is identified by the scars on her side, the slices of boat propeller – so common that they have historically been the primary way researchers identify different manatees.[15]



Back at Margaritaville, Bob looks toward the shallow water gardens beyond his backyard, an experimental nursery for aquatic plants – manatee food - in the pond behind his house. He swears he sees someone seemingly walking across the surface of the water.



It couldn’t be John… he passed last year.



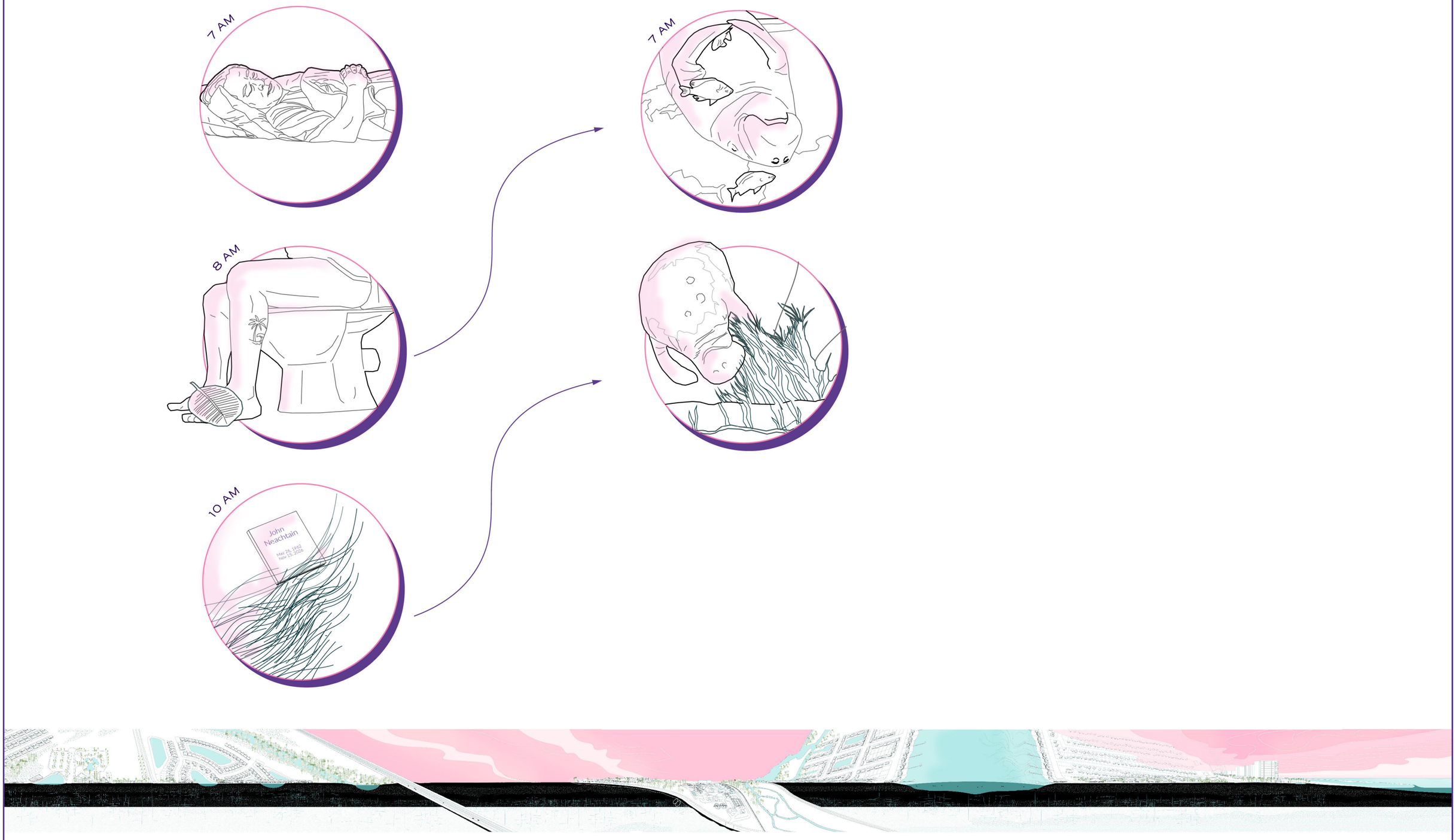
The soil from his remains helps grow this manatee food.



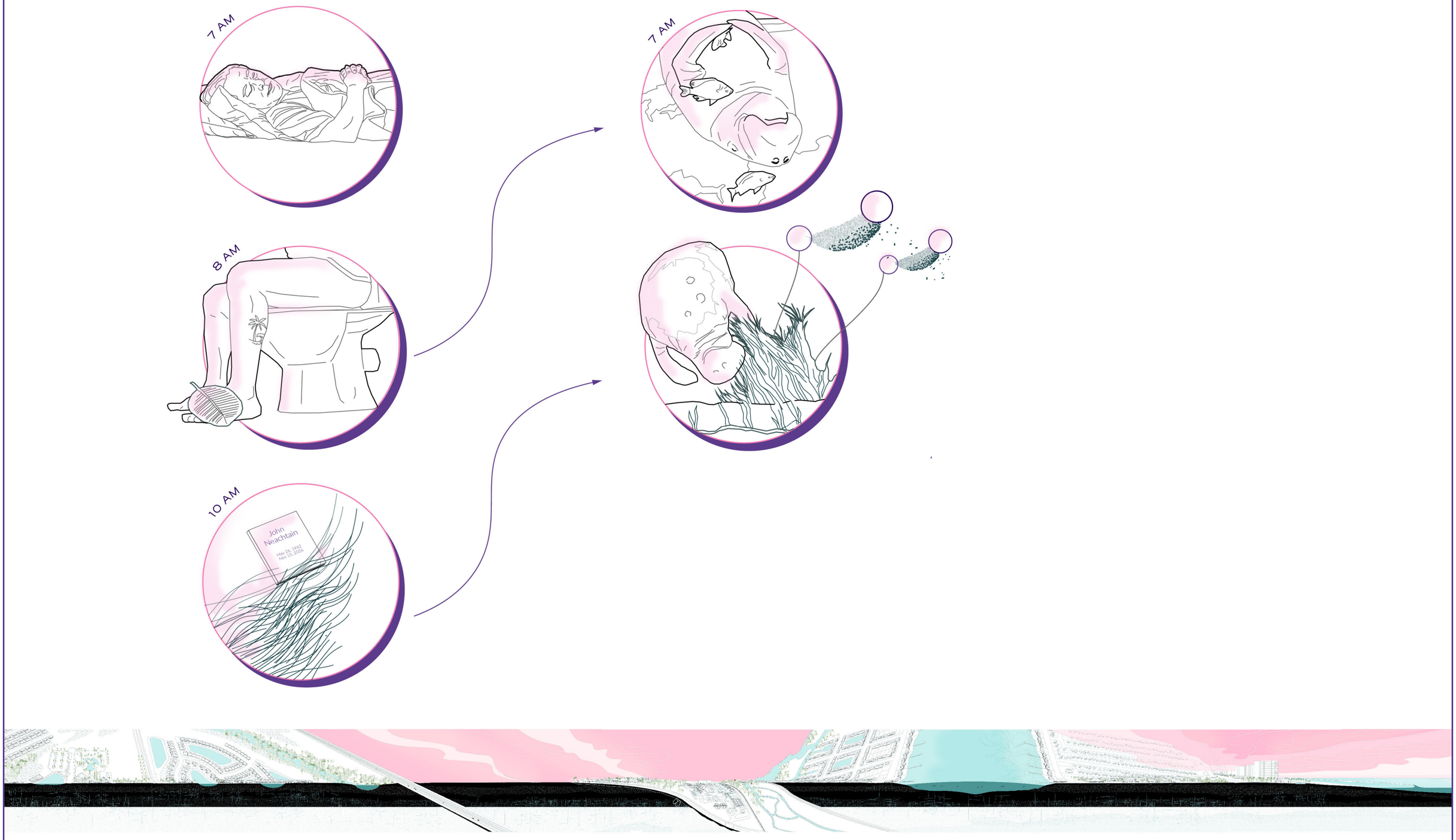
It was only years ago that manatees had to choose between freezing and starving.



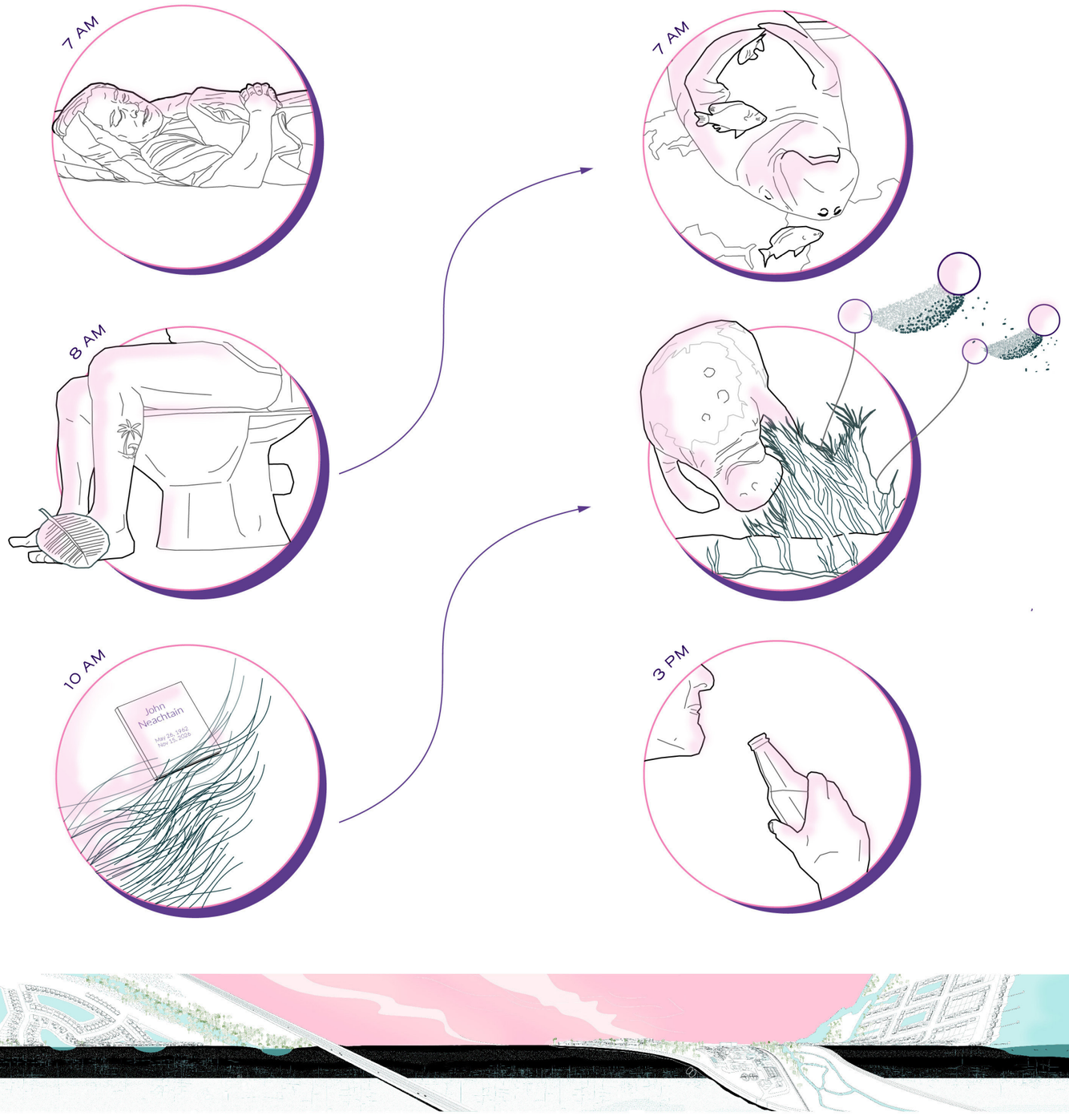
Algal blooms had decimated their food sources.



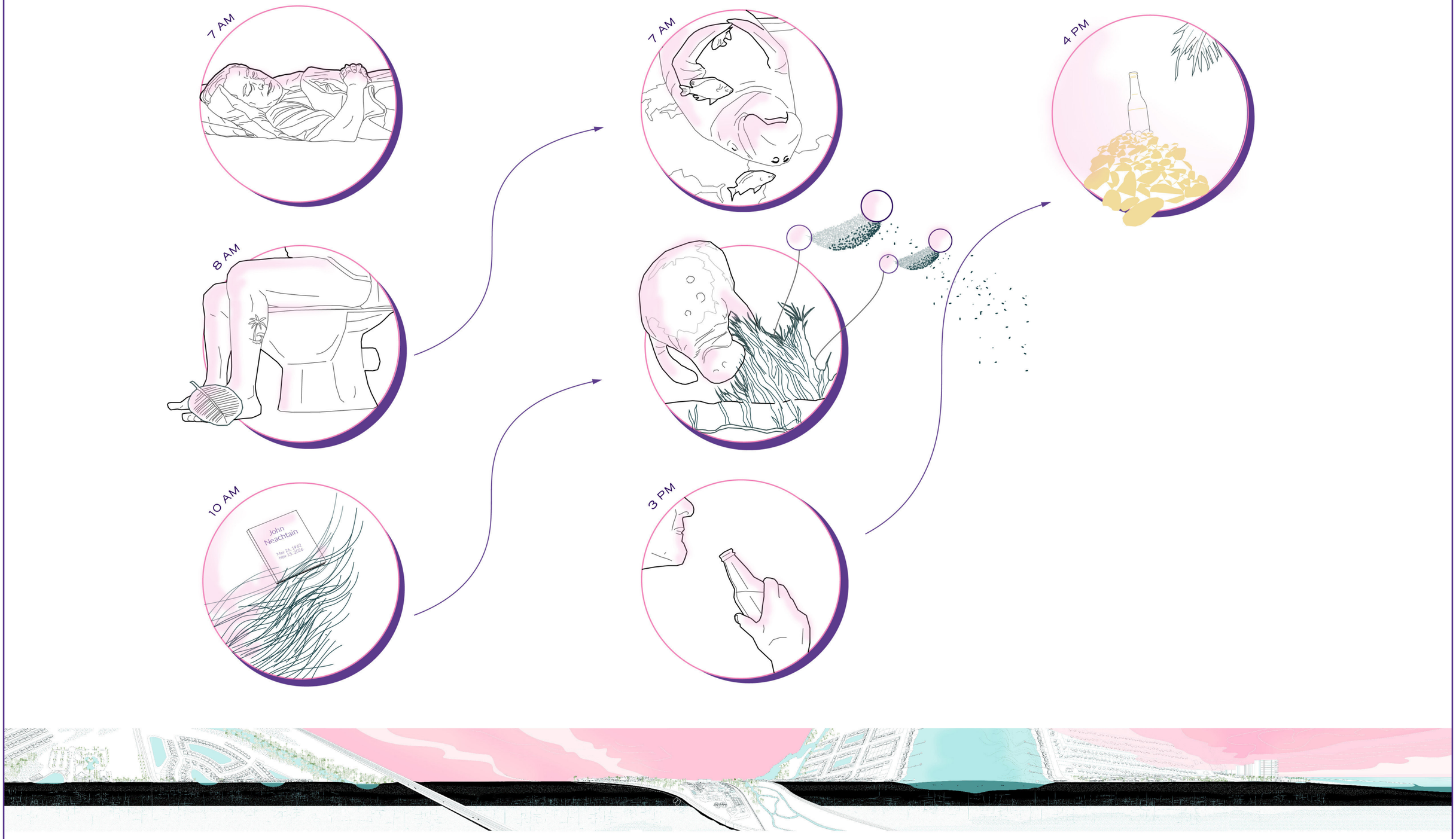
In this future paradise, however, Mandy can choose between multiple spaces of food, warmth, even joy as she heads downstream grazing.



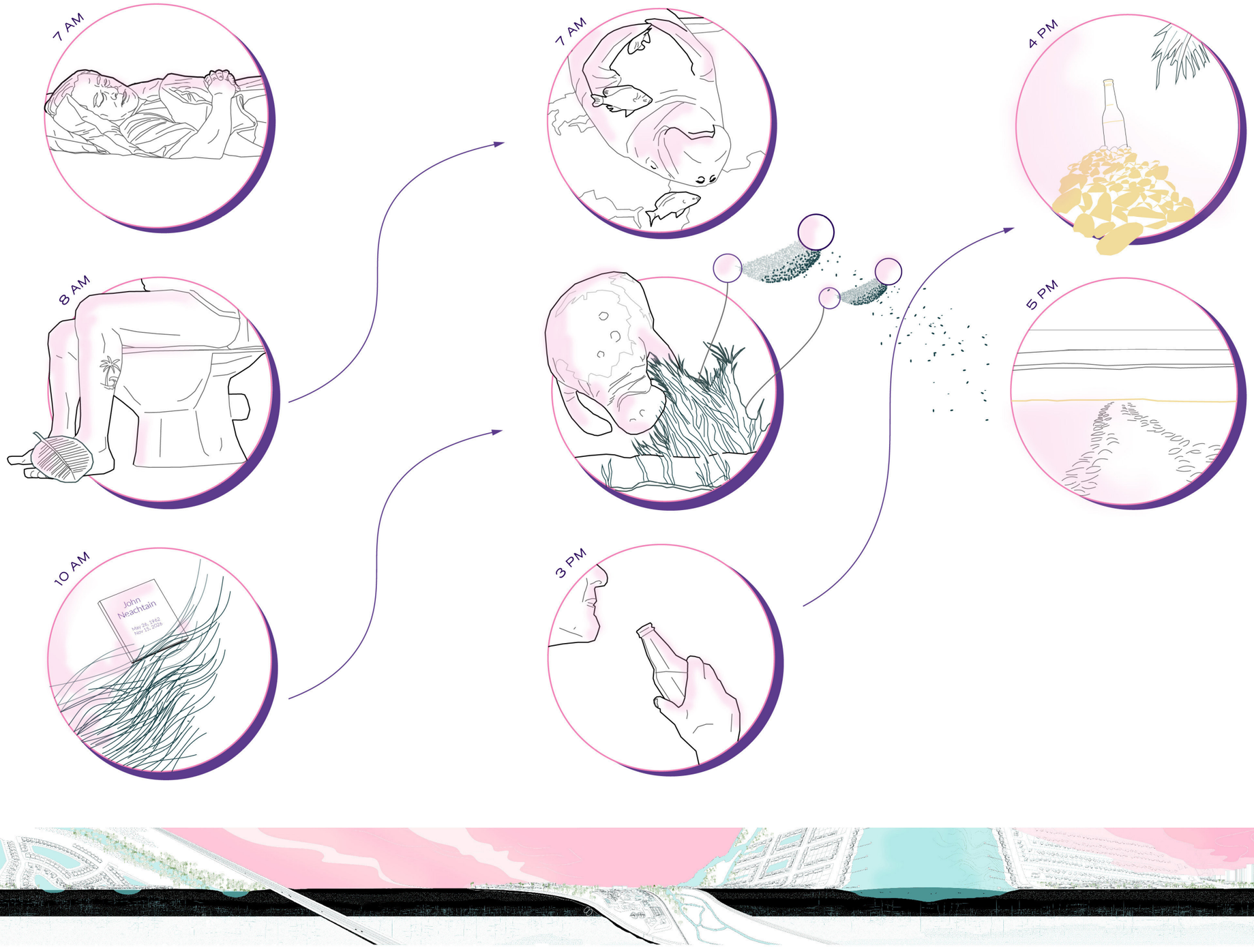
Buoys float overhead, distributing seeds while keeping boaters at bay.



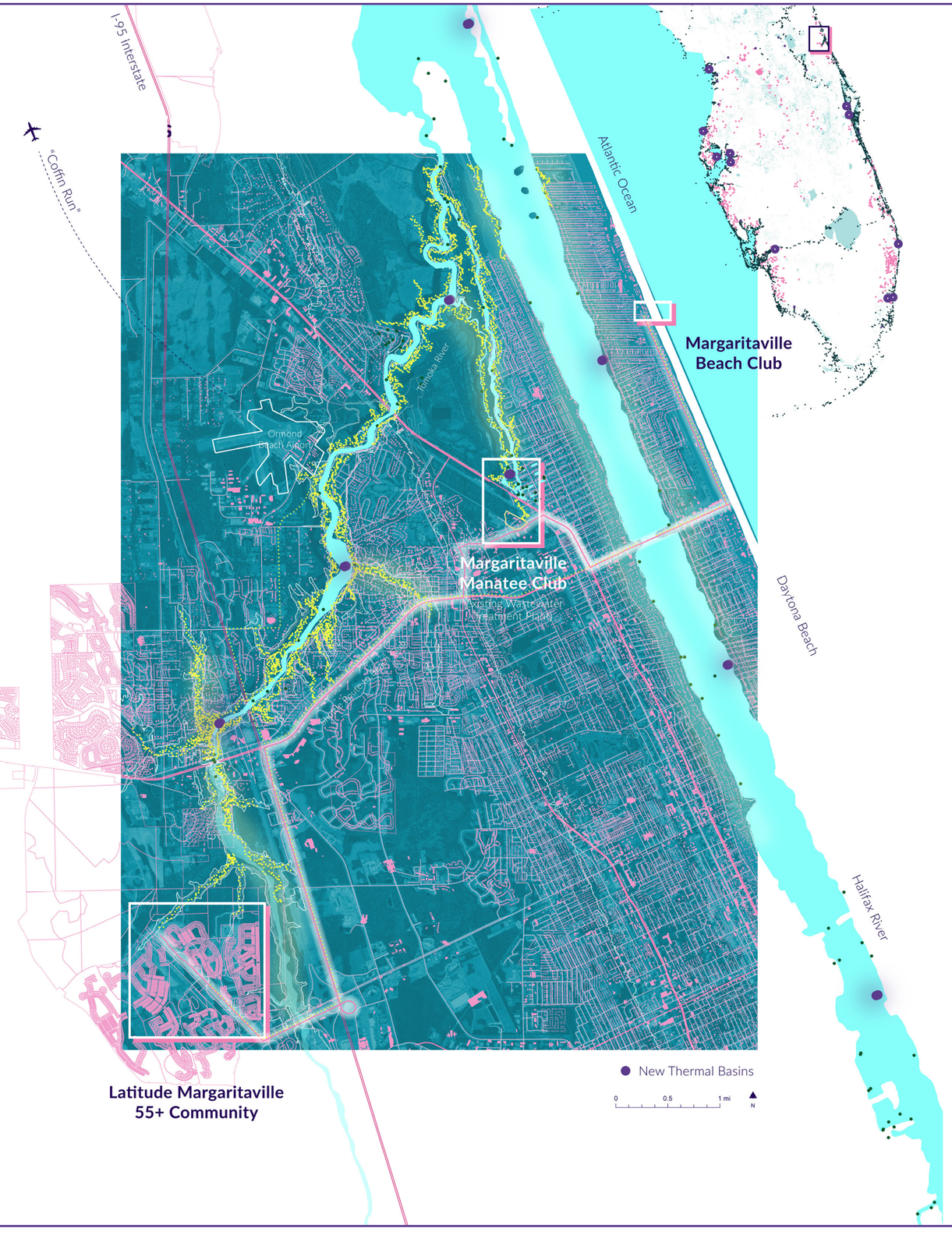
After a drink by the pickleball courts...



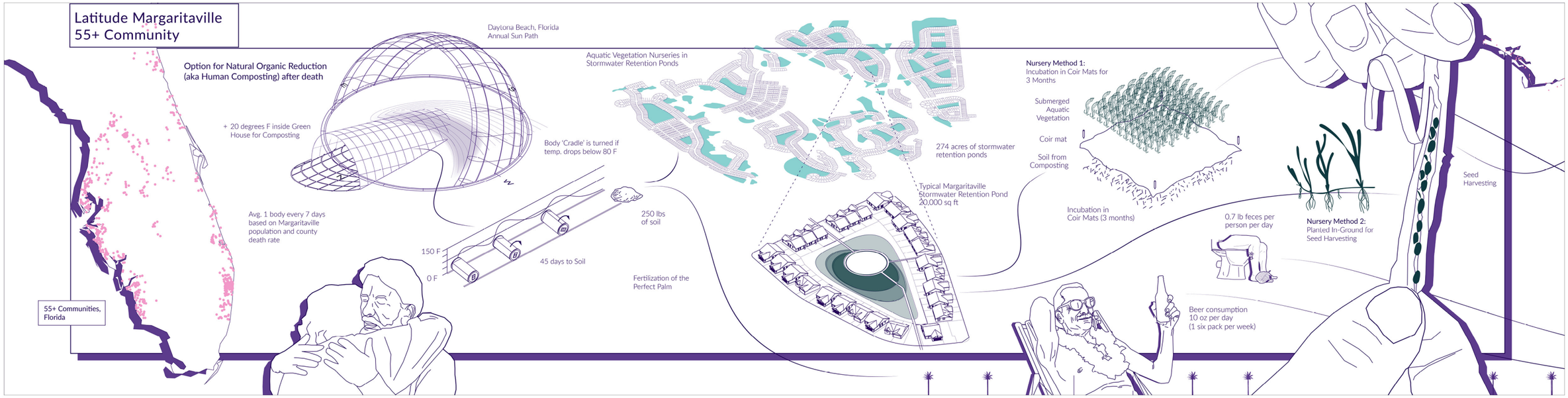
Bob takes the shuttle to Margaritaville's Beach Club. Sunlight dances off the sand, made from crushed and smoothed glass.



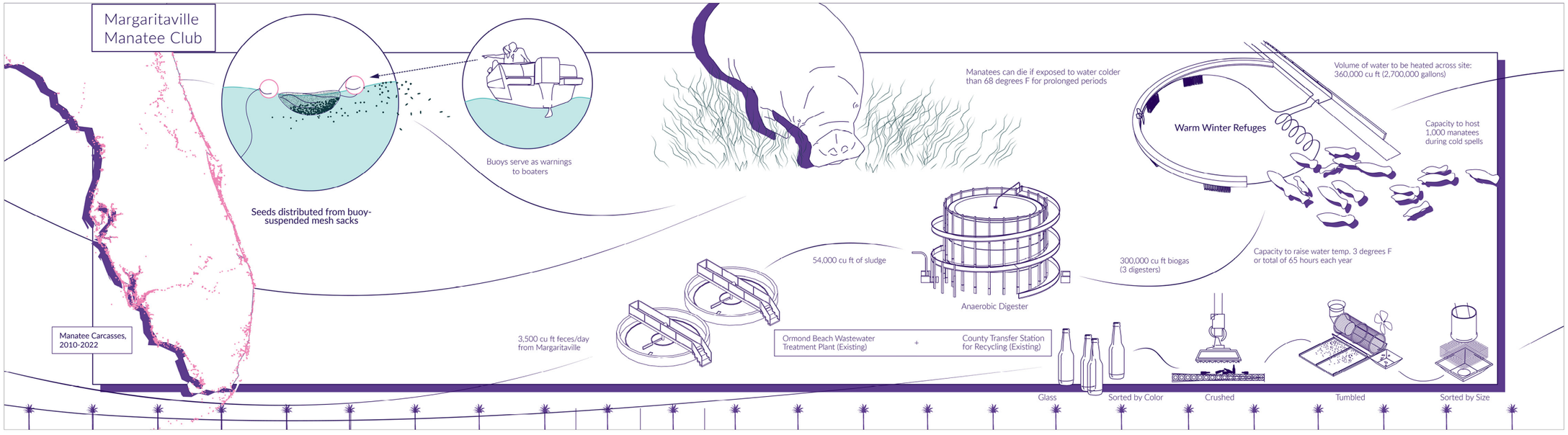
Sea turtle tracks move toward the water. The sun begins to set.



Across these three sites, this proposal harnesses a series of processes dealing with...

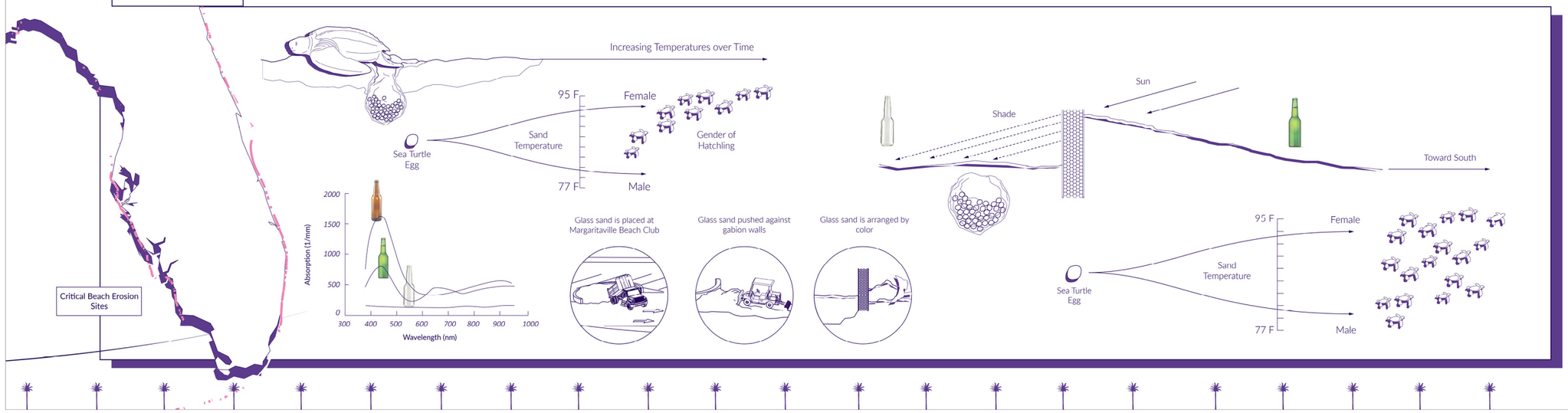

Latitude Margaritaville
55+ Community
Option for Natural Organic Reduction
(aka Human Composting) after death
+ 20 degrees F inside Green
House for Composting
Daytona Beach, Florida
Annual Sun Path
Body 'Cradle' is turned if
temp, drops below 80 F
Avg. 1 body every 7 days
based on Margaritaville
population and county
death rate
150 F
0 F
45 days to Soil
250 lbs
of soil
Fertilization of the
Perfect Palm
Aquatic Vegetation Nurseries in
Stormwater Retention Ponds
274 acres of stormwater
retention ponds
Typical Margaritaville
Stormwater Retention Pond
20,000 sq ft
55+ Communities,
Florida
Nursery Method 1:
Incubation in Coir Mats for
3 Months
Submerged
Aquatic
Vegetation
Coir mat
Soil from
Composting
Incubation in
Coir Mats (3 months)
0.7 lb feces per
person per day
Beer consumption
10 oz per day
(1 six pack per week)
Nursery Method 2:
Planted In-Ground for
Seed Harvesting
Seed
Harvesting

...death

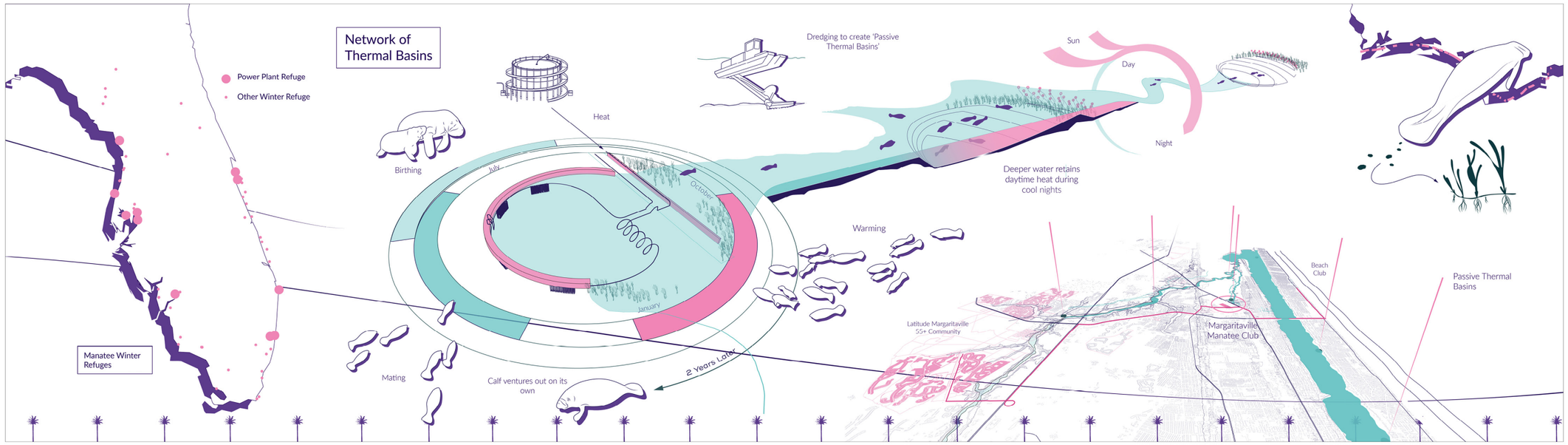

Margaritaville
Manatee Club
Seeds distributed from buoy-suspended mesh sacks
Buoys serve as warnings to boaters
Manatees can die if exposed to water colder than 68 degrees F for prolonged periods
Warm Winter Refuges
Volume of water to be heated across site: 360,000 cu ft (2,700,000 gallons)
Capacity to host 1,000 manatees during cold spells
Capacity to raise water temp. 3 degrees F or total of 65 hours each year
300,000 cu ft biogas (3 digesters)
54,000 cu ft of sludge
Anaerobic Digester
Manatee Carcasses, 2010-2022
3,500 cu ft feces/day from Margaritaville
Ormond Beach Wastewater Treatment Plant (Existing)
+
County Transfer Station for Recycling (Existing)
Glass
Sorted by Color
Crushed
Tumbled
Sorted by Size

...waste

Margaritaville
Beach Club



...and elements traditionally kept outside the garden walls.



Together, these processes bring the obscene into the garden and set the stage for new forms of coexistence. I'll now describe each of these sites in more detail.



We start at Latitude Margaritaville, an example of the highly popular “active adult communities” for the “55 and better” that are springing up across Florida.



In the community’s town center…











Jimmy Buffet's Latitude Margaritville, Daytona Beach
Winner of National Assn of Home Builders "Best Landscape Design" Award
(Landscape Architect: Heidt Design)

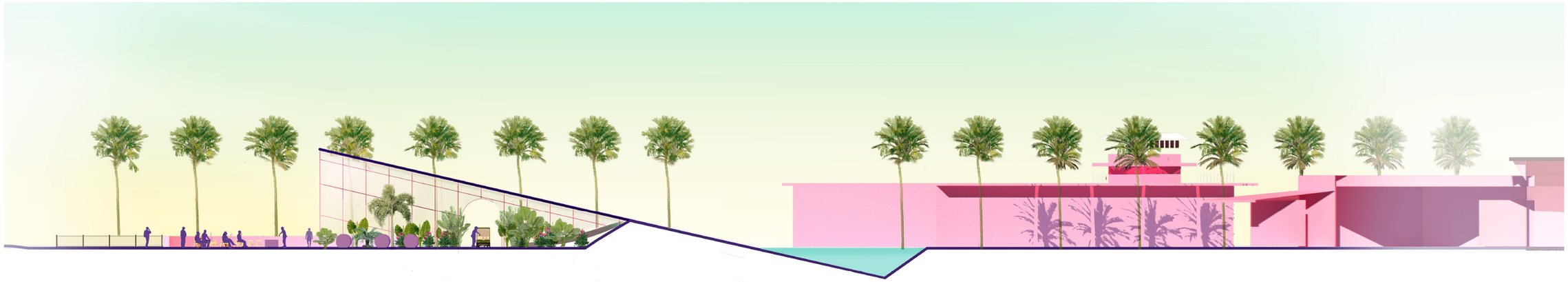
...shown here

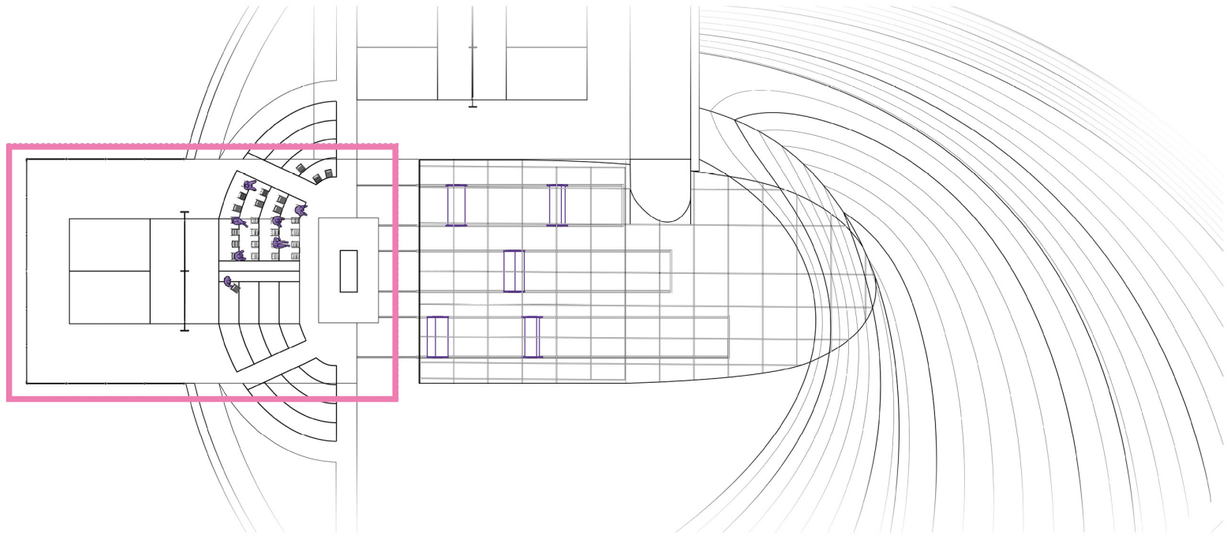
Latitude Margaritaville Town Center

Pickleball & Natural Organic Reduction

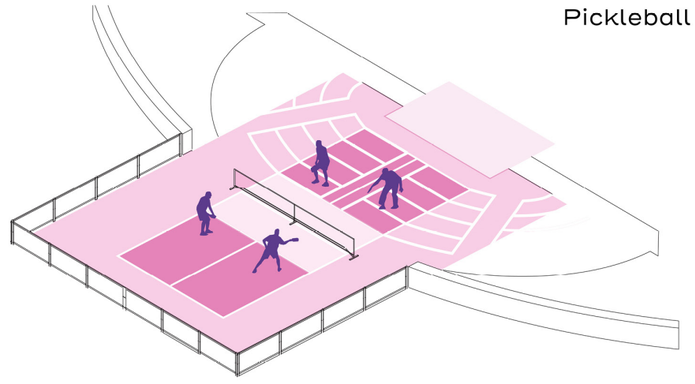


...the thing that is most obscene (or that paradise seeks most to avoid) – the reality of death – enters. Instead of having their bodies shipped "back home" to the north for burial, retirees can have their bodies converted to soil when they die.

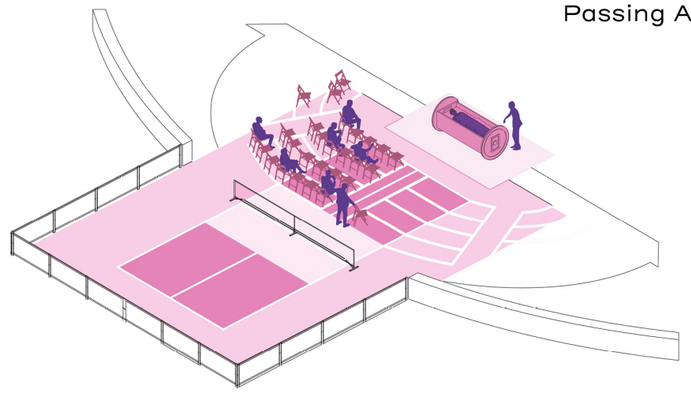




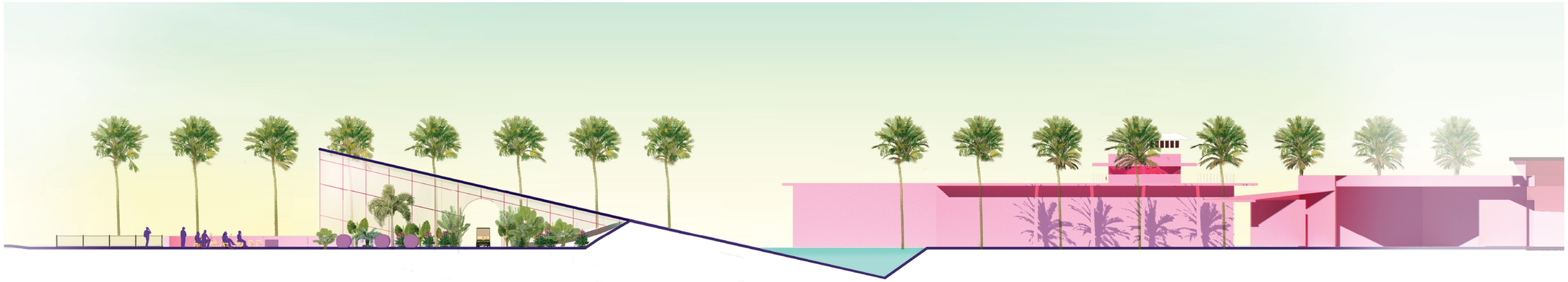
Pickleball

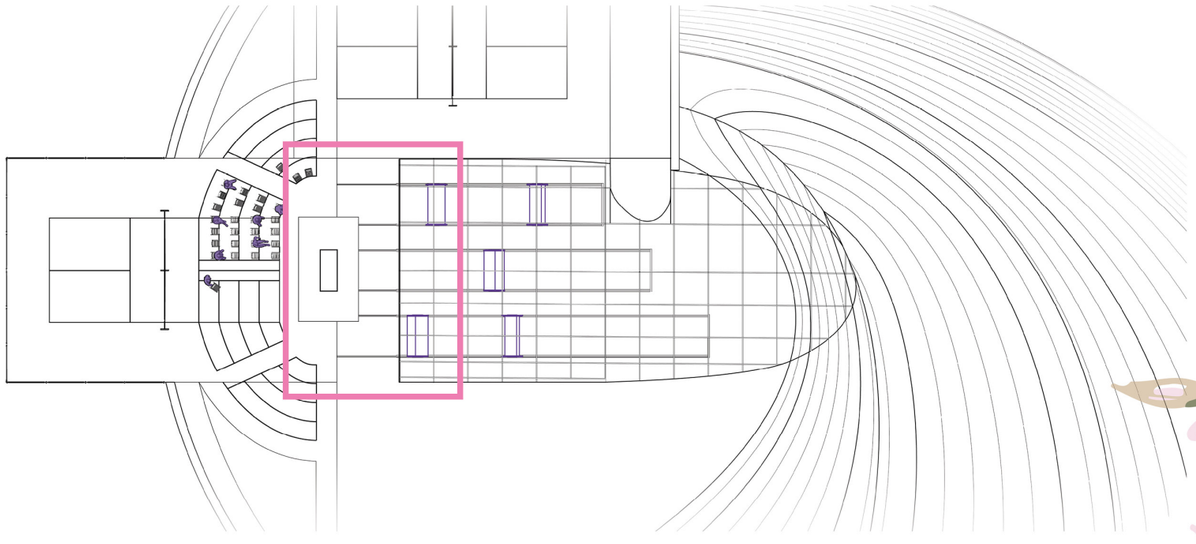


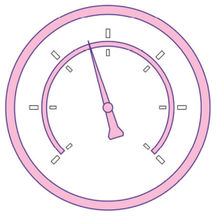
Passing Away



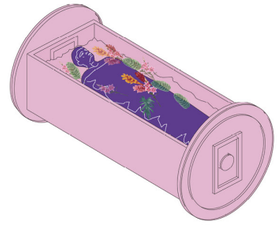
The space serves as both a Pickleball Court - Central Florida being the world capital of Pickleball - and a site for saying goodbye when the body is laid into the composting vessel.[16] Markings on the ground guide both pickleball and ceremonies following death.







Vessel must remain
at 131 F+ for 3+ Days



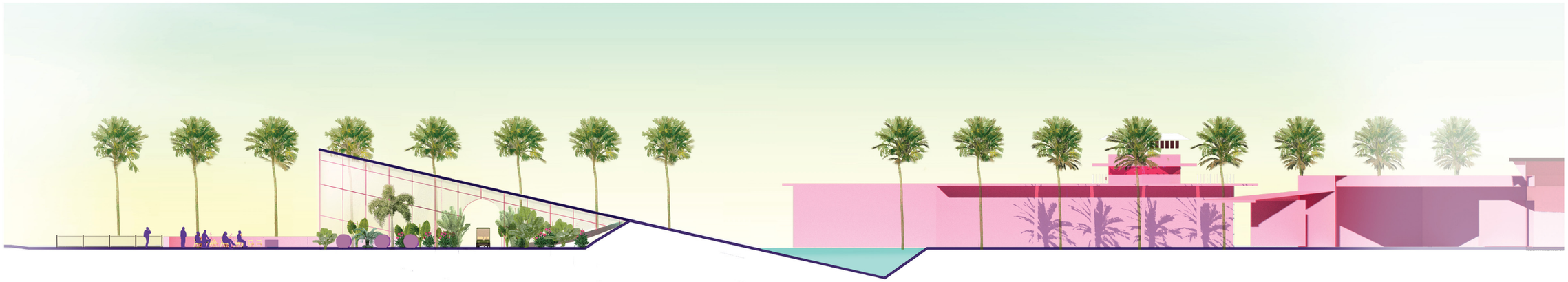


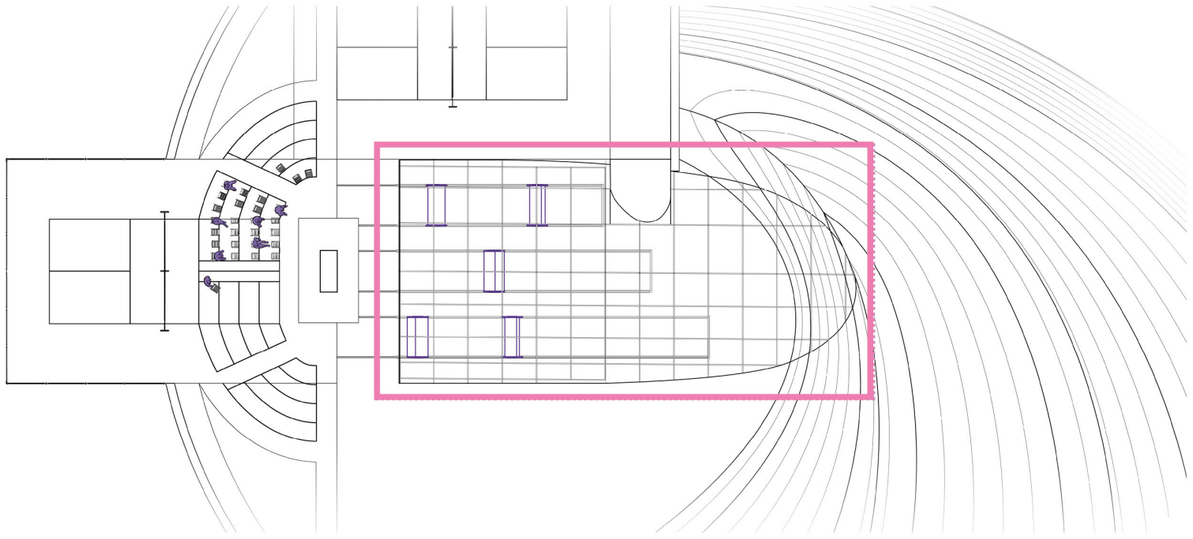
To soil in 4–6 weeks



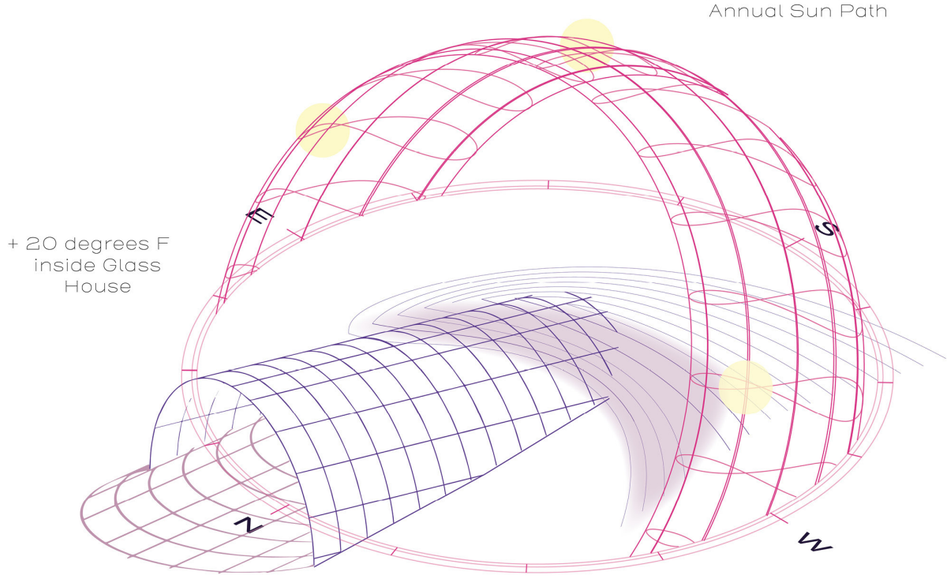
Natural Organic Reduction

For natural organic reduction – also known as human composting - the body is placed in a bed of mulch and flowers, which is sealed.



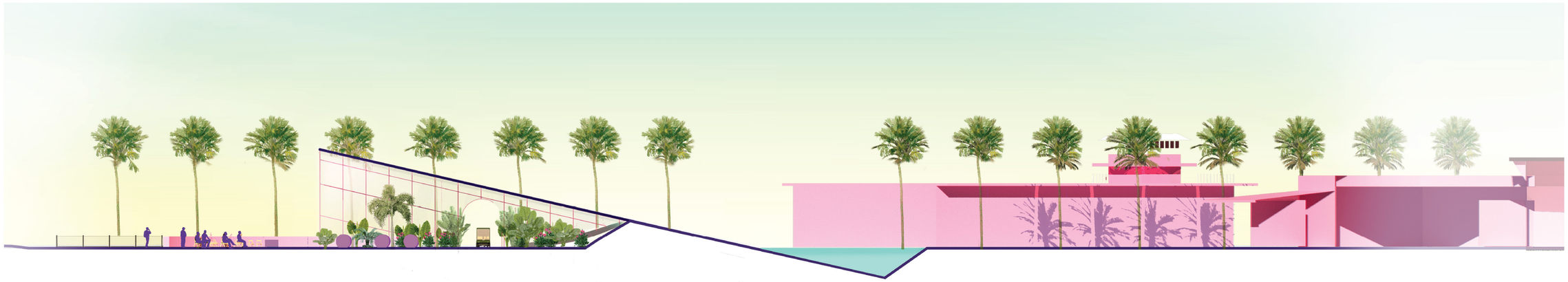


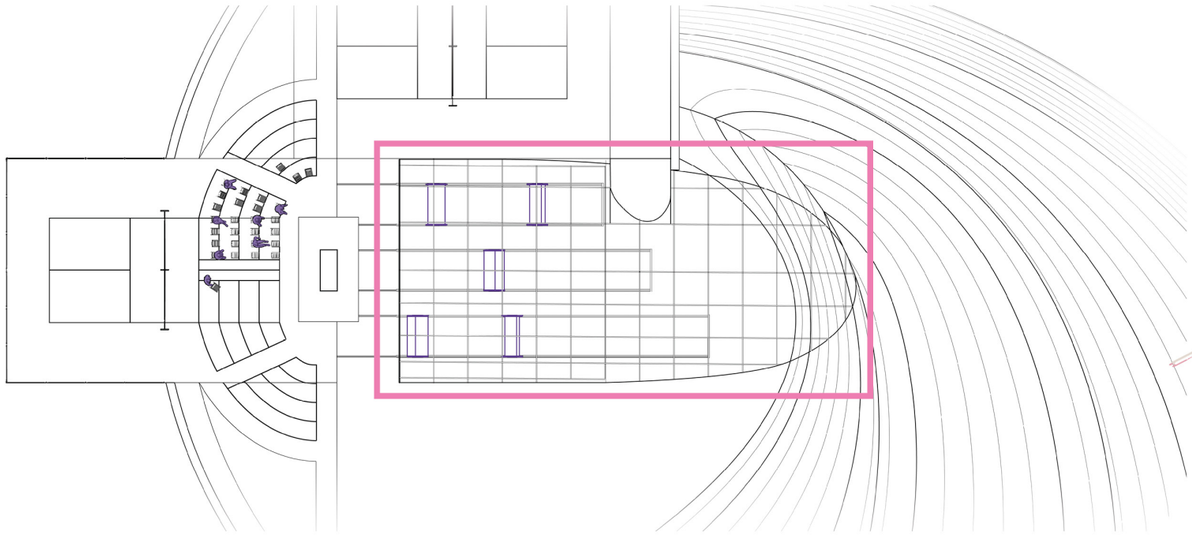
Daytona Beach, Florida
Annual Sun Path



Glass House Oriented to
Strongest Sunlight

It is moved into the glass house to trap heat, which enables the composting process. The roof of the glass house is oriented toward the south, where the strongest sunlight comes from.



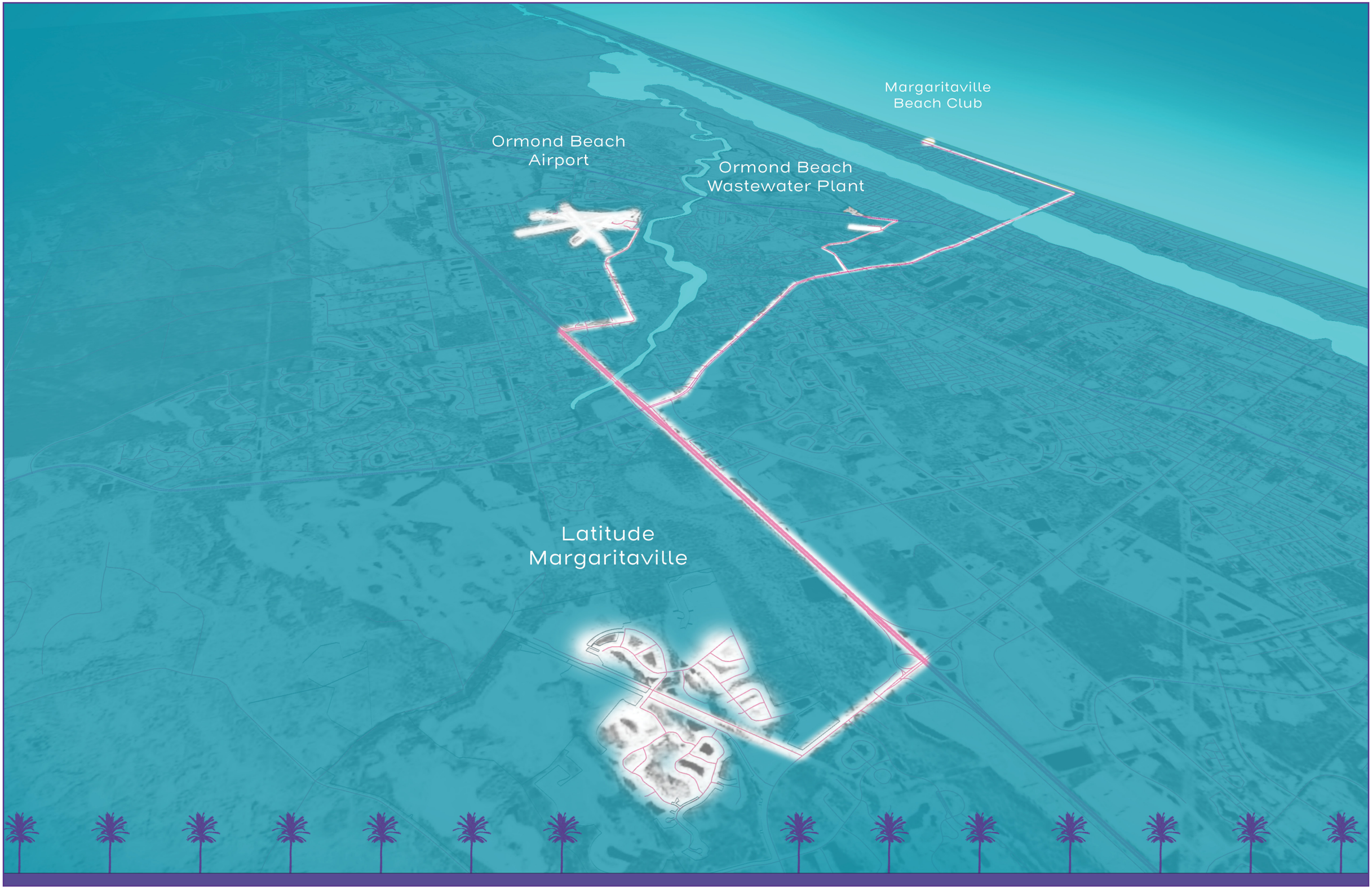


Inside Glass House



Heat of Glass House allows for
Growth of “True” Tropicals
around Composting Vessels

The heat of the glass house allows for the growth of “true” tropicals – those bright flowering plants which really only grow in the Florida keys or Caribbean, and providing, in death, a real tropical paradise.



Some of this nutrient-rich soil is used to create the Perfect Palm (to be most aesthetically pleasing, palms must be fertilized).[17] Rows of such palms are planted to stretch toward the nearby airport to say goodbye to those who took the coffin run. Others follow the route toward Margaritaville's beach club.



The rest of the soil is used to help grow aquatic vegetation for manatees...



using the water retention ponds that are arrayed throughout Margaritaville.

Stormwater Retention Ponds



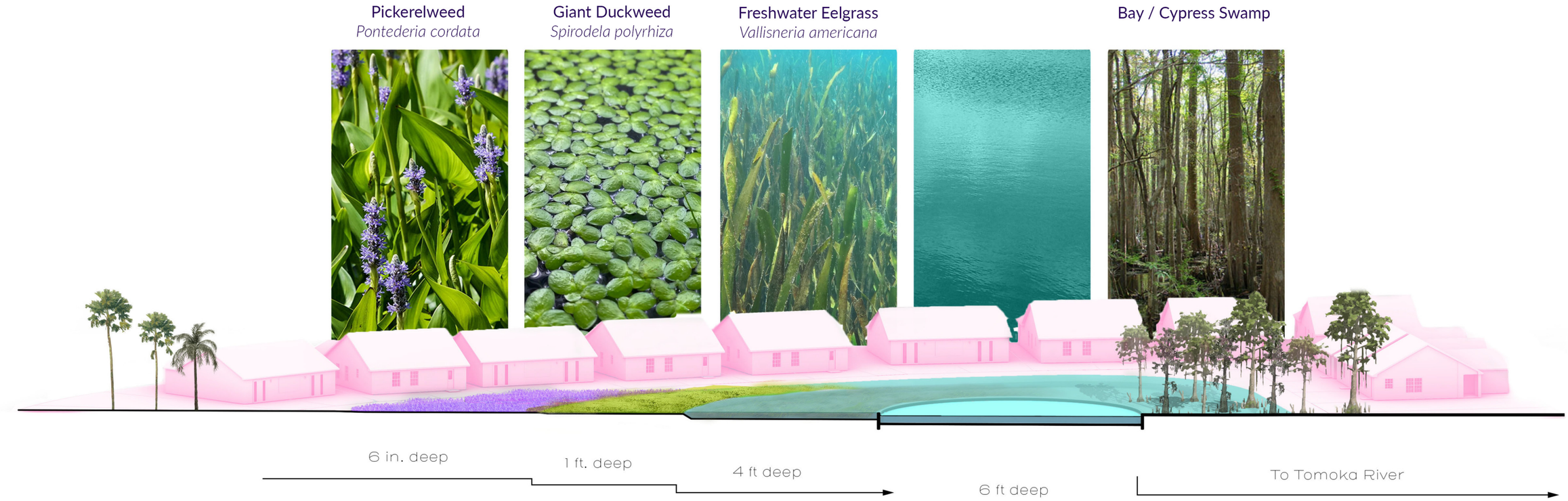
53



54

Currently they look like this.

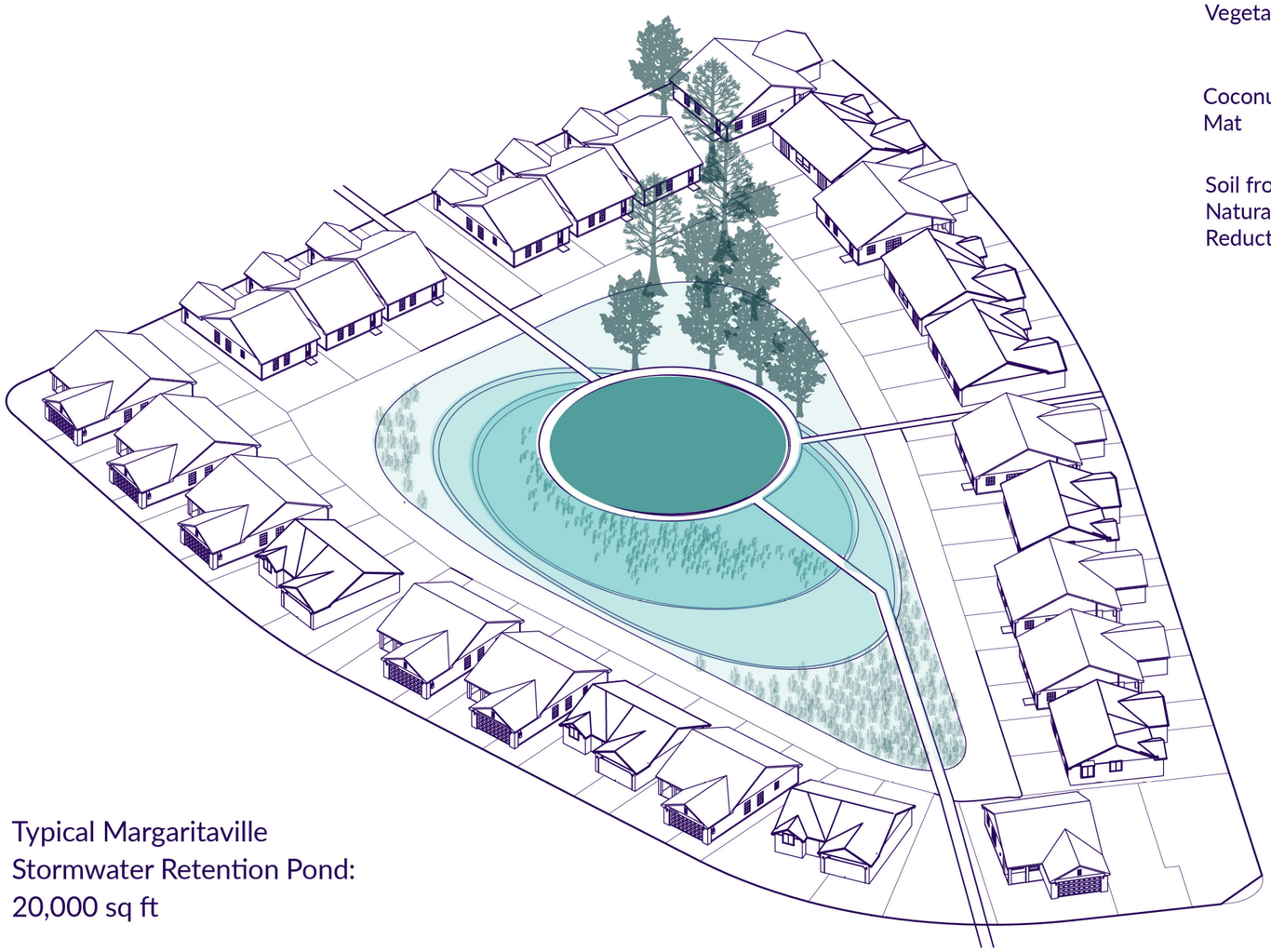
Terraced Freshwater Aquatic Nursery





The ponds are terraced to grow plants with different sunlight needs.

Terraced Freshwater Aquatic Nursery

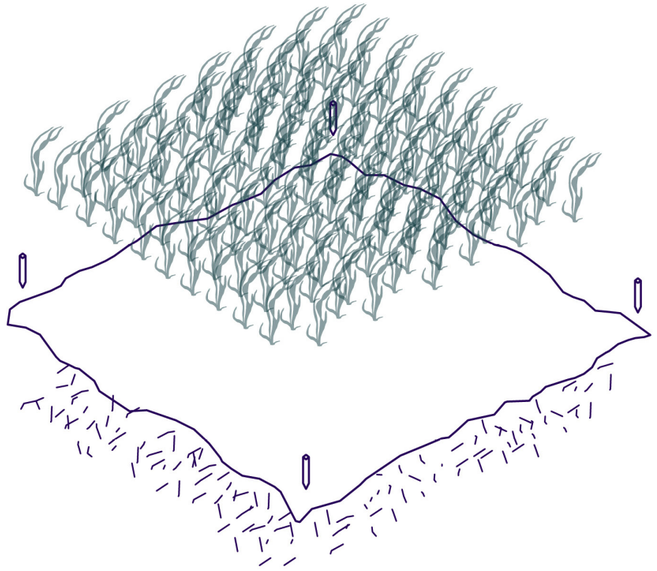


Typical Margaritaville
Stormwater Retention Pond:
20,000 sq ft

Submerged
Aquatic
Vegetation

Coconut Coir
Mat

Soil from
Natural Organic
Reduction



3 Month Incubation in Coir Mats

Aquatic plants are incubated in coir mats before being transplanted to nearby waterways.

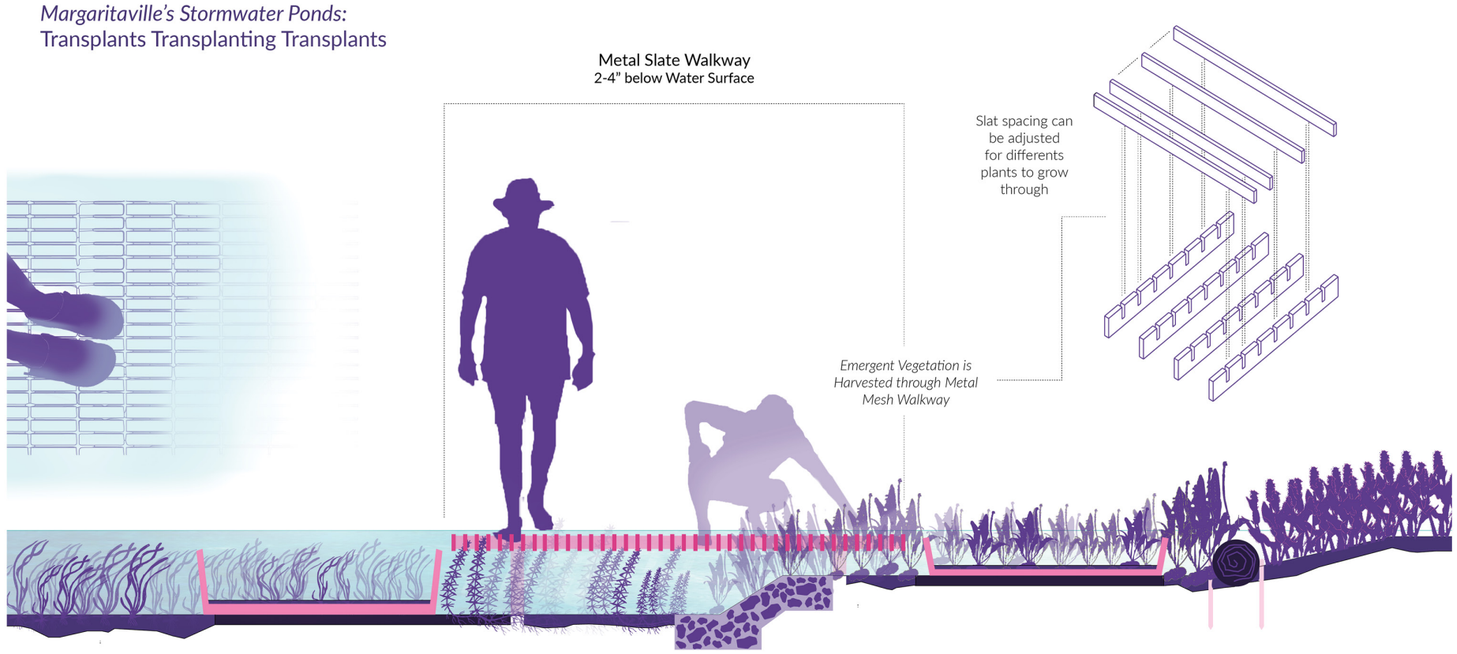


The person who appeared to be walking on water…



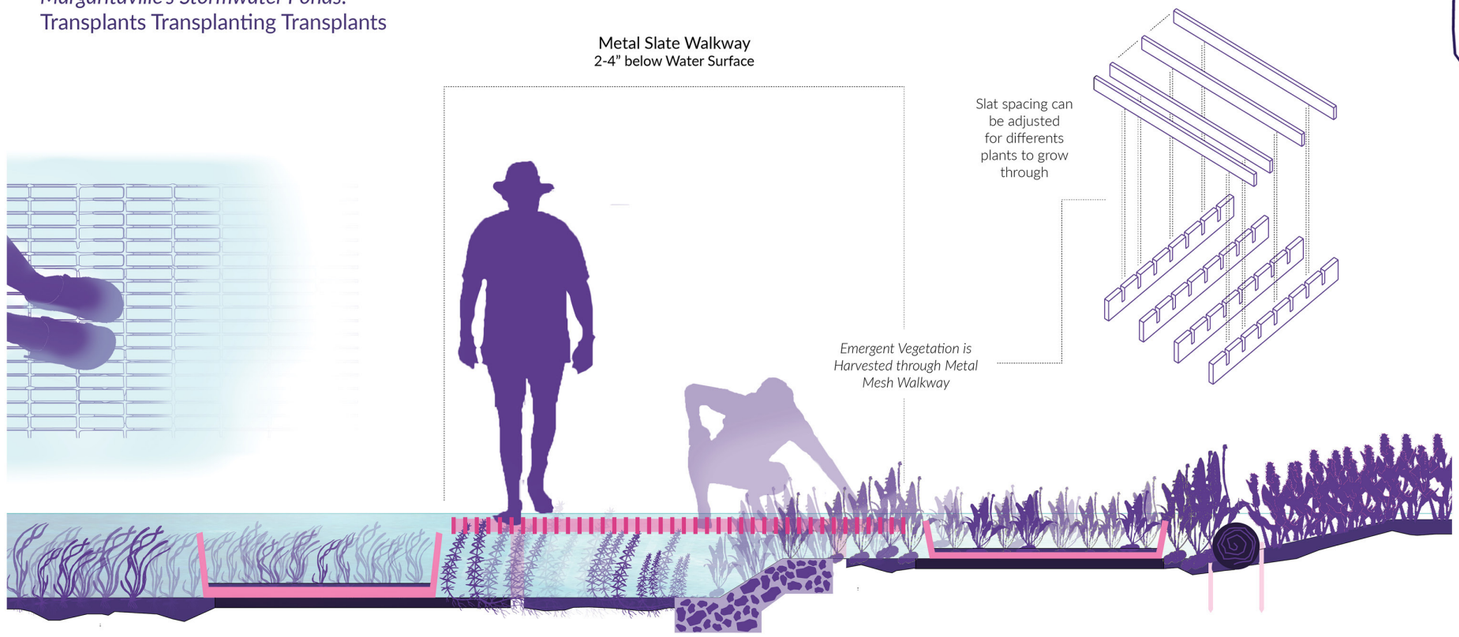
was walking on a metal mesh walkway...

Margaritaville's Stormwater Ponds:
Transplants Transplanting Transplants



located just a few inches below the water surface.

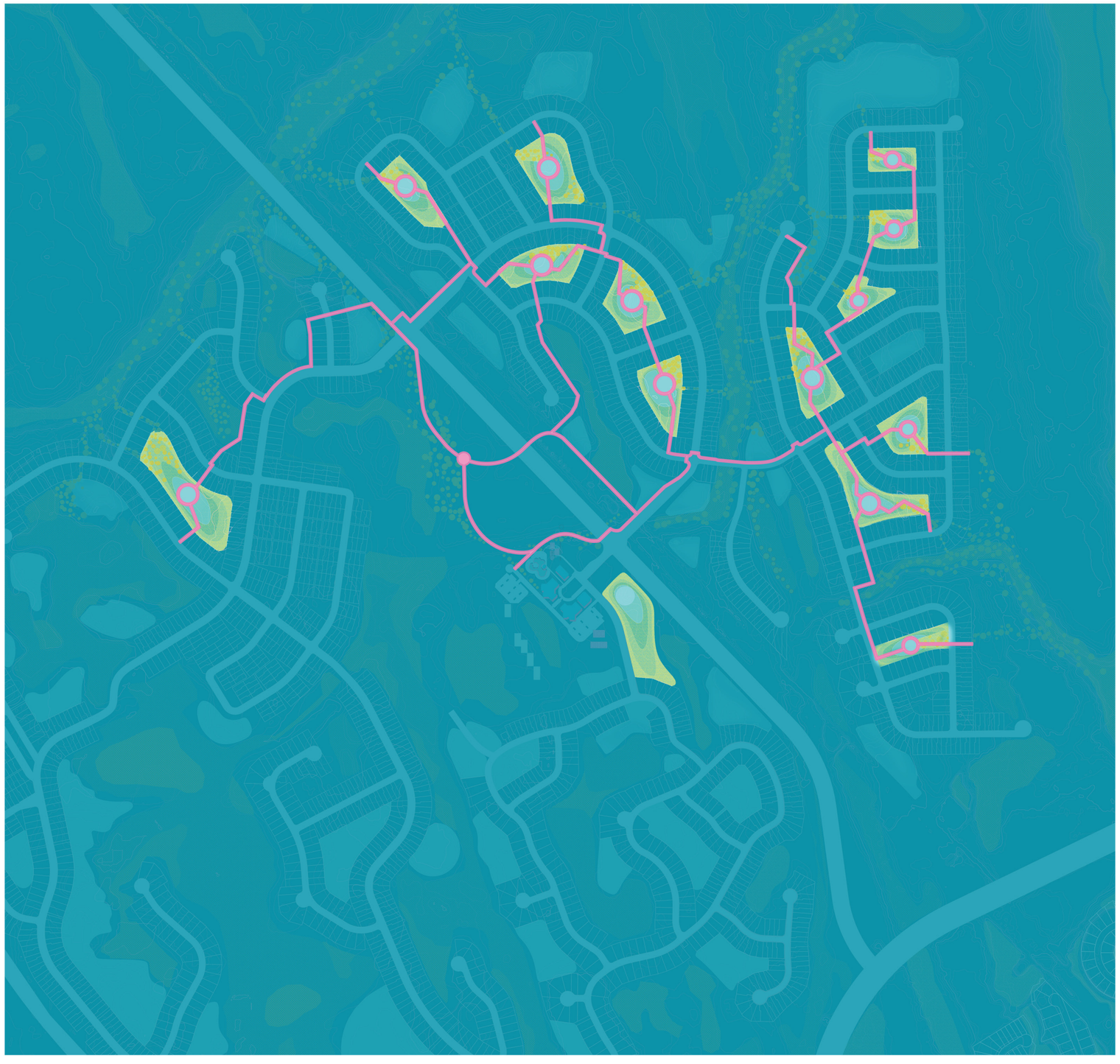
Margaritaville's Stormwater Ponds:
Transplants Transplanting Transplants



Seeds can be gathered through the walkway.

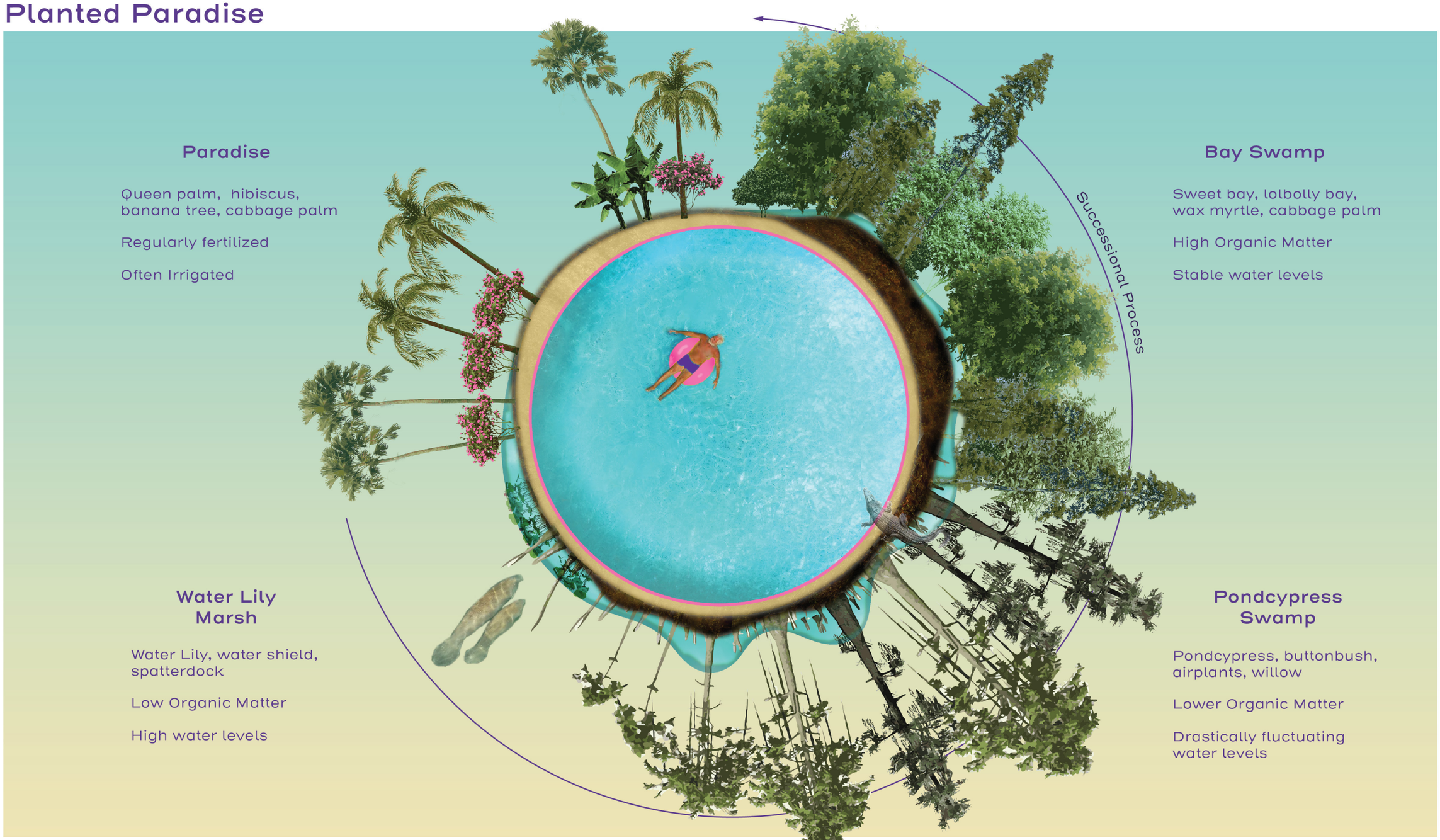


These terraced gardens form a network of small nurseries in the 55+ community...



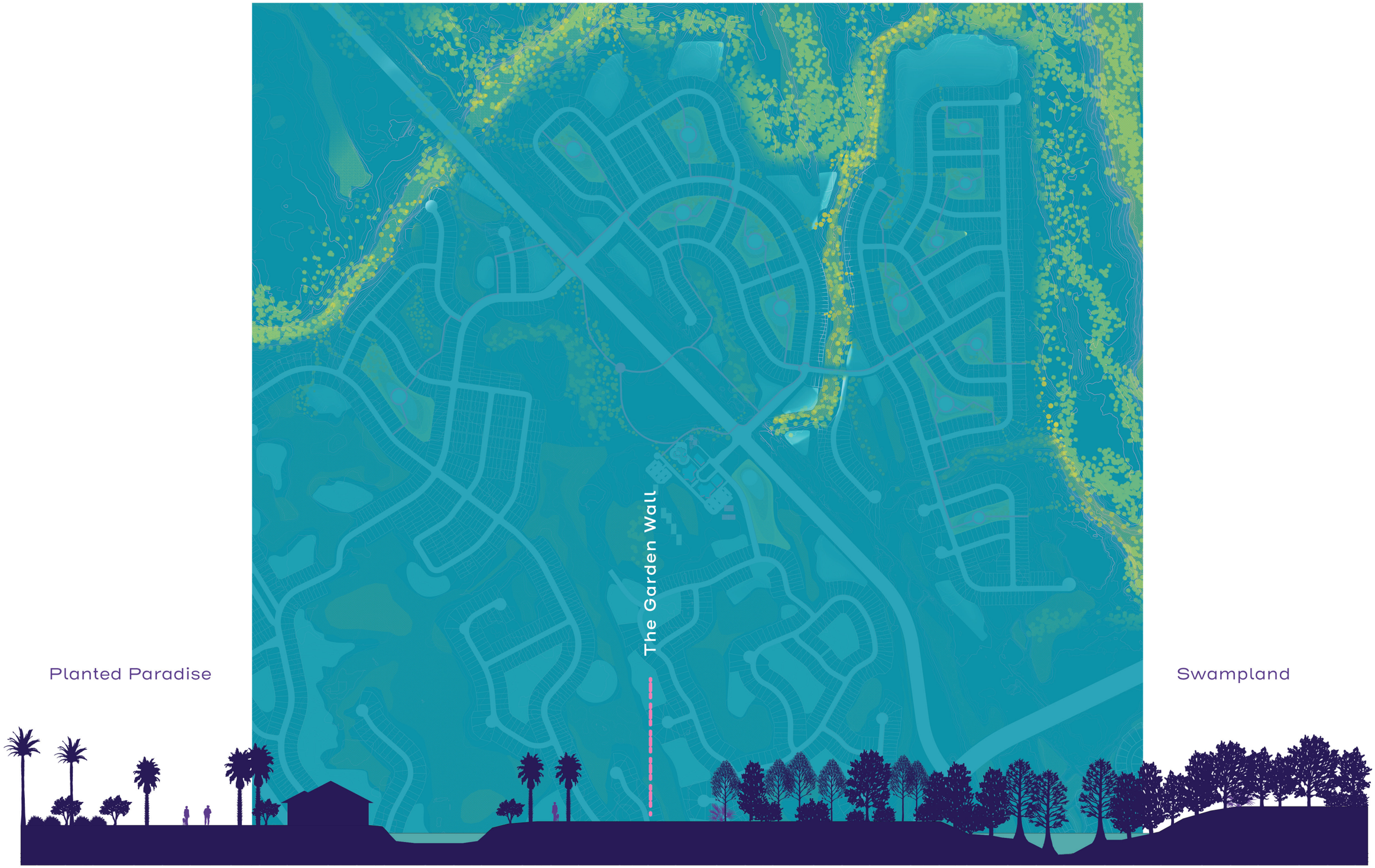
connected by a new circulation system.

Planted Paradise

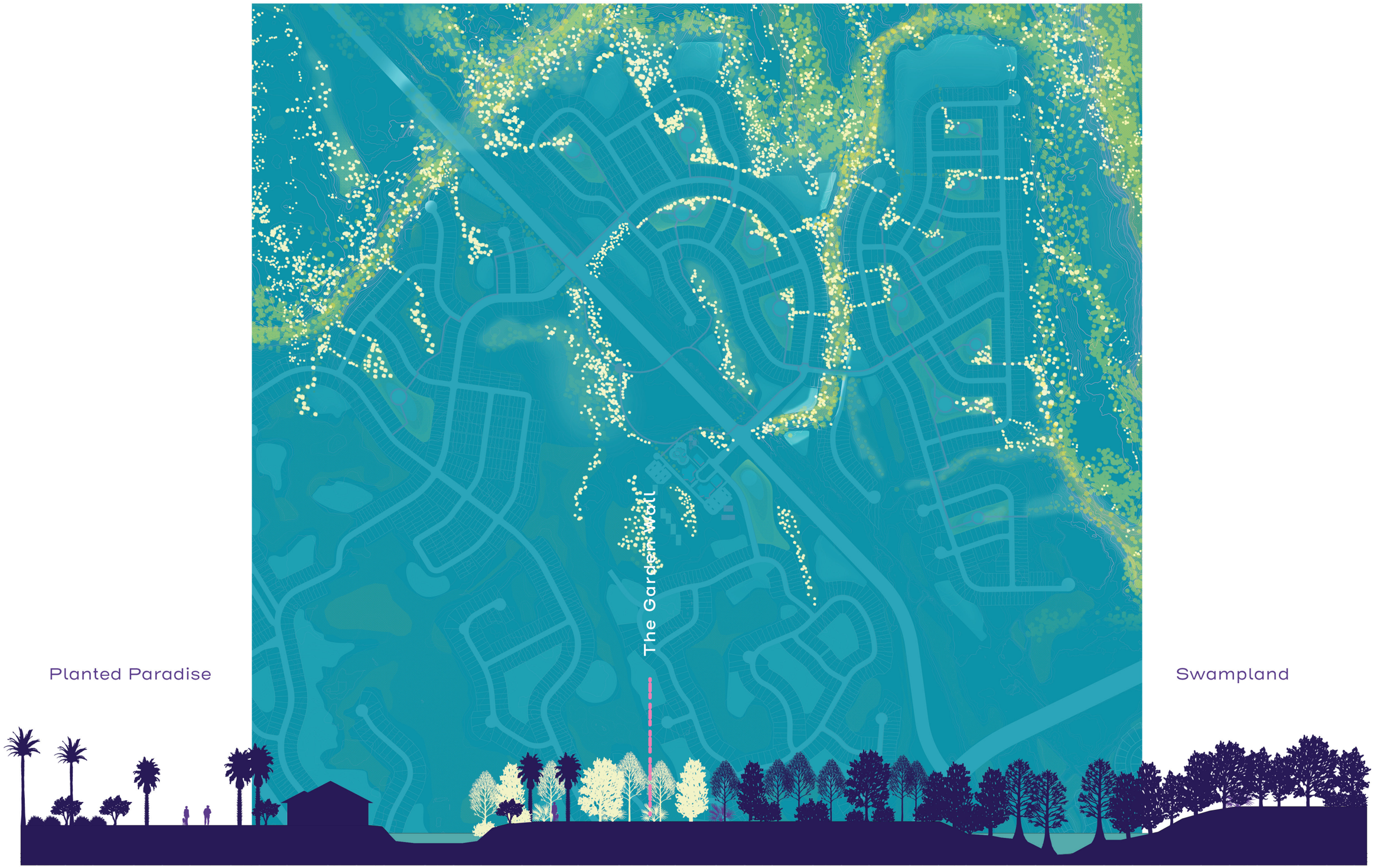


Swampland Succession

These terraced ponds also serve as a point where planted paradise and the naturally-occurring swamplandia of the region converge.

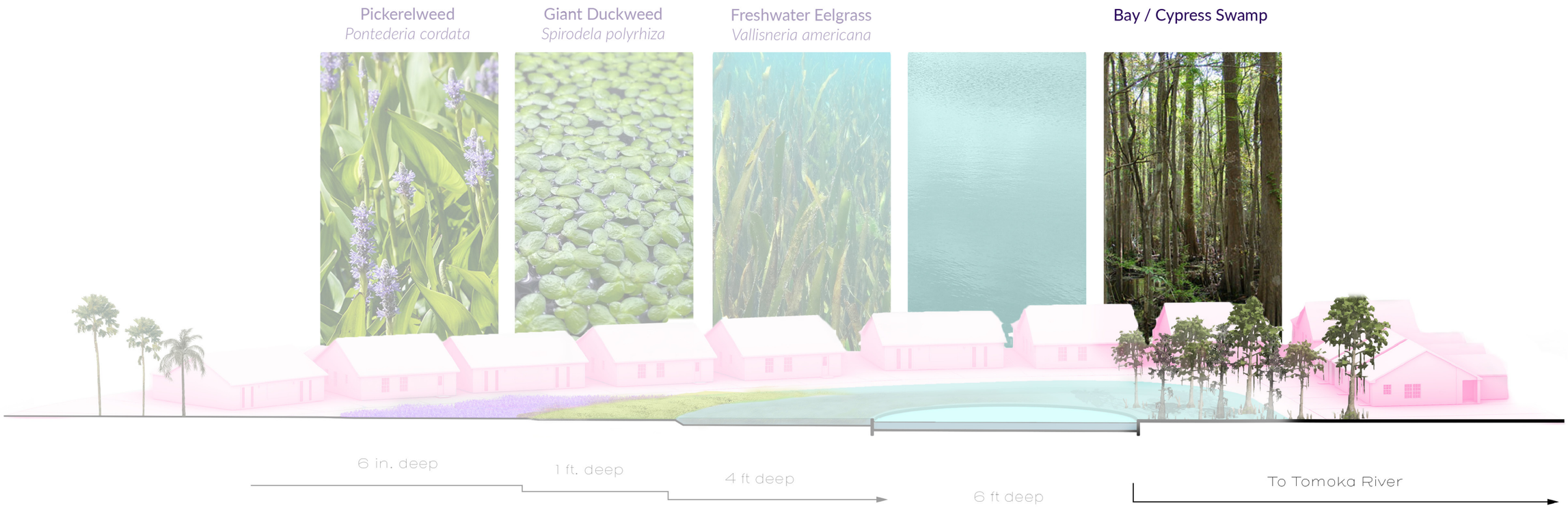


Vegetation that has been kept outside the figurative garden wall...

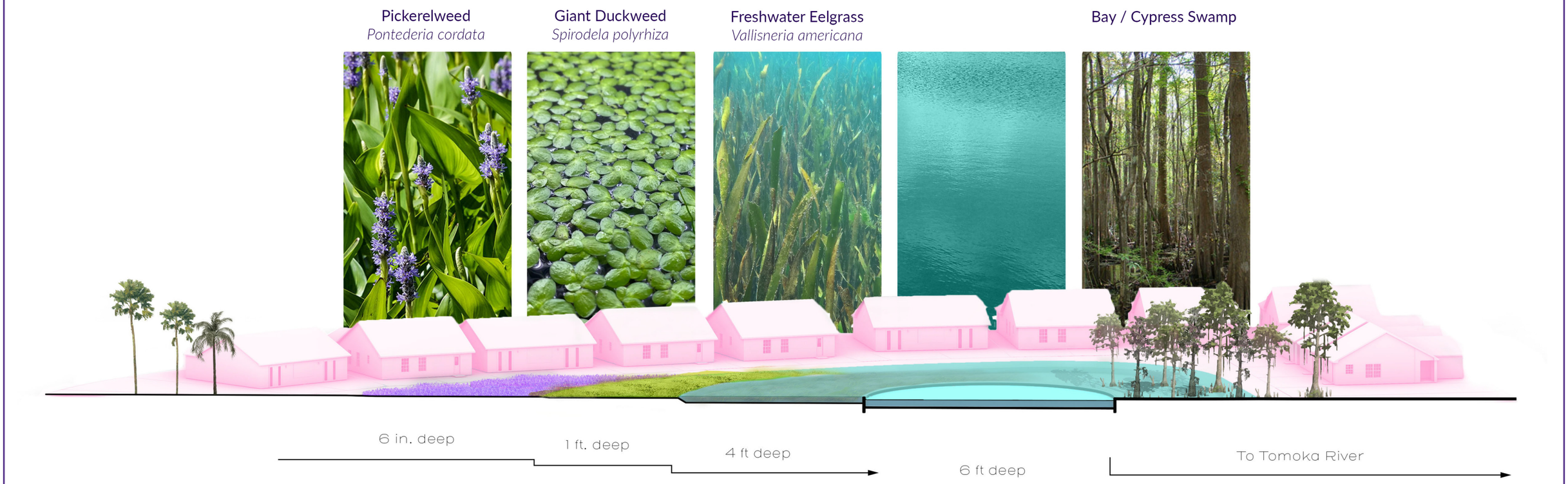


enters through gaps between parcels...

Swampland Enters

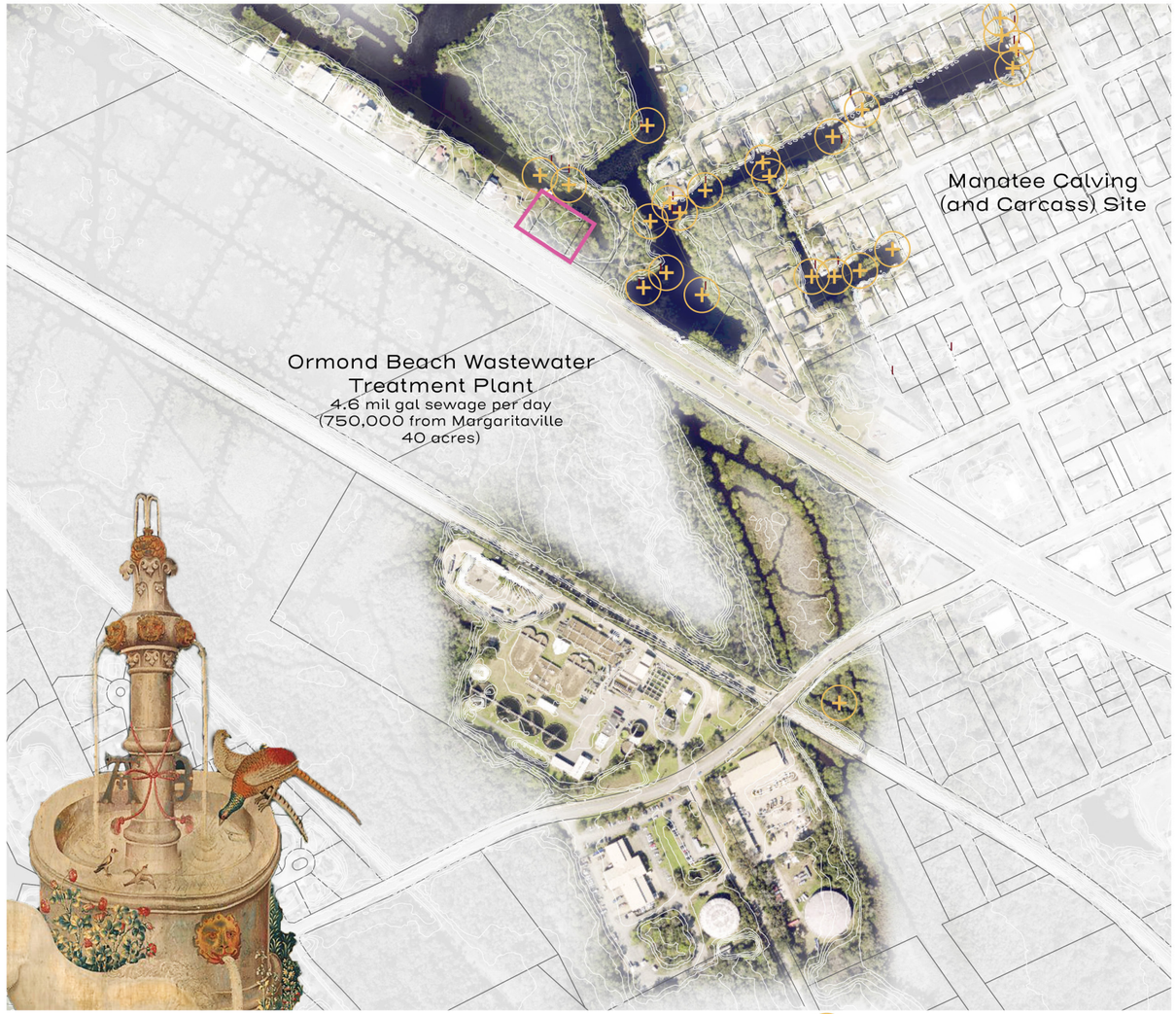


where it can help filter water in the growing ponds.

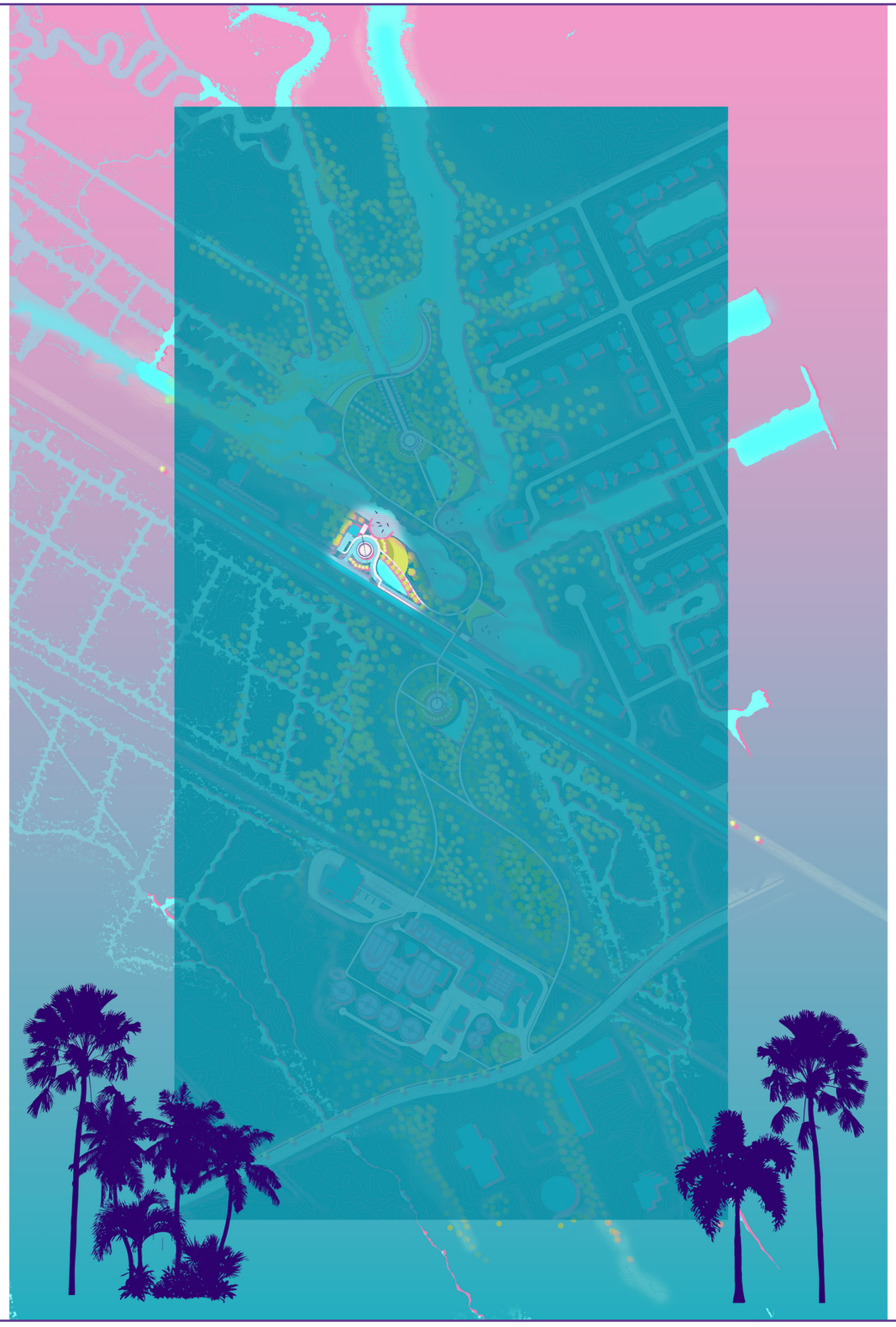




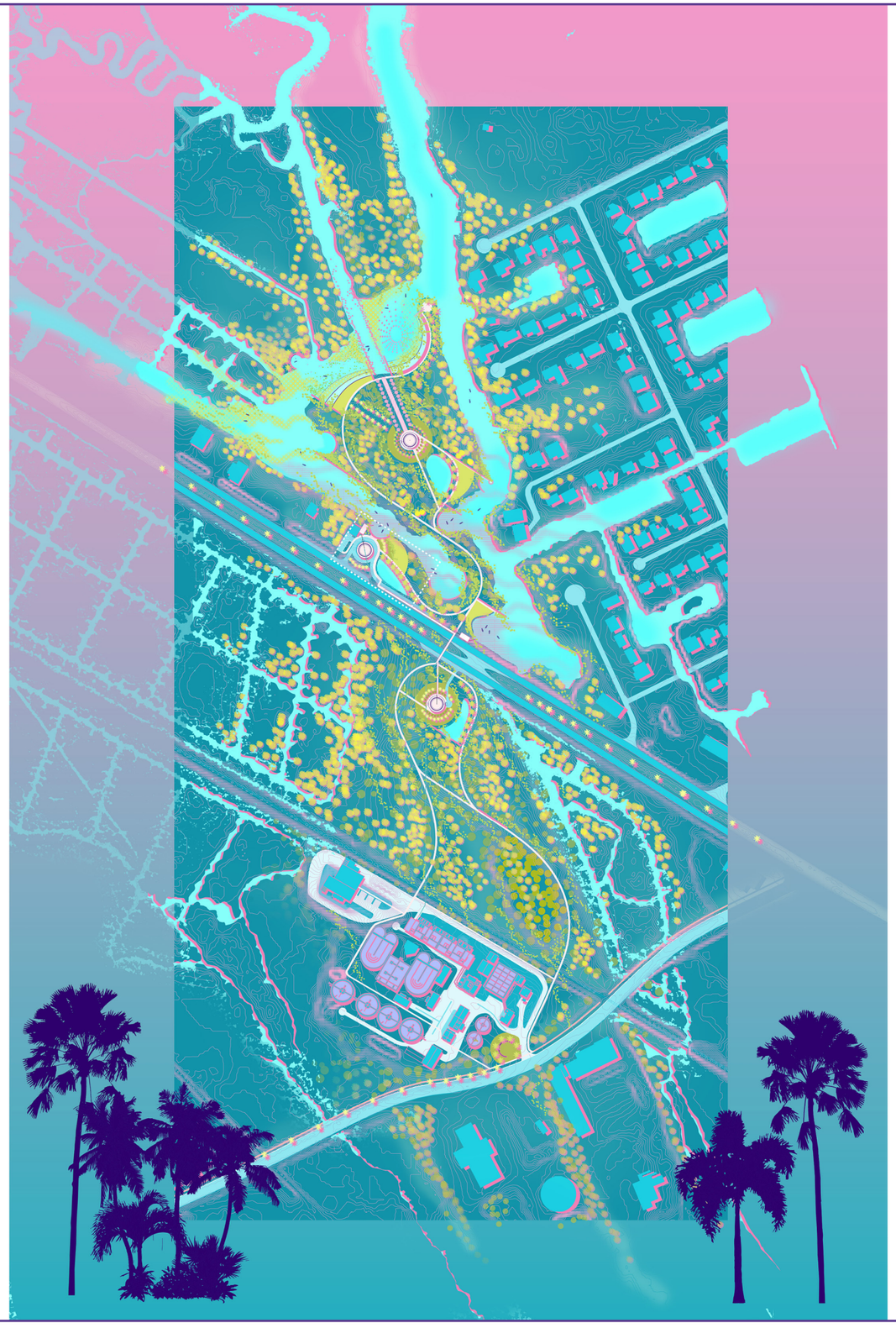
Plants grown in Margaritaville's ponds are transplanted by community members…



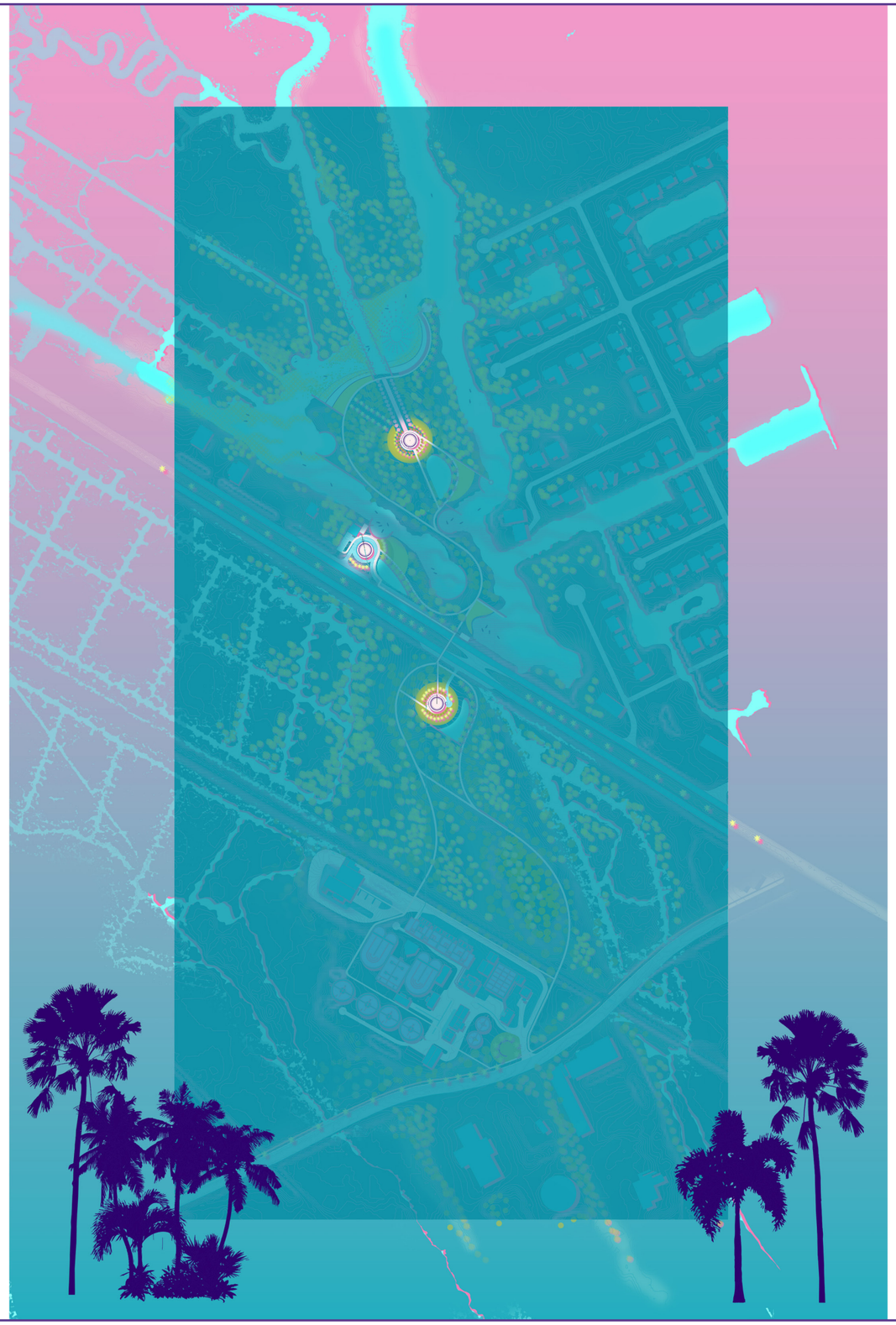
to canals adjacent to the wastewater plant, which receives Margaritaville's sewage. This brings me to the second site in this proposal.



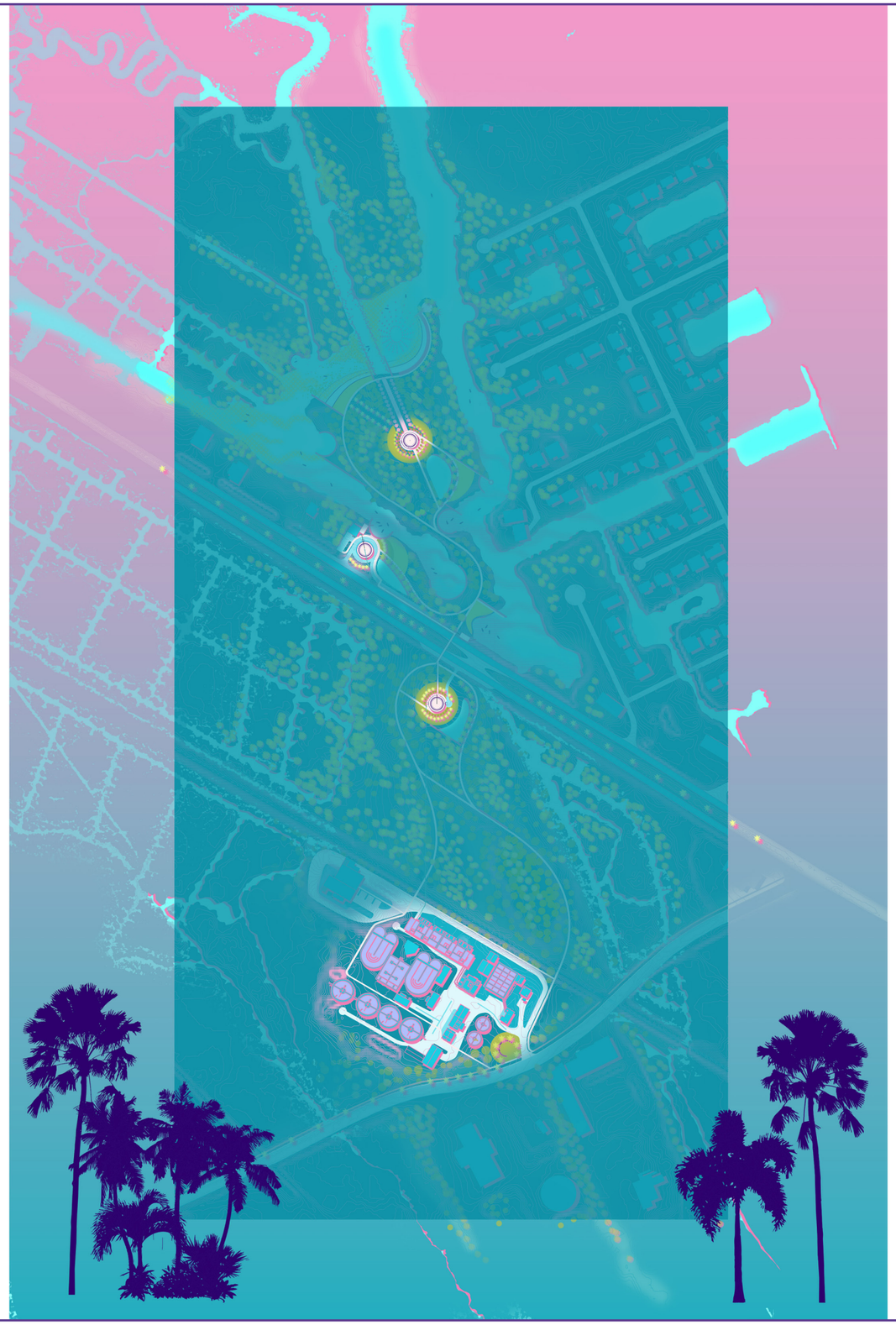
Here, the Margaritaville community acquires a parcel...



The proposal spreads out from here, creating a garden arranged around the obscene.



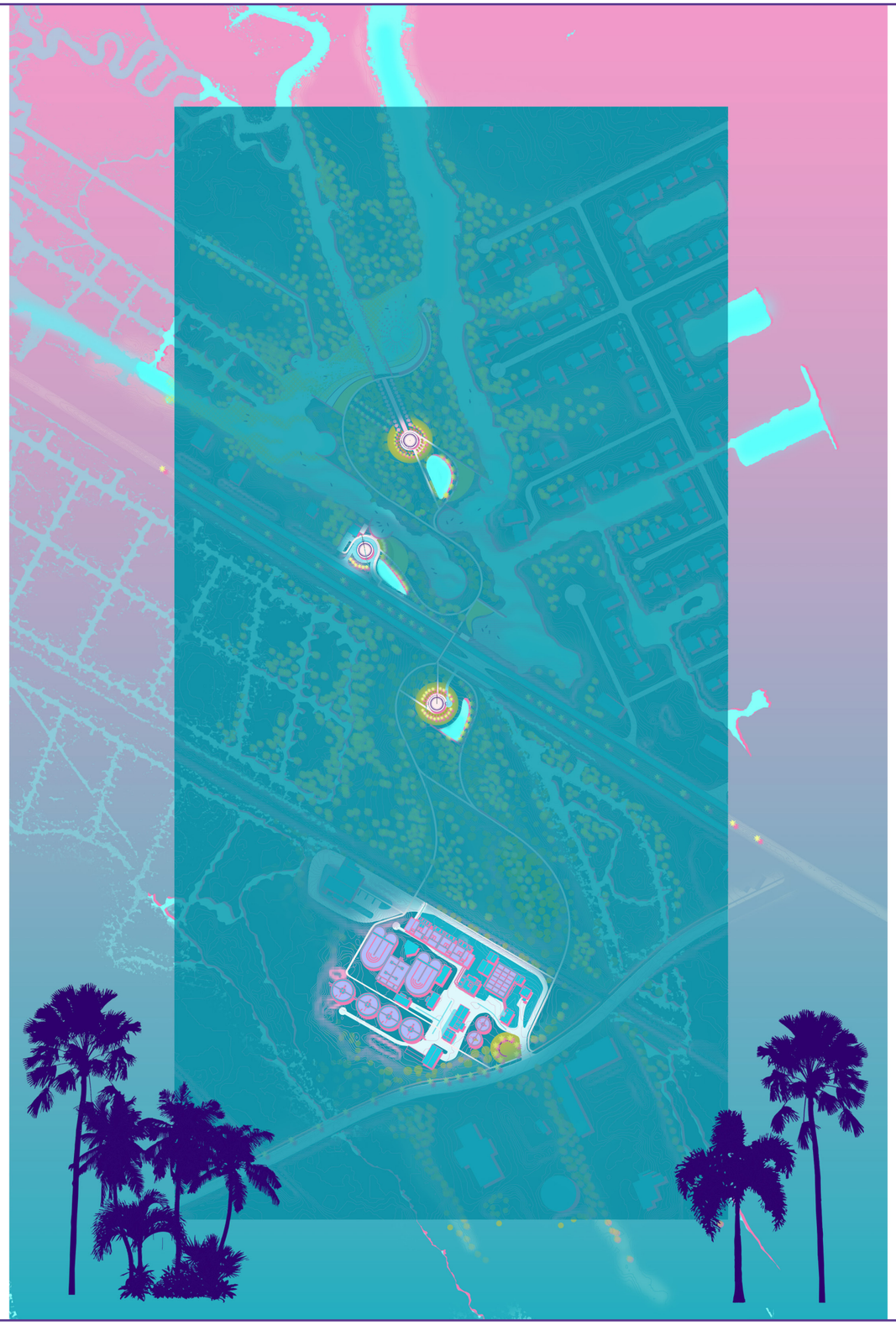
At the garden's heart is a series of Anaerobic Digesters. These produce biogas from human waste which can, in turn, be used to produce heat and electricity.[18]



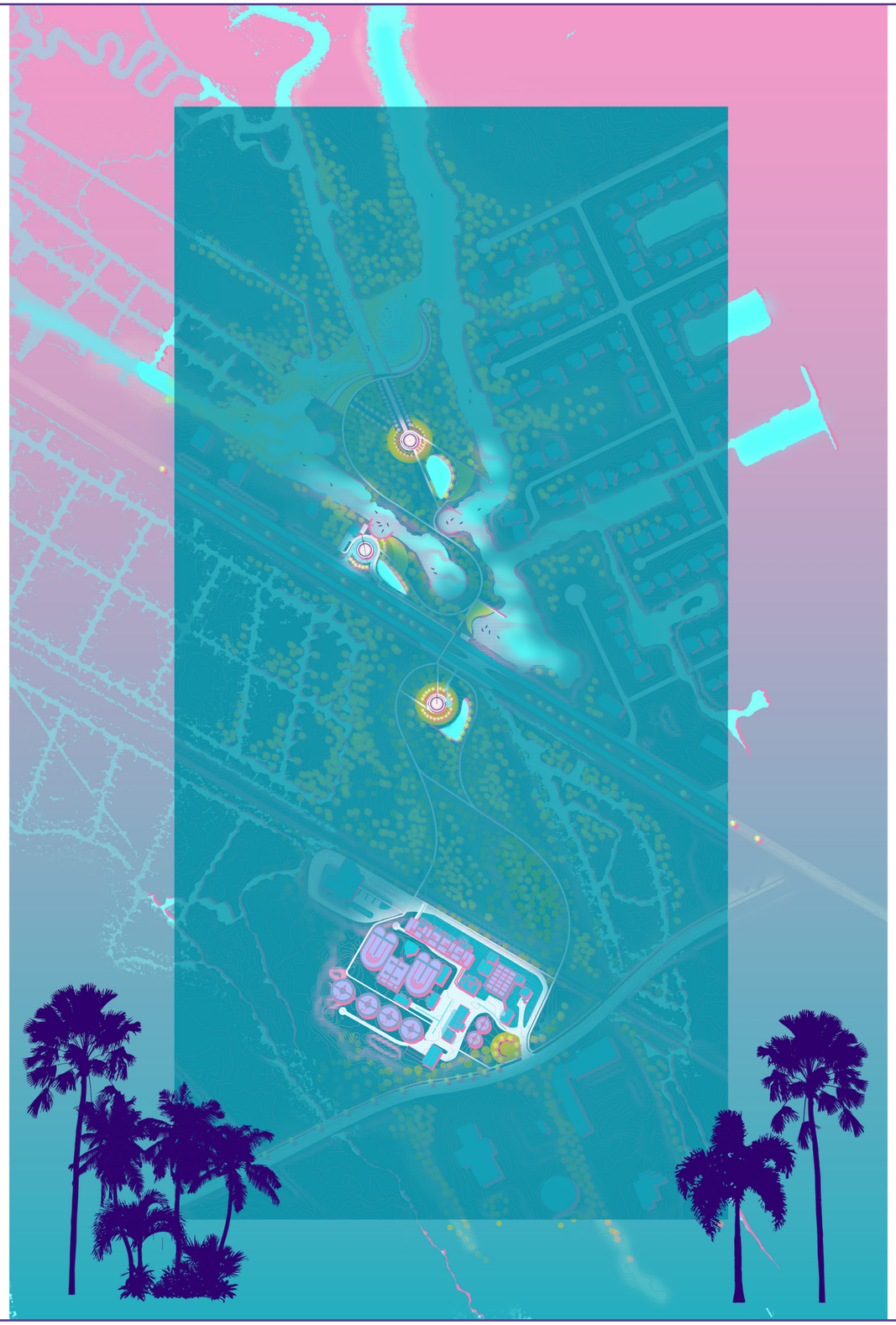
Margaritaville’s waste already enters the wastewater treatment plant here. The separated sludge is sent to the anaerobic digesters…



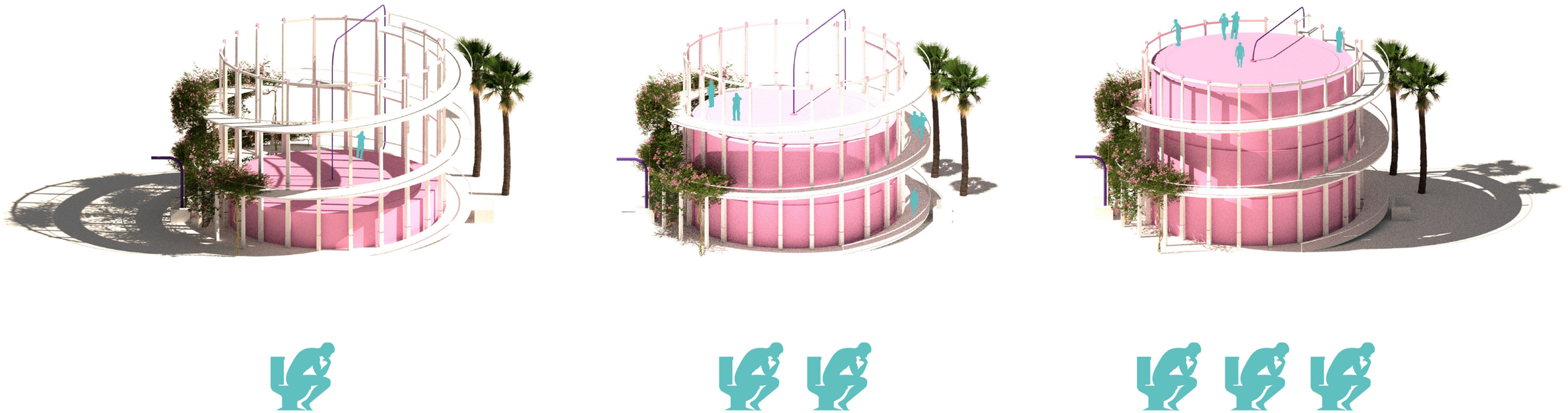
...at one point crossing the highway...



... before arriving at the digesters. The biogas produced powers small generators, which heat the water...



... and provide manatees with a winter sanctuary as power plants are decommissioned.



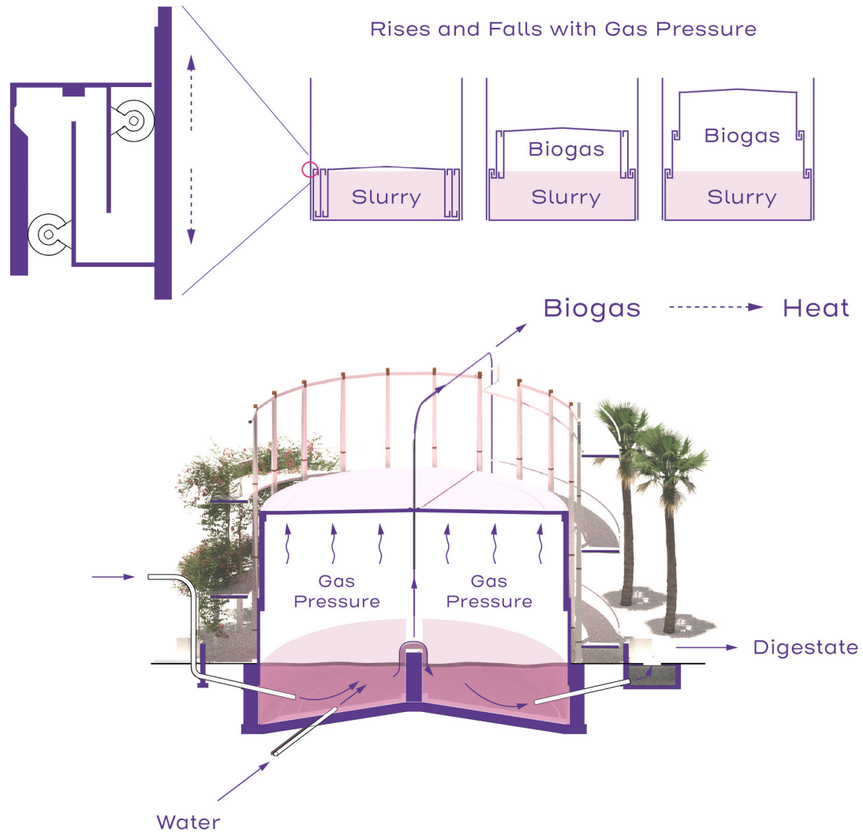
These floating drum Anaerobic Digesters rise and fall with the amount of biogas within them. Here we see one digester at three different points in time. A ramp allows retirees to occupy the digesters at different heights. In a very literal sense, the retirees' own waste creates a new vision of paradise as their vantage point changes with the rising and falling of the digester.[19]

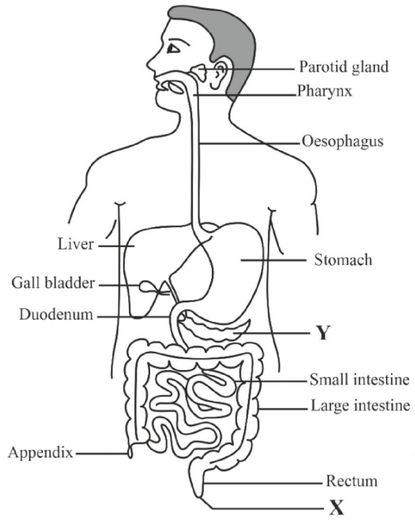


Meanwhile, and most critically, they produce heat for the manatee which can die if water temperatures drop.

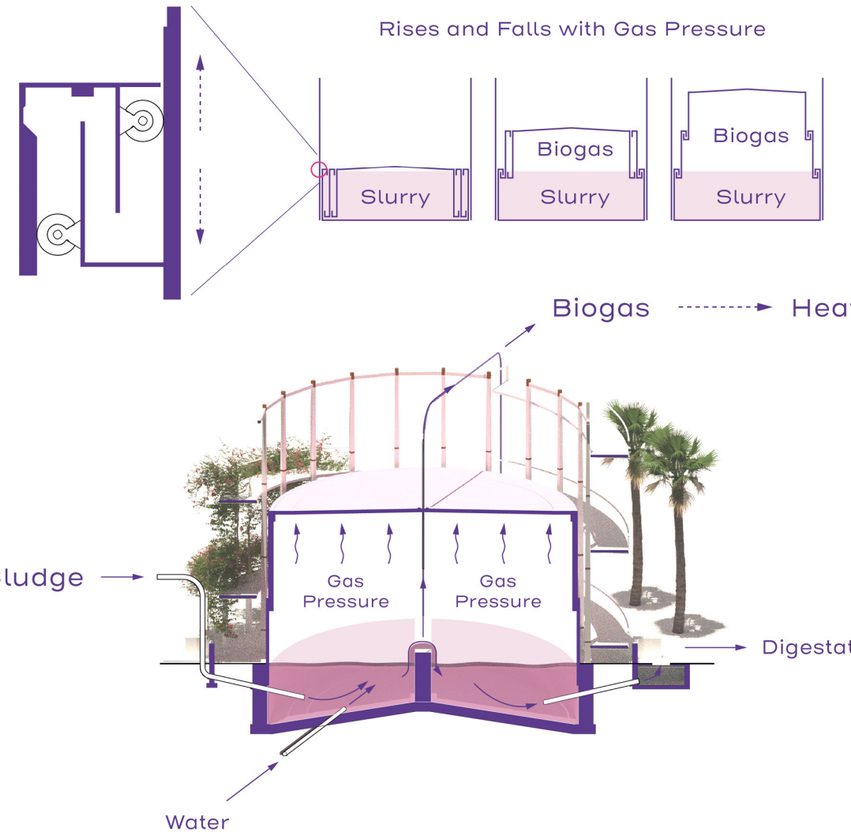


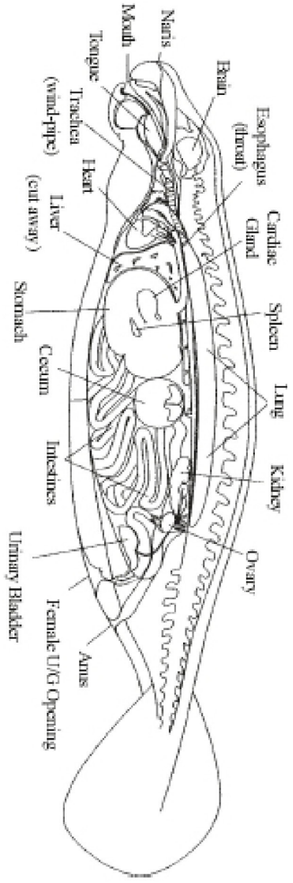
We can see how one of these digesters functions more closely here.


Rises and Falls with Gas Pressure
Slurry
Biogas
Slurry
Biogas
Slurry
Biogas
Heat
Gas Pressure
Gas Pressure
Digestate
Water



Sludge





Need to Remain in Water above 68 F

Slow Metabolism

Human Digestion

1–3 Days

1 person: 0.7 lb feces/day

120 people: 84 lb feces/day

Machine Digestion

60 Days

0.05 cu ft biogas

6 cu ft biogas

Manatee Digestion

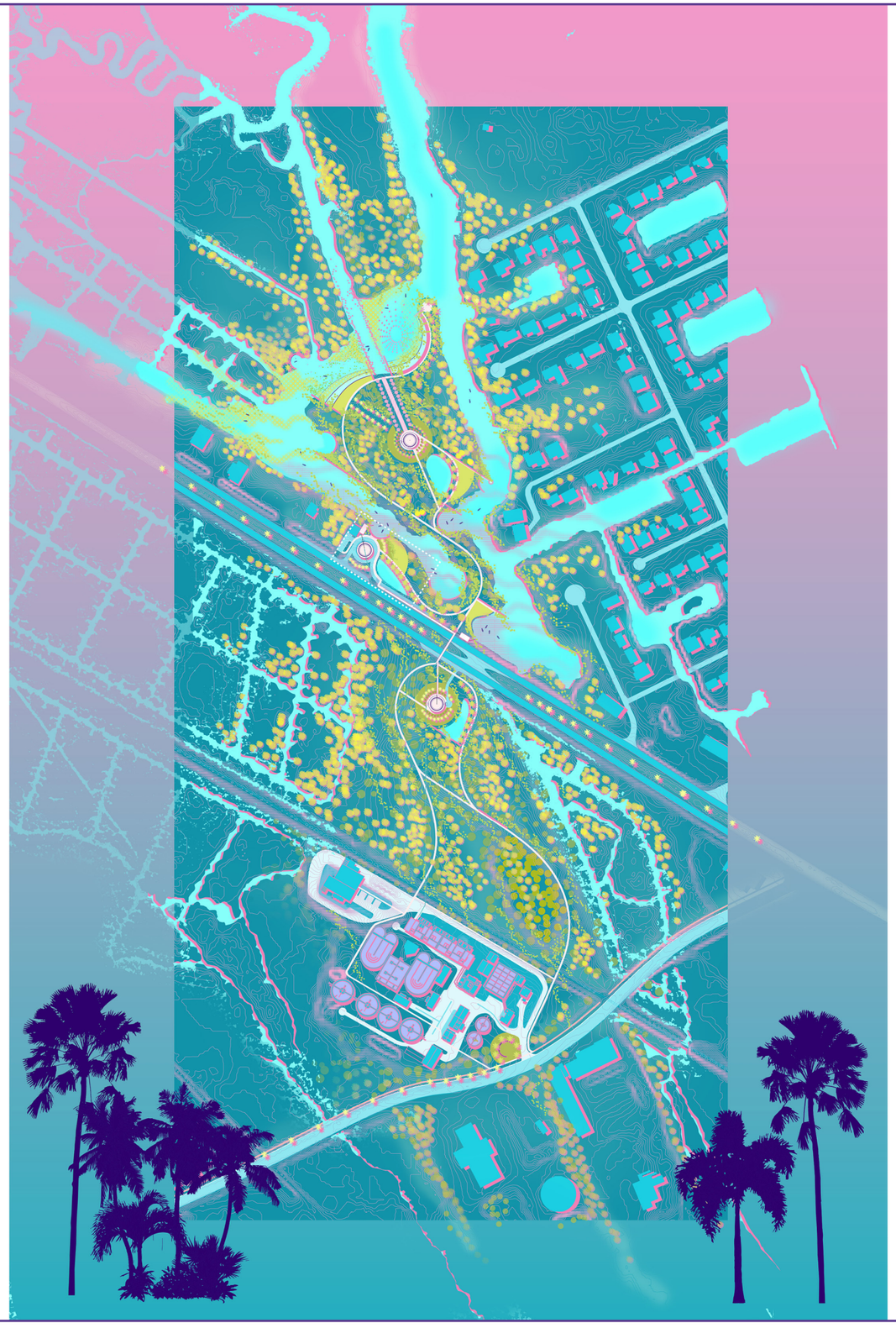
7 Days

Energy Produced: 7 watts (for 1 hour)

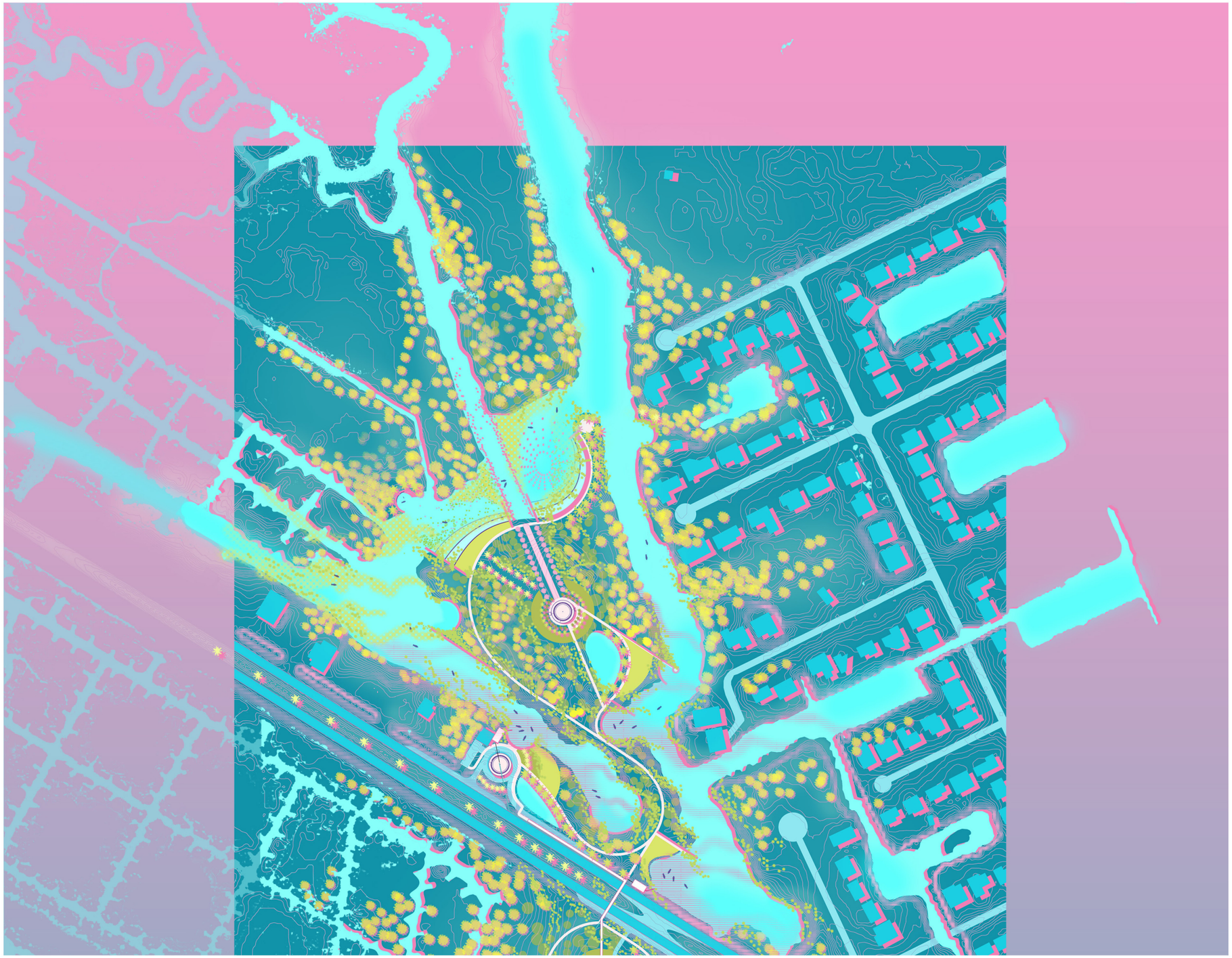
Energy Produced: 1000 watts (for 1 hour)

Enough to raise temp. of 1000 gallon pool by 10 degrees F

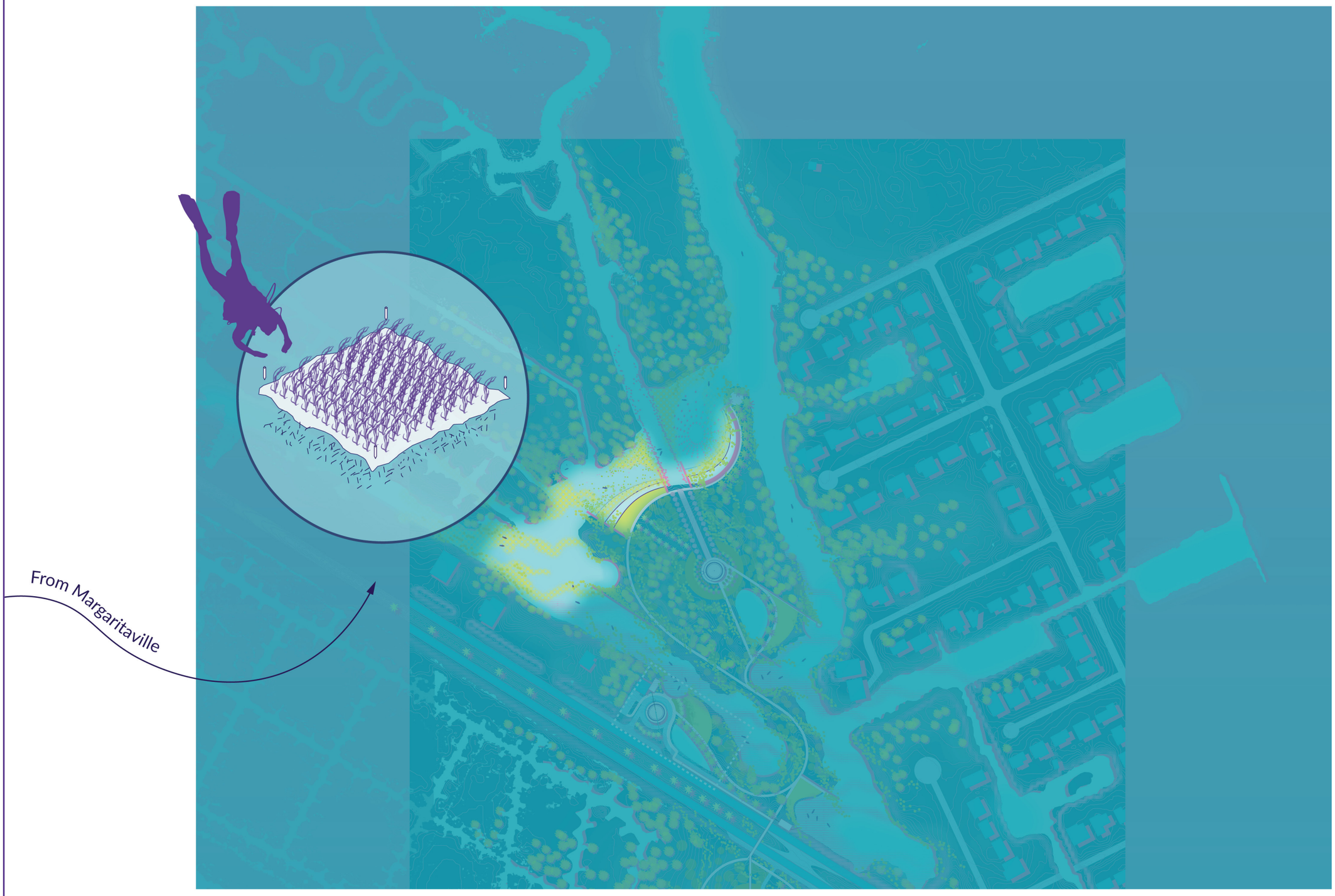
The digester forms a link – an obscene machine - which connects human digestion to that of the manatee. The manatee's own slow metabolism– necessary for extracting nutrients from aquatic plants – also means it must remain in water above 68 F.[20]



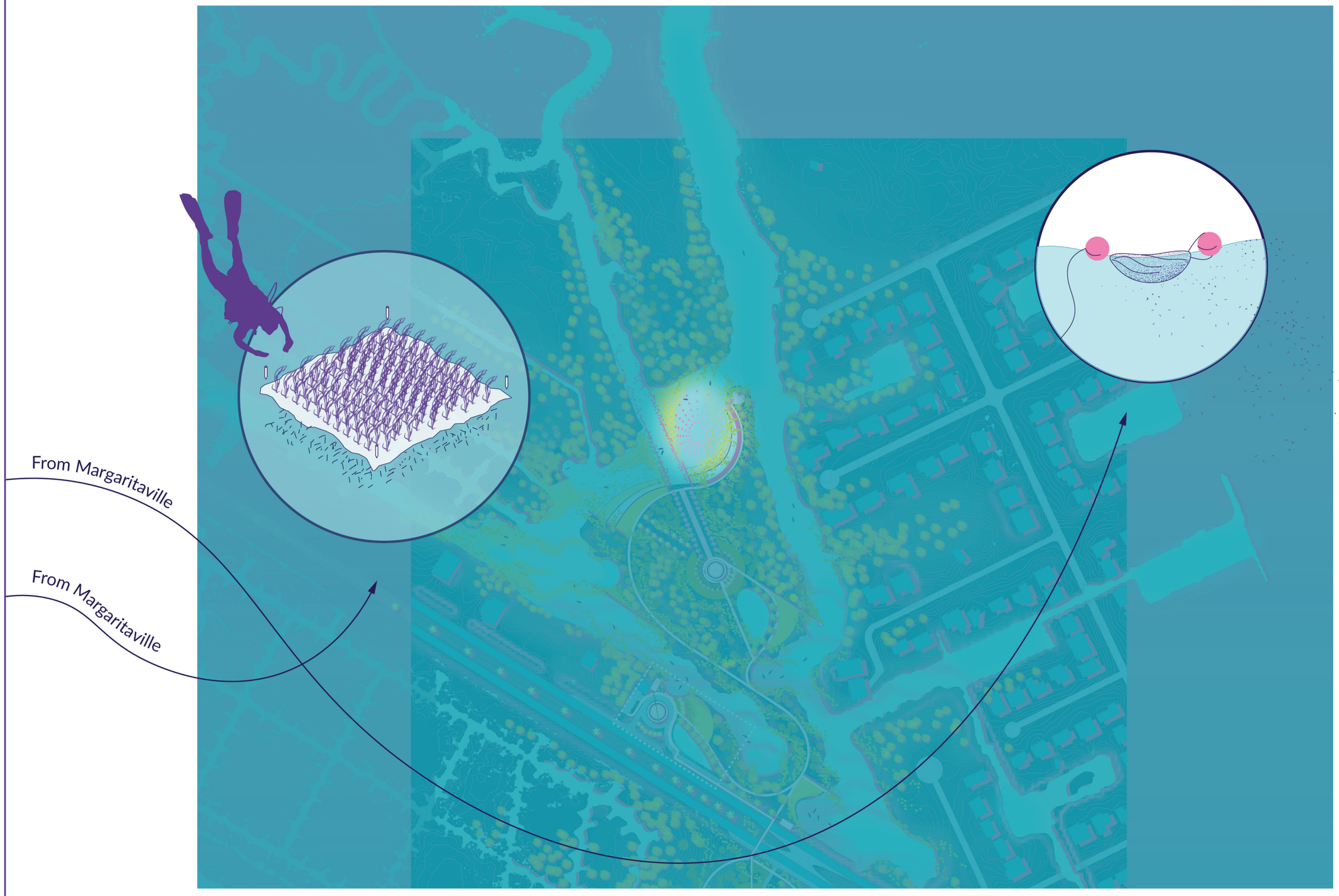
I'll now zoom in on the upper portion of this plan.



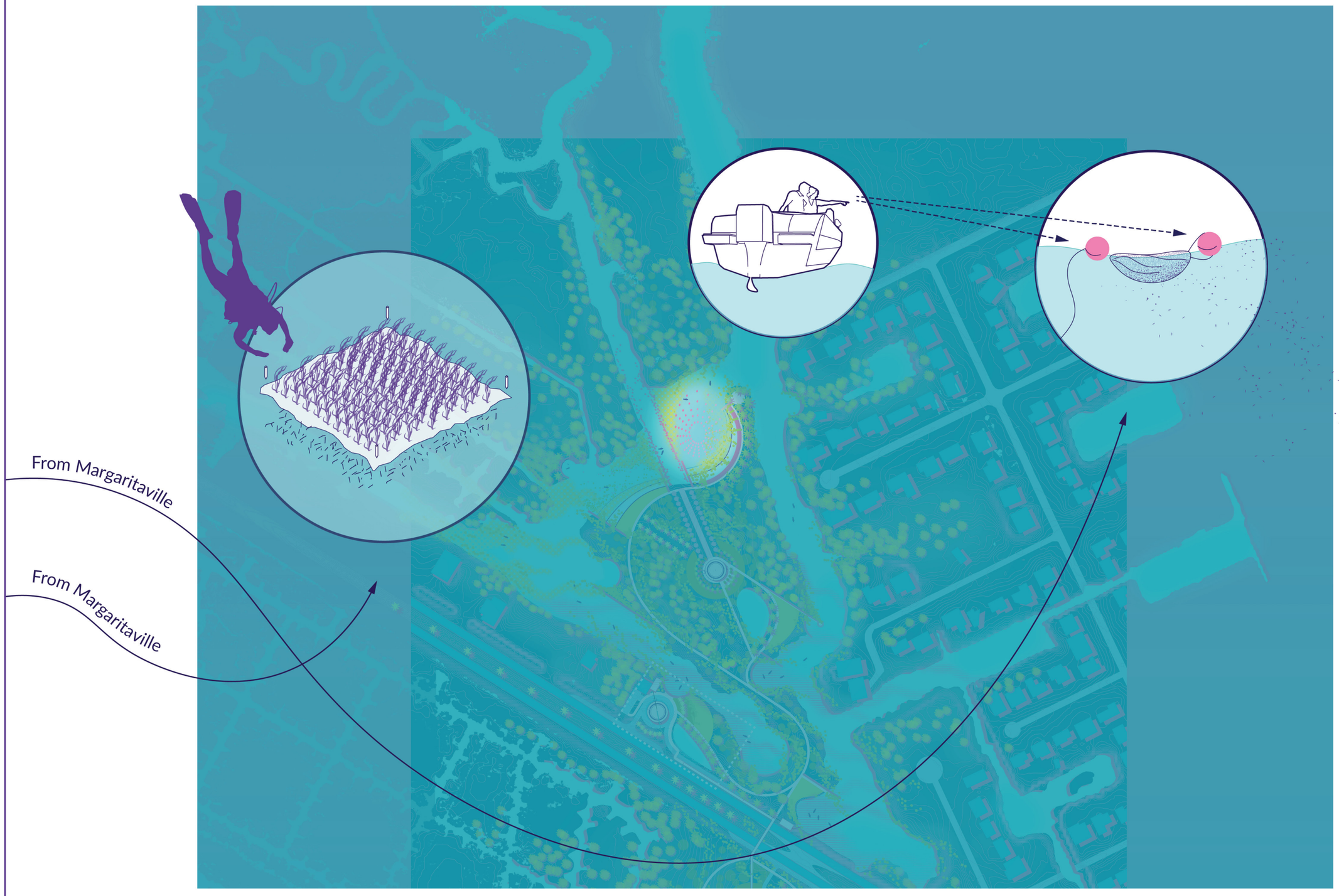
In and near the water warmed by these digesters, new vegetation, edible to manatees, is planted.



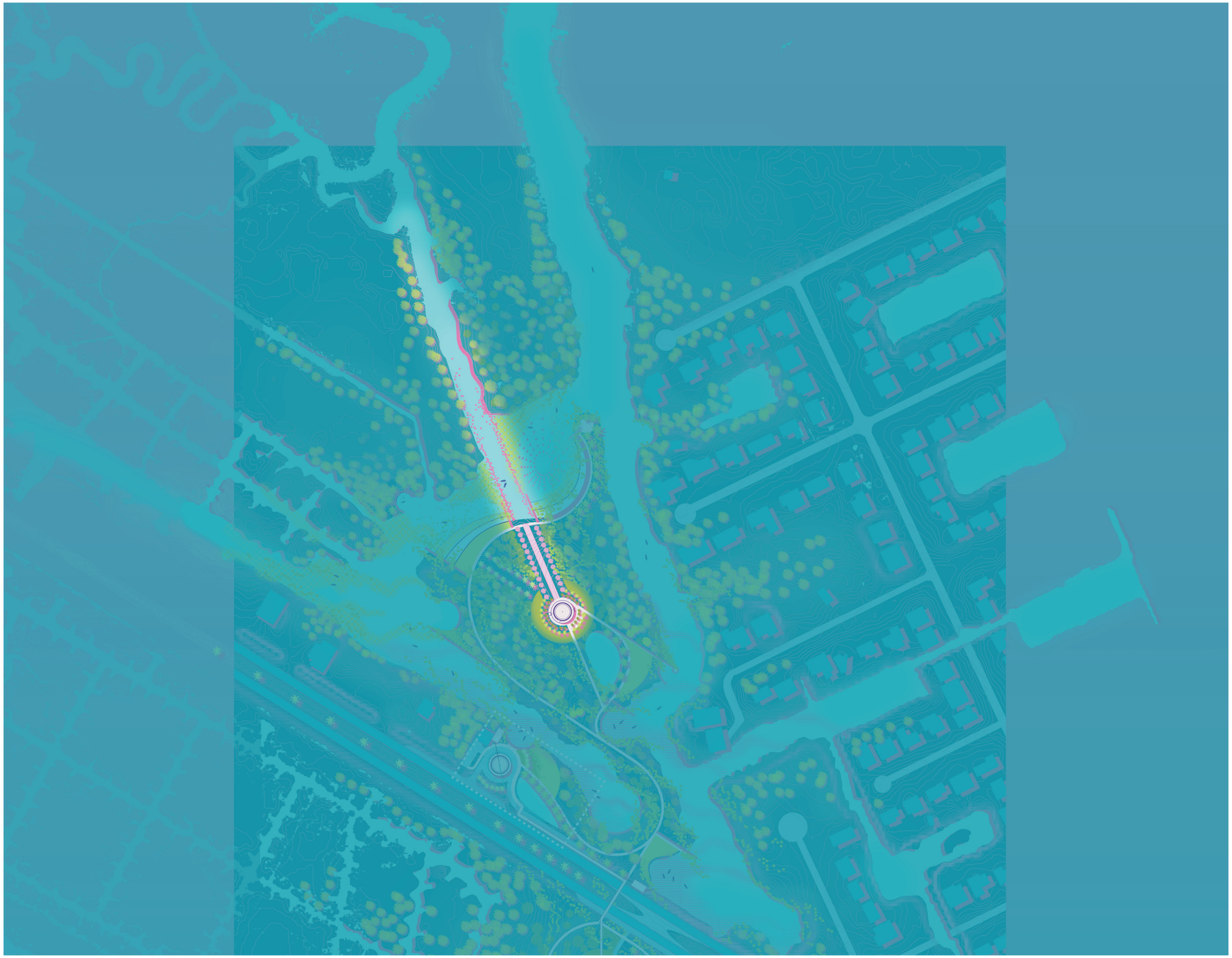
Coir mats are staked directly in-ground...



...or seeds are distributed from floating buoys.



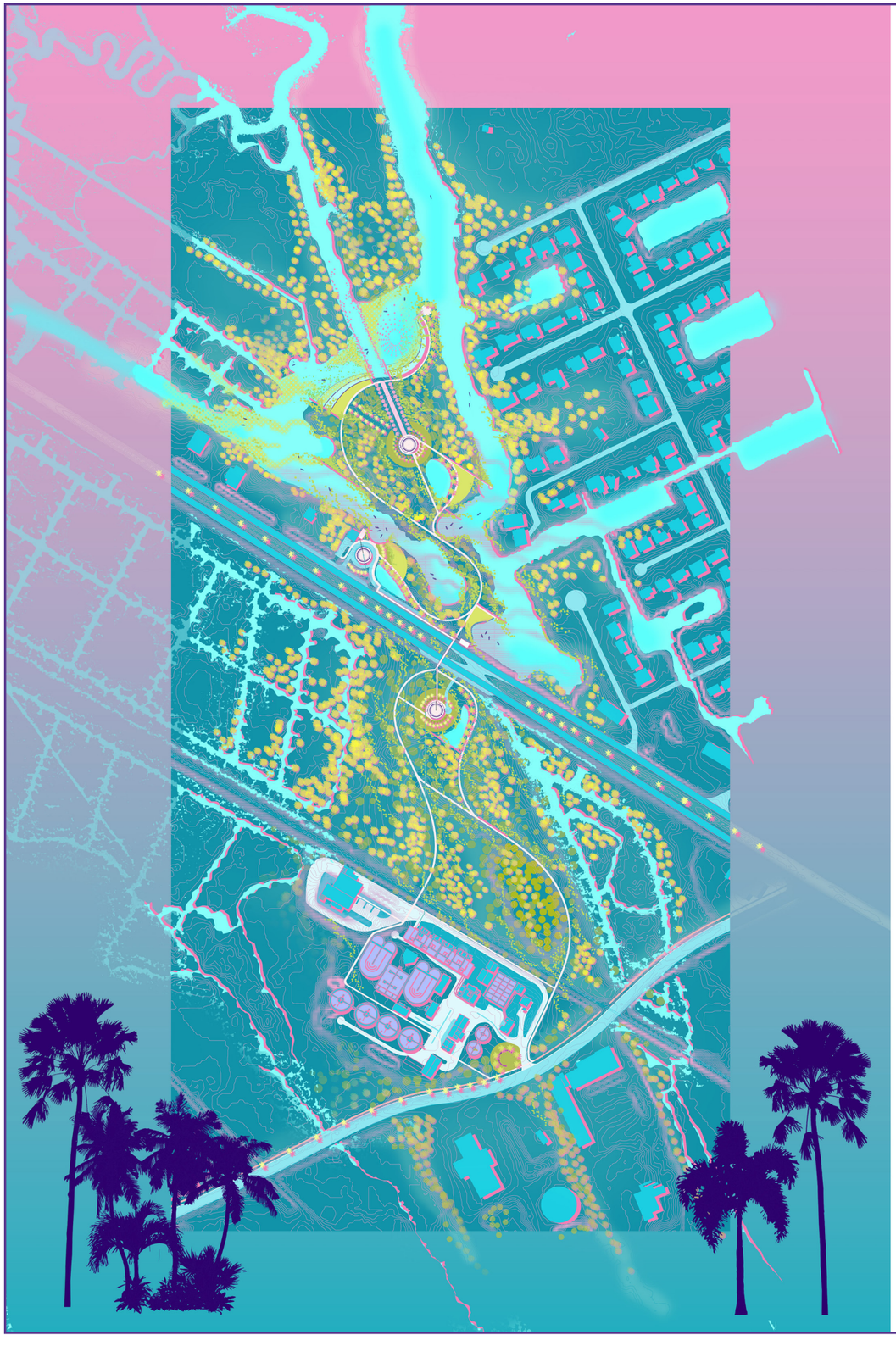
The buoys also serve as a warning to boaters that manatees gather in this area.



On land, an allee of flowering, fruiting trees, move down from a digester before descending into the water...



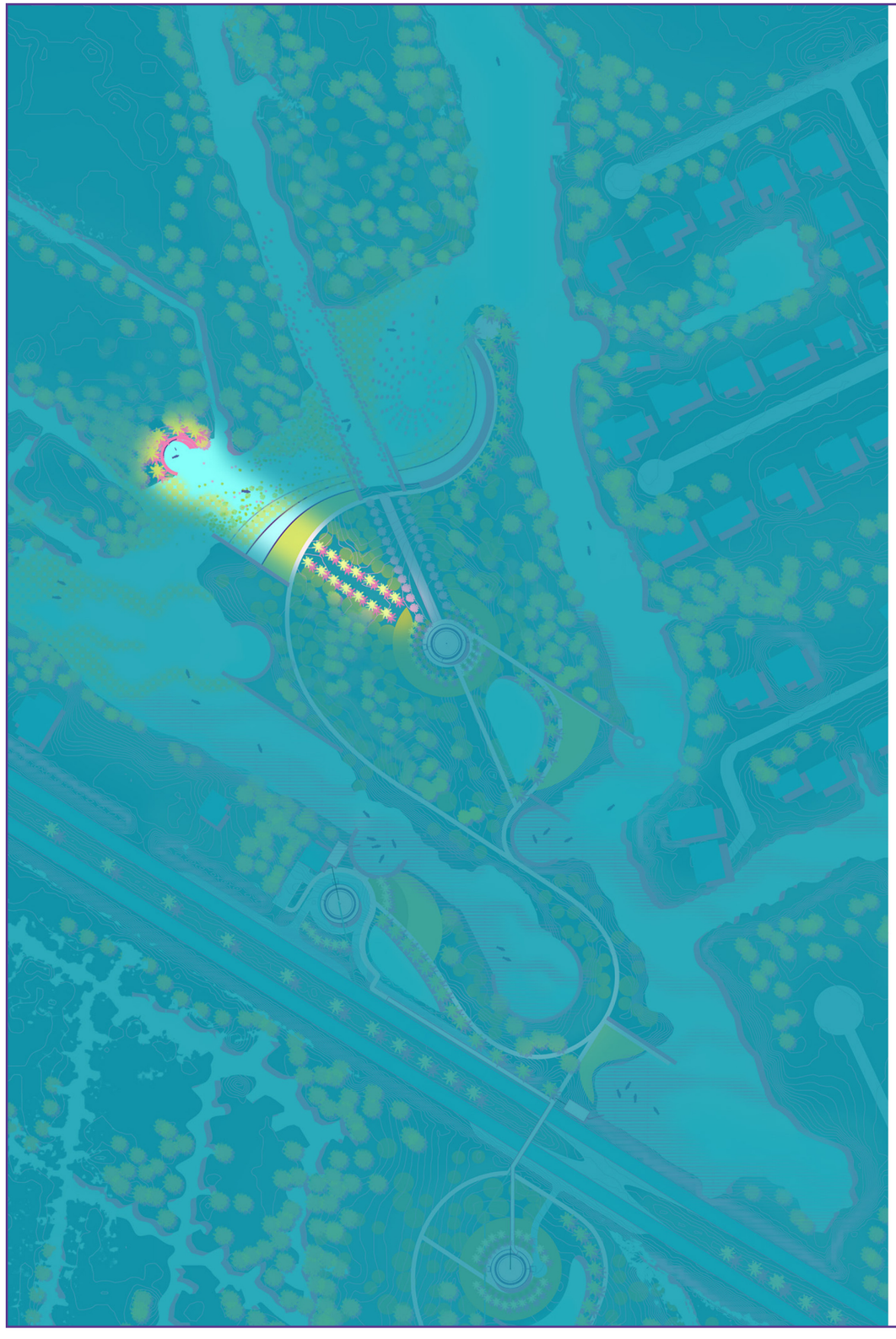
...where it becomes an allee of flowering aquatic plants edible to manatees.

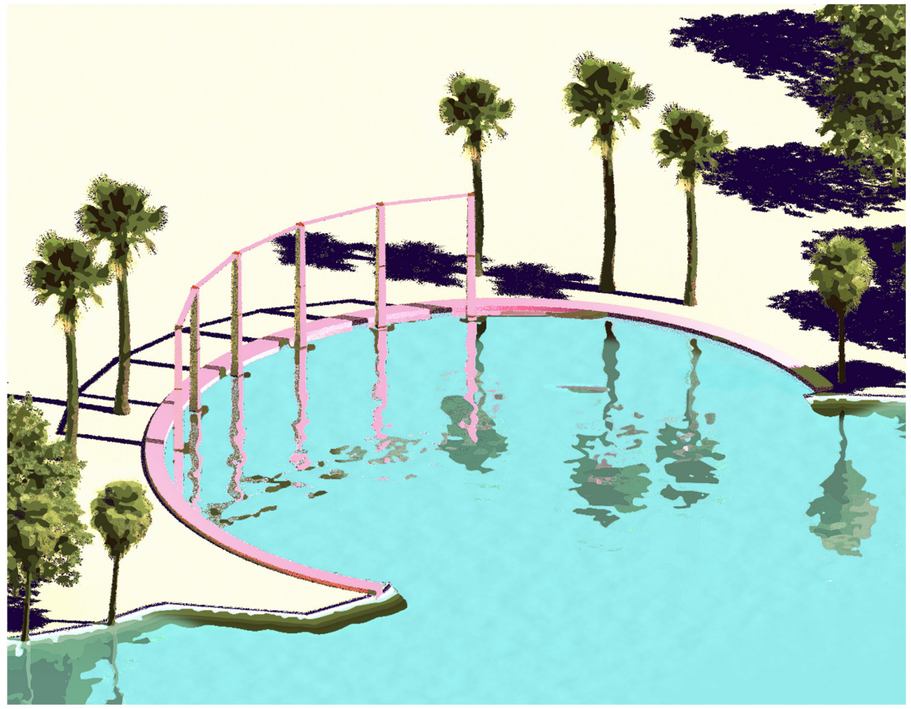


Together, these conditions of heat and food set the stage for new interactions between the retiree and the manatee.

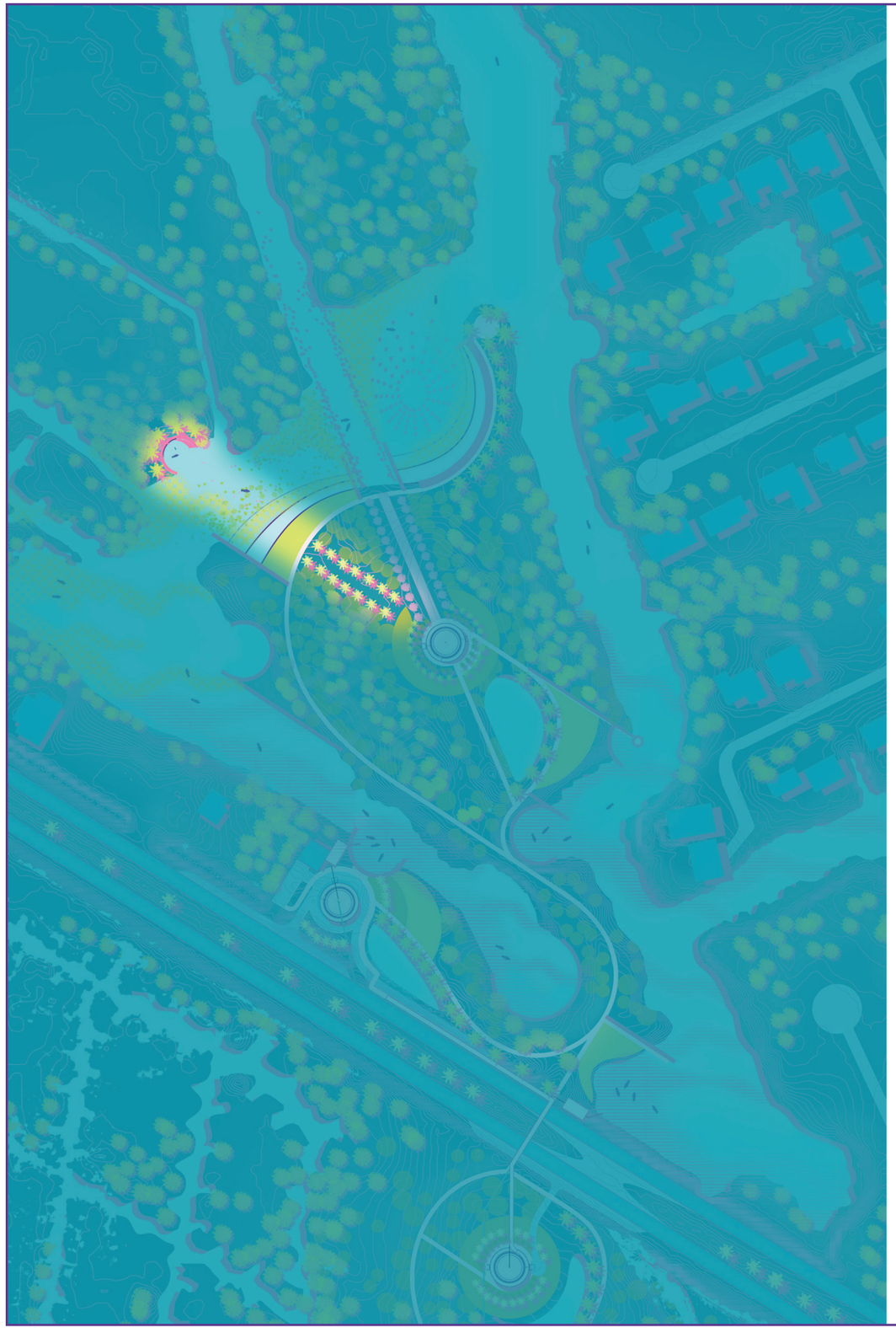


These are centered around a series of coves.

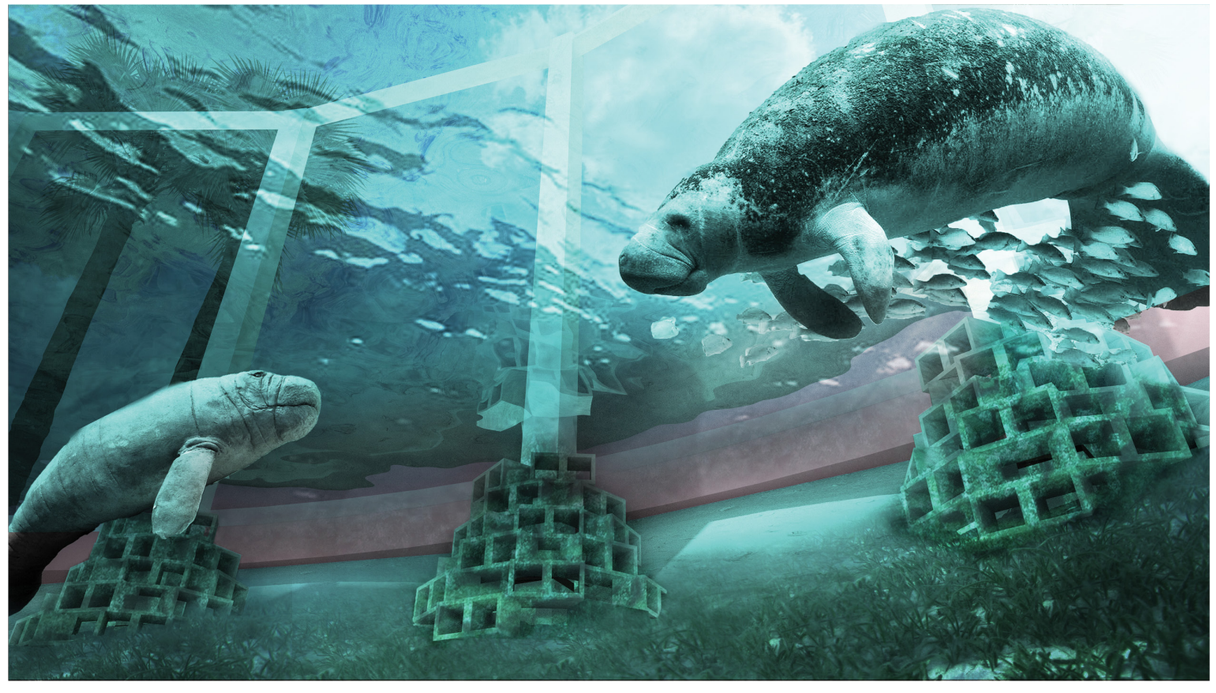




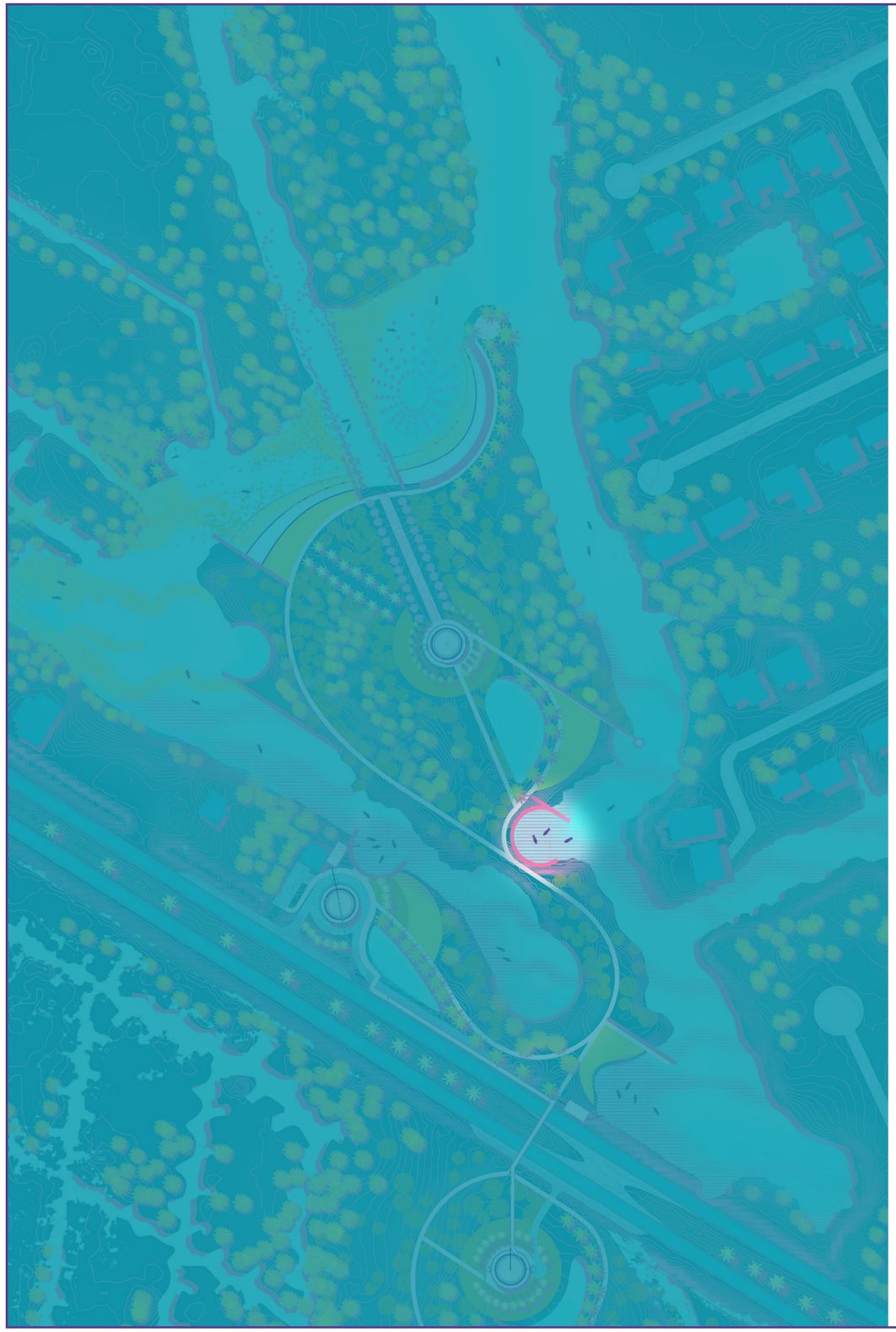
These coves range from calving coves - visible only from afar, marked by a folly emerging from the water, a space of solitude for mothers giving birth...





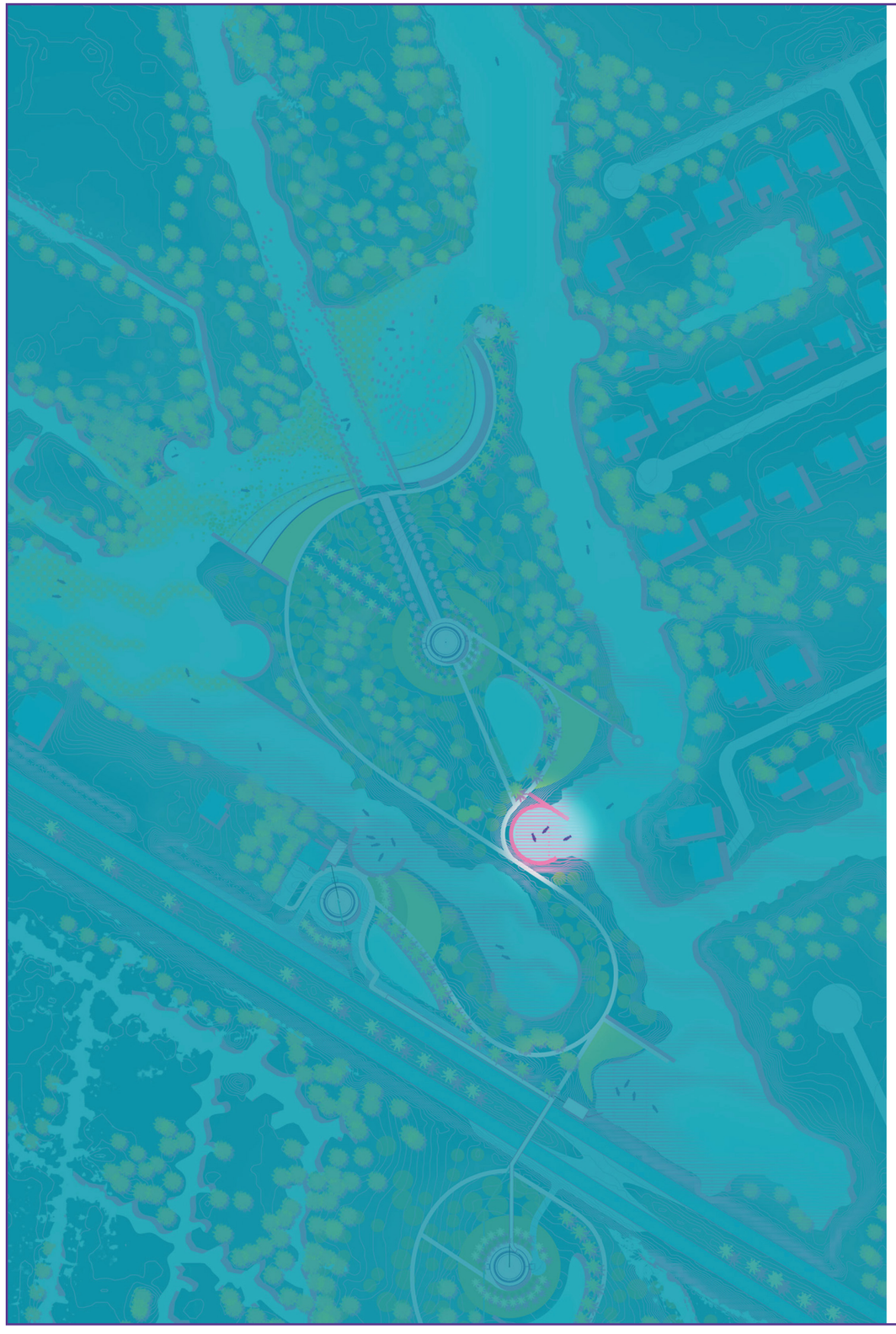


with columns descending into artificial reefs...





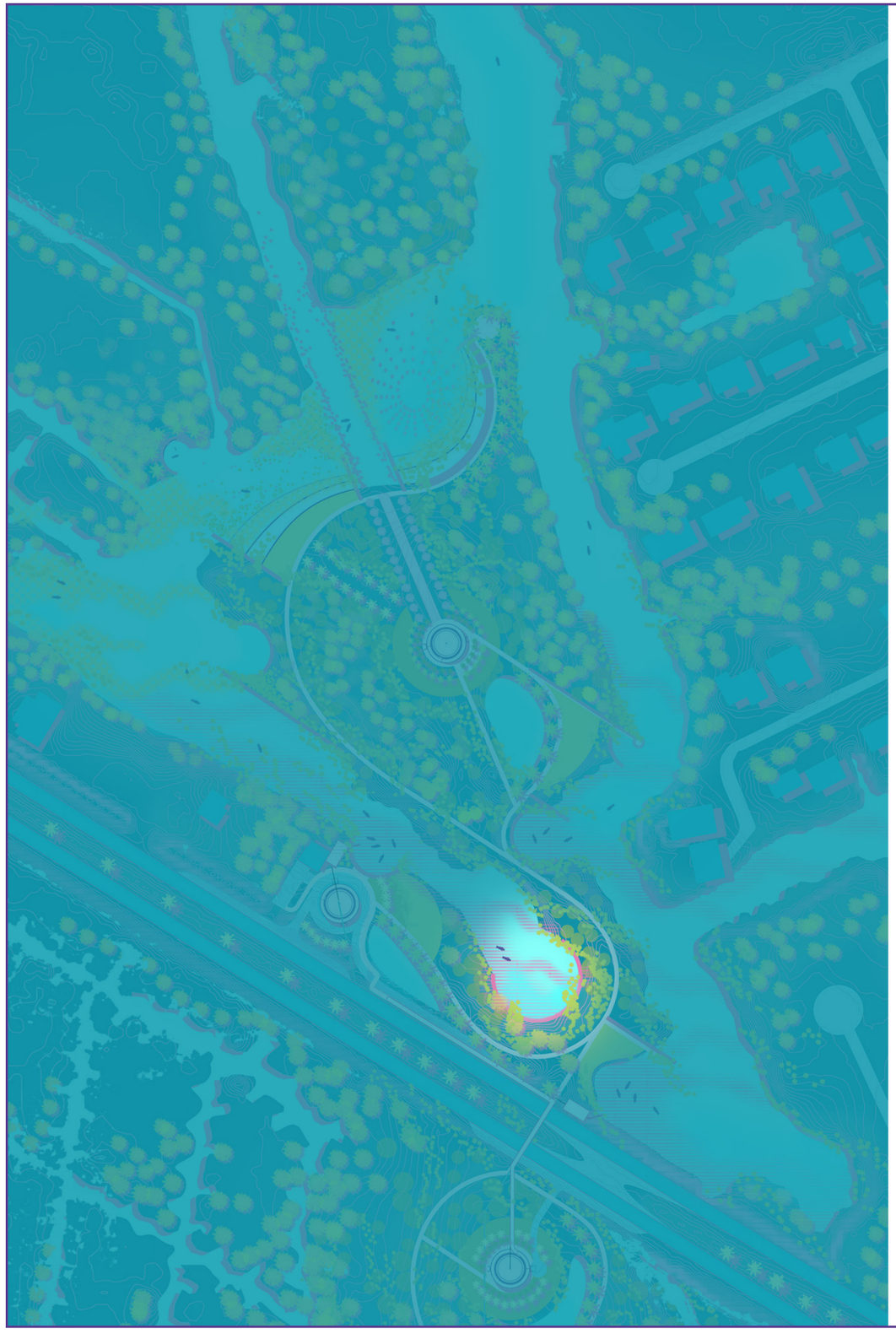
...mist rising from dark water warmed by their own excrement.

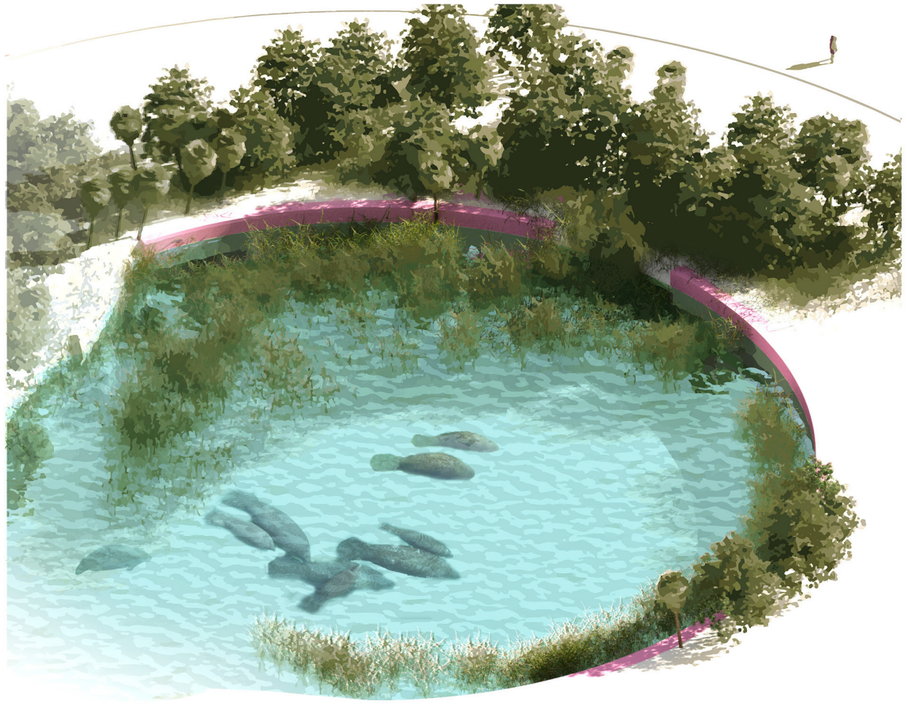




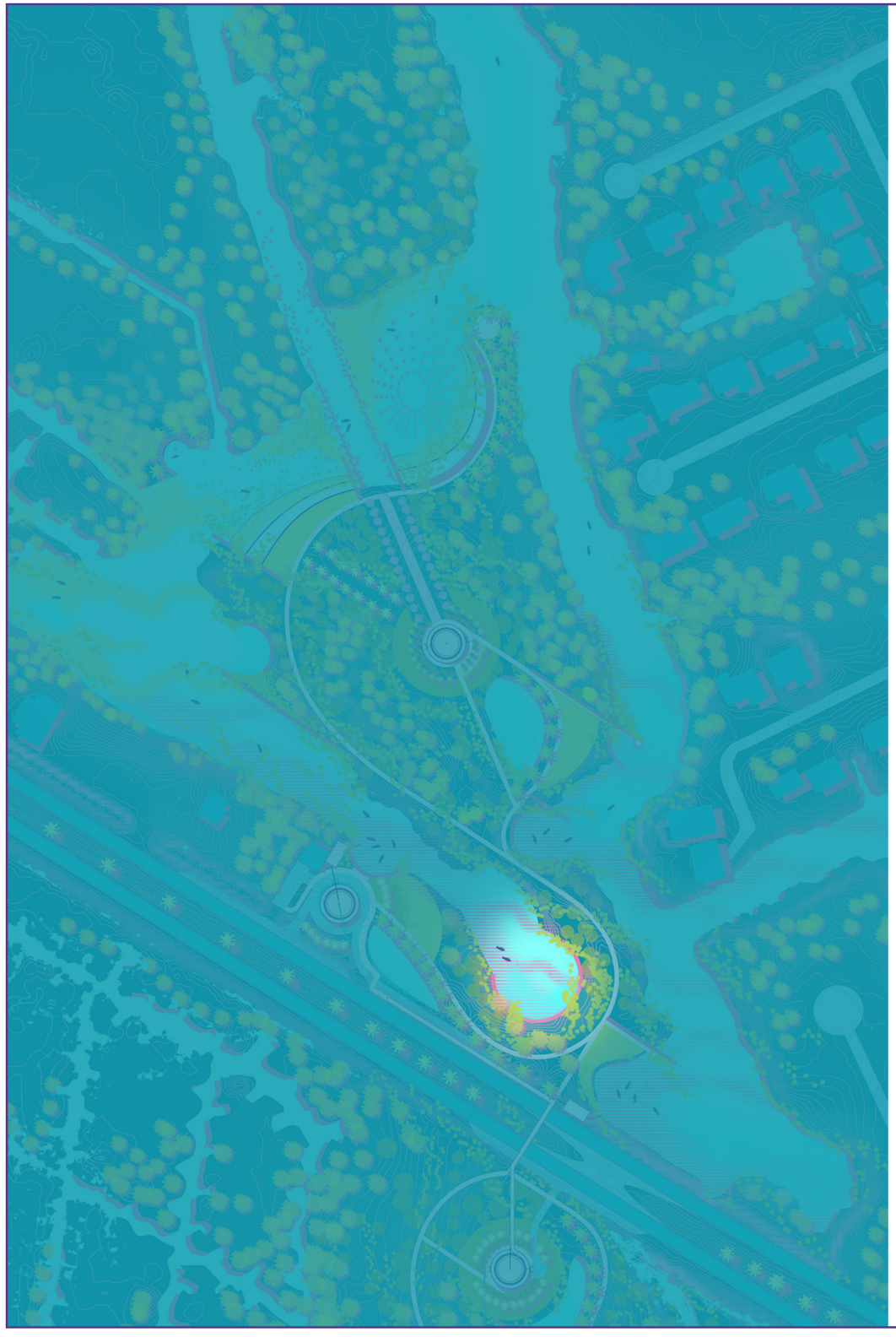


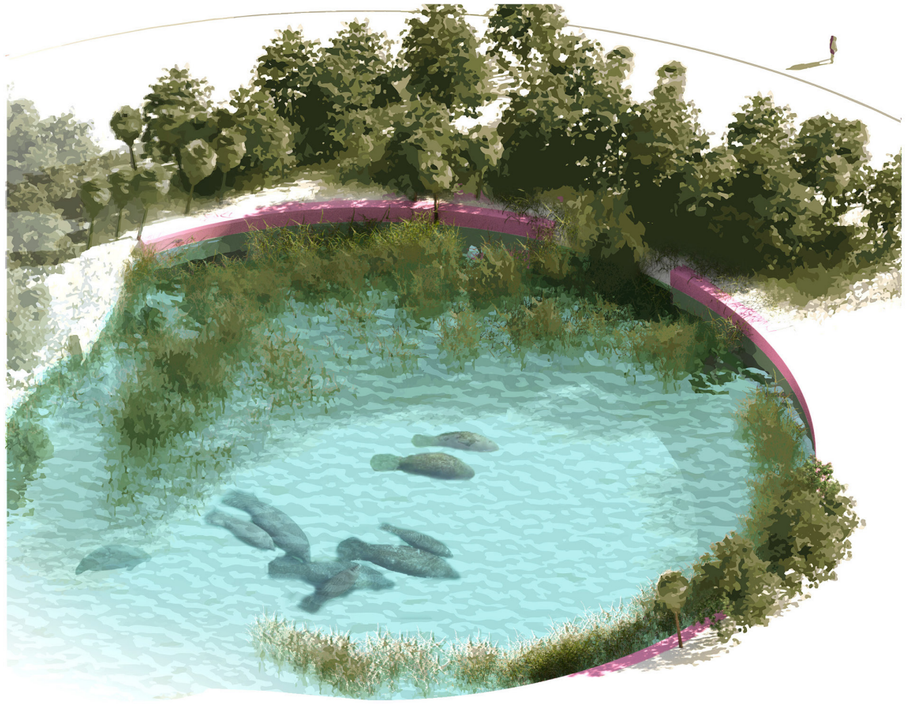
The rest of the soil is used to help grow aquatic vegetation for manatees...





At points, vegetation breaks through cove walls, creating a mucky mix of hard and blurred edges...







55

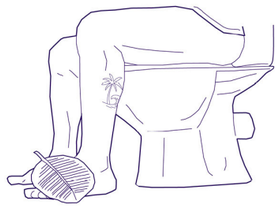
...that echoes the springs manatees historically relied on.

Margaritaville Manatee Club

Human Waste-to-Heat Conversion

Latitude Margritaville

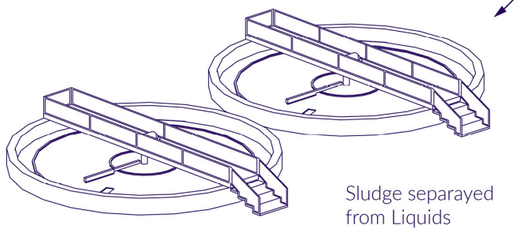
Morning Constitutional



Human Waste

Ormond Beach Wastewater Treatment Plant

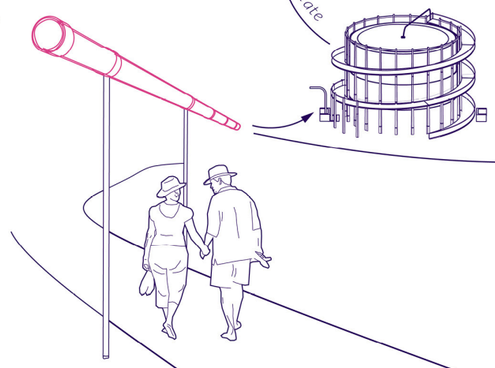
Settlement Tanks



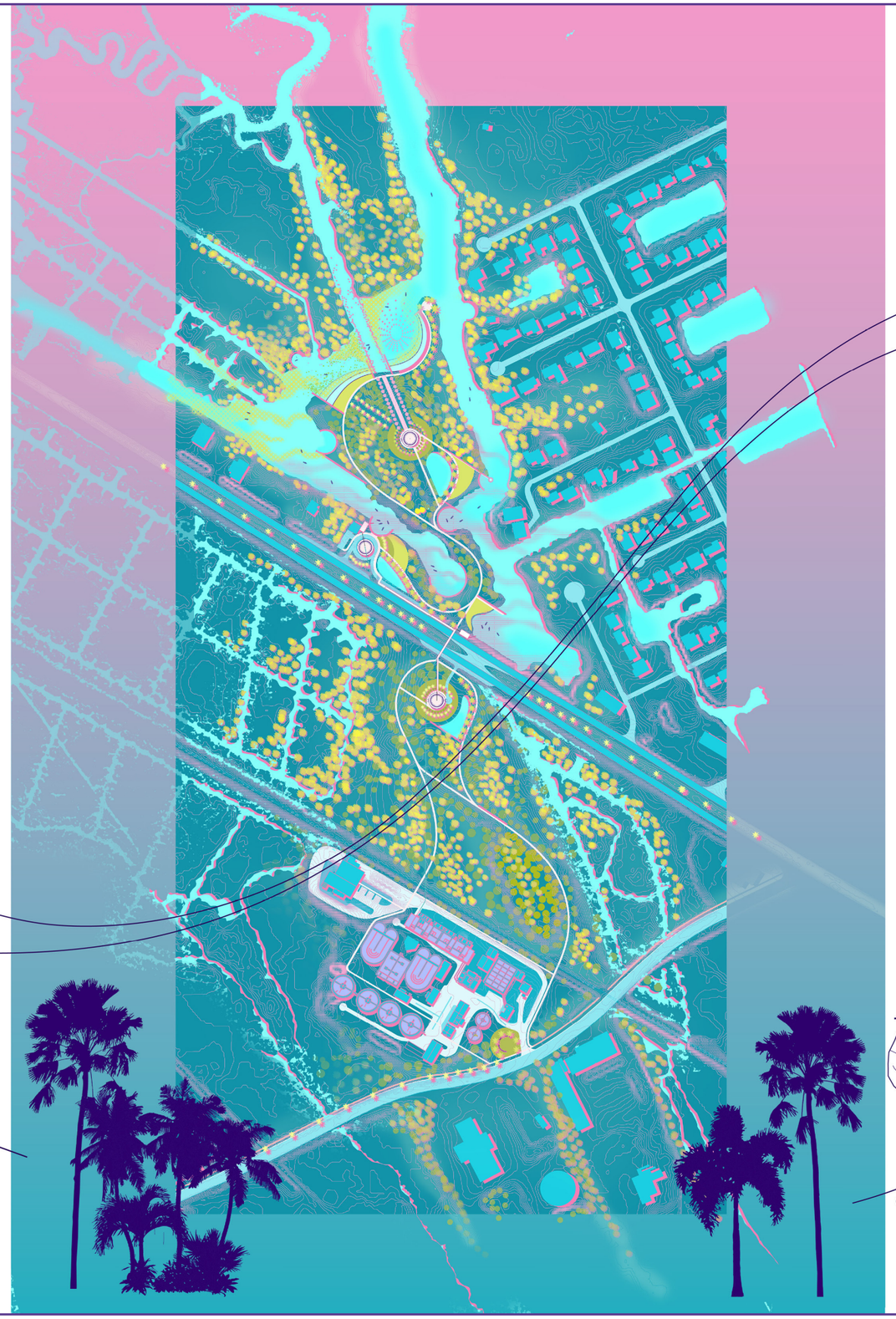
Sludge separayed from Liquids

Sludge

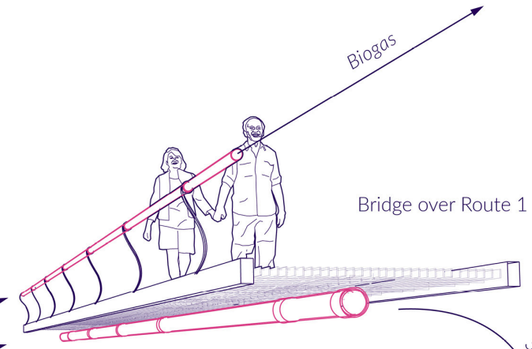
Digestate



Sludge sent to Anaerobic Digesters



Biogas



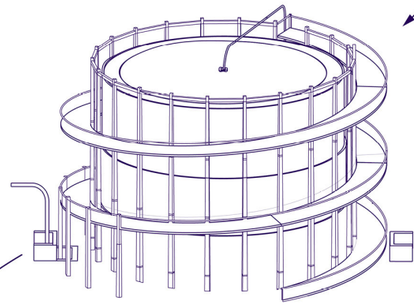
Bridge over Route 1

Sludge

Sludge

Margaritaville Manatee Club

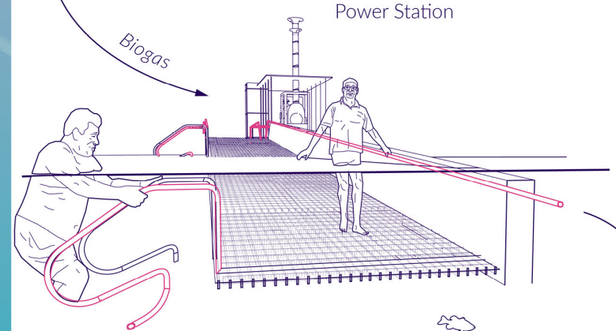
Floating Top Anaerobic Digester



Digestate

Biogas

Combined Heat and Power Station

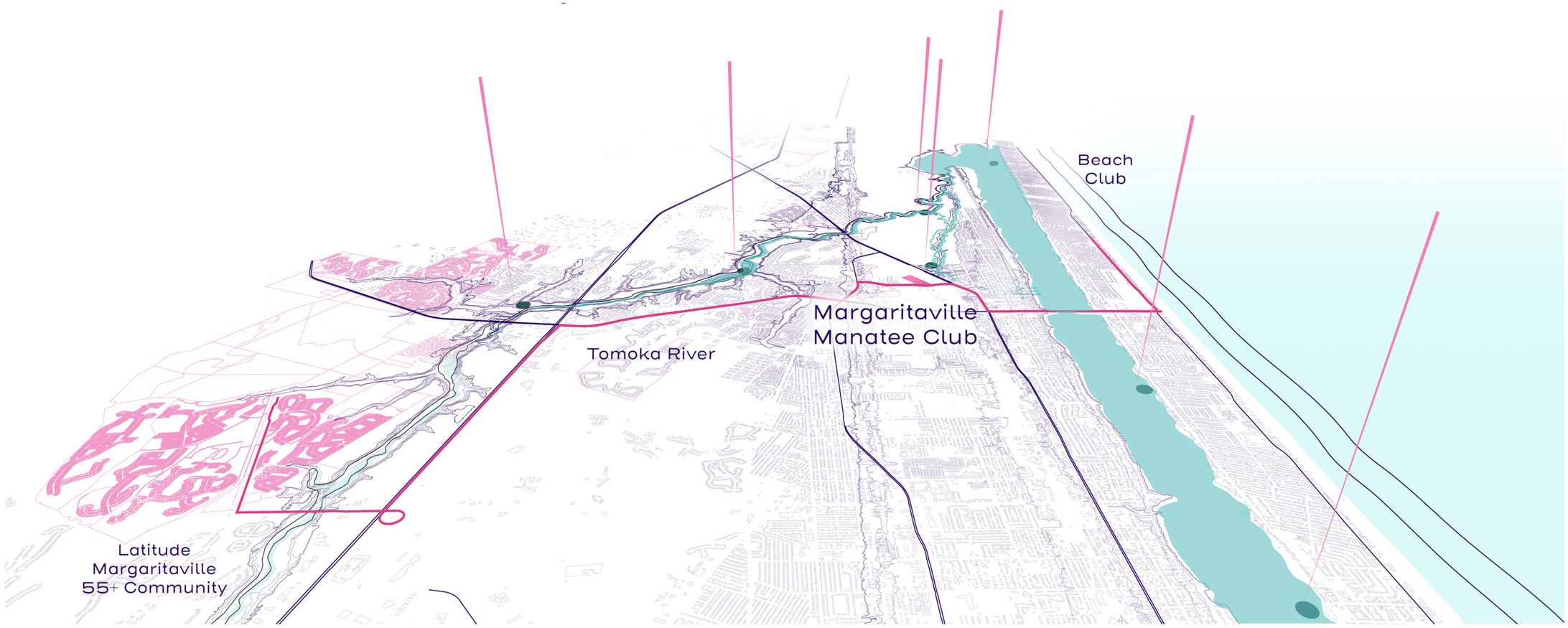


Ramp into Water

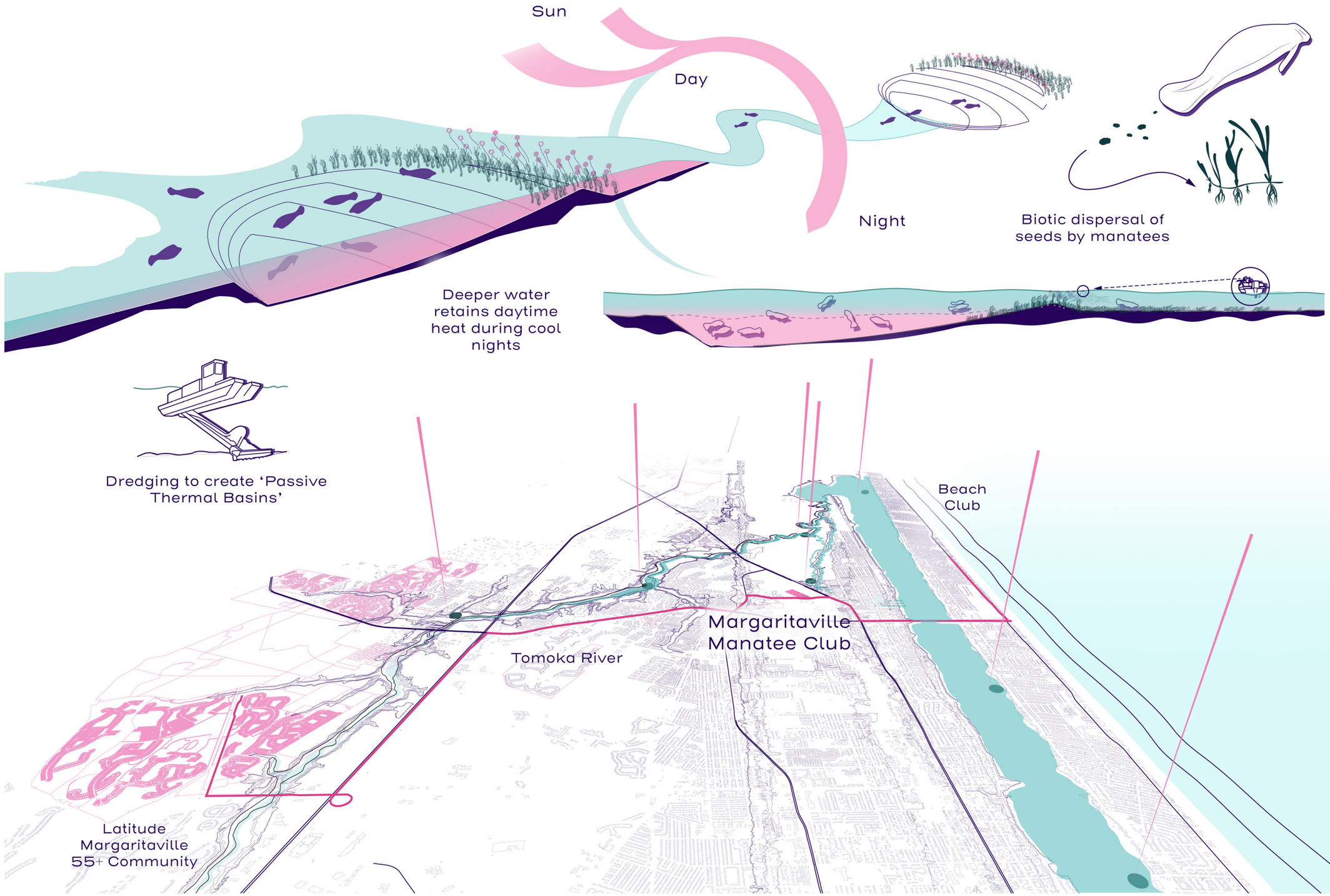
Cool Water

Heated Water

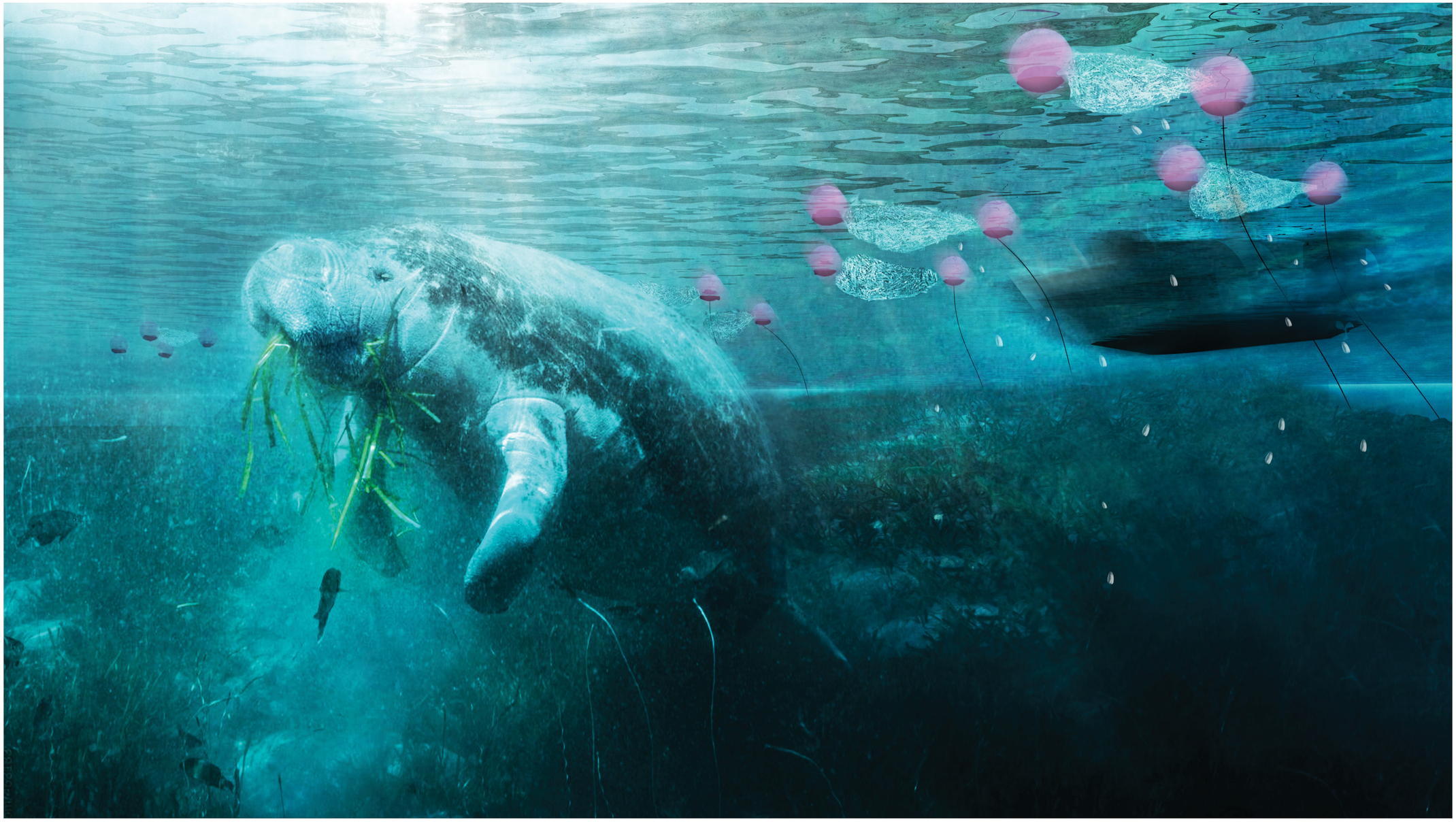
Waste moves along with the retirees. Handrails double as pipes carrying biogas and hot water, eventually leading retirees into the water.



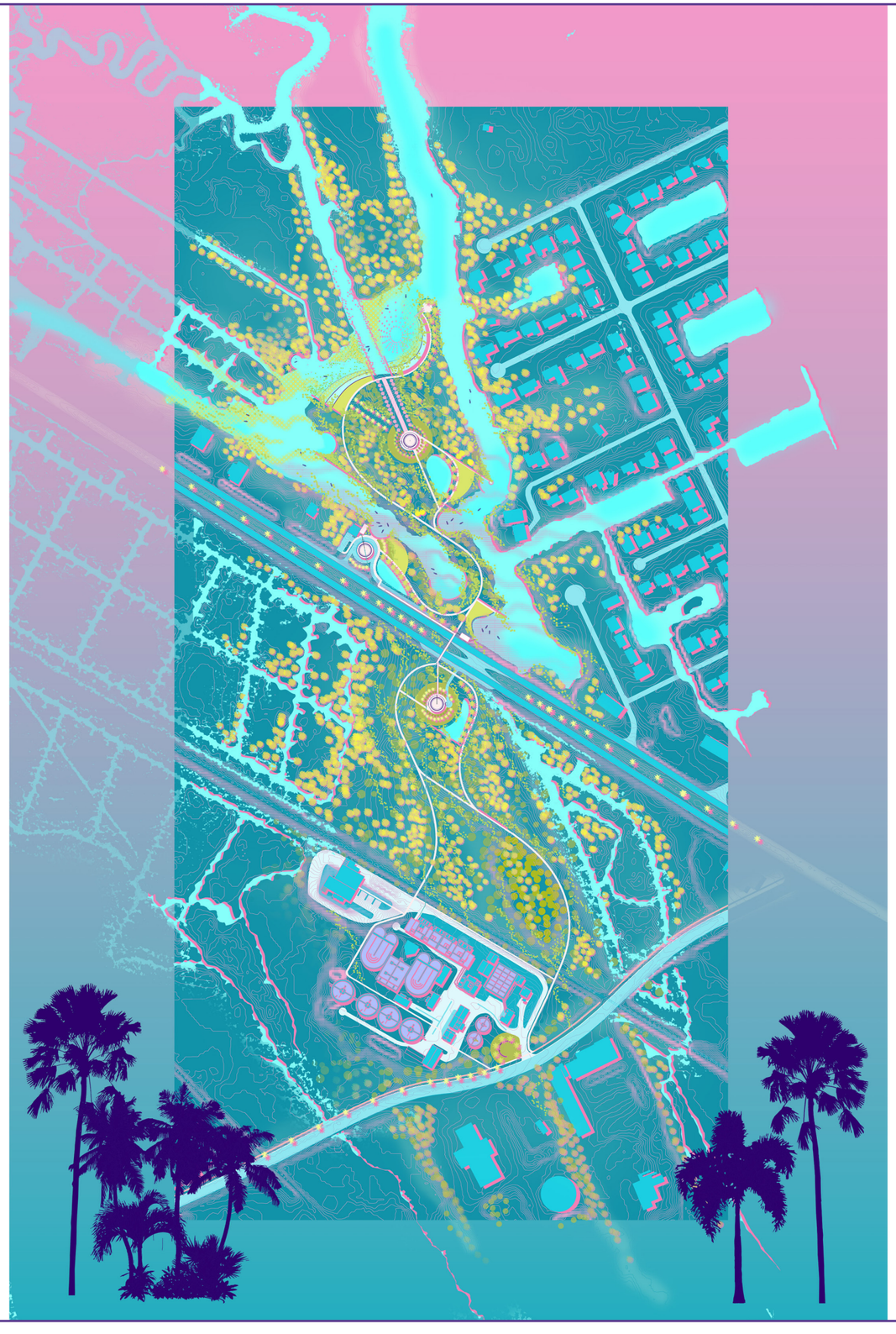
The Margaritaville Manatee Club forms a node in a broader system of passive warm water refuges for manatees, extending along the Tomoka and Halifax rivers.



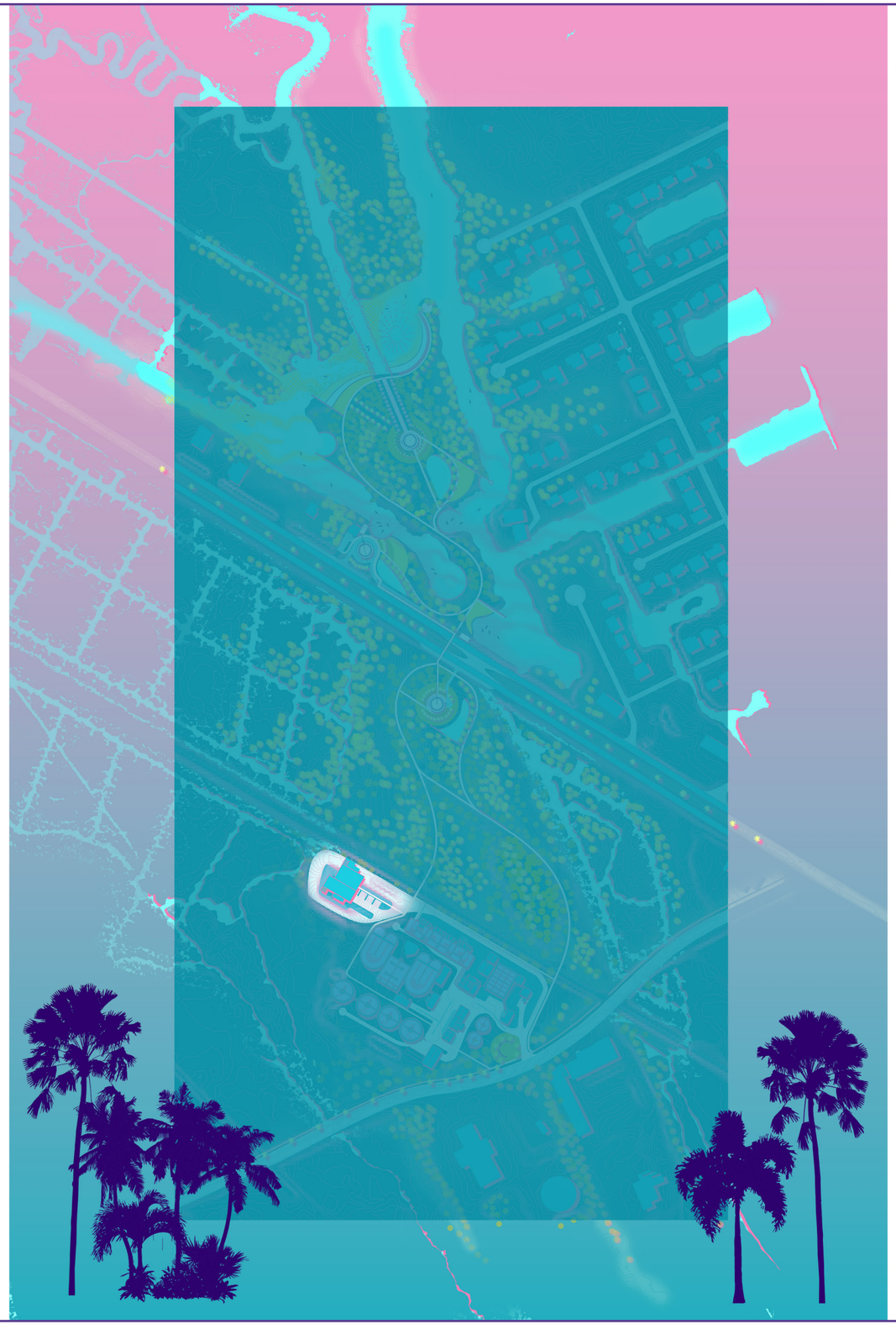
Dredging, which already occurs in these waterways, is coordinated to create small pockets of deep water. These deep pockets trap water warmed by the daytime sun, keeping it warmer as nighttime temperatures fall.



The edge of each thermal basin is lined by buoys, distributing seeds while warning boaters.



One final element at the wastewater treatment plant will take us to the final site in this proposal.



Onsite is an existing County Transfer Station where recycling is sorted.



This brings us to Margaritaville's Beach Club, which already exists. Here, the obscene becomes, materially, the garden itself.



56



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58

The beach, like the majority of beaches in Florida, is losing sand faster than it can be replenished, as sea levels rise and storm surges become more frequent.[21] The state relies on beach nourishment, but sources of sand are shrinking. Some Florida counties have explored using glass – crushed and smoothed to resemble beach sand – to replenish beaches – with basic approval of ecologists.[22]



59



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So, it is only fitting that the beach in front of Margaritaville's beach club is replenished using glass from beer bottles, the waste byproduct of the Good Life.



The arrangement of different colors makes the beach's constructed-ness visible. Humans are not the only ones who occupy the beach, however.



62



63



64



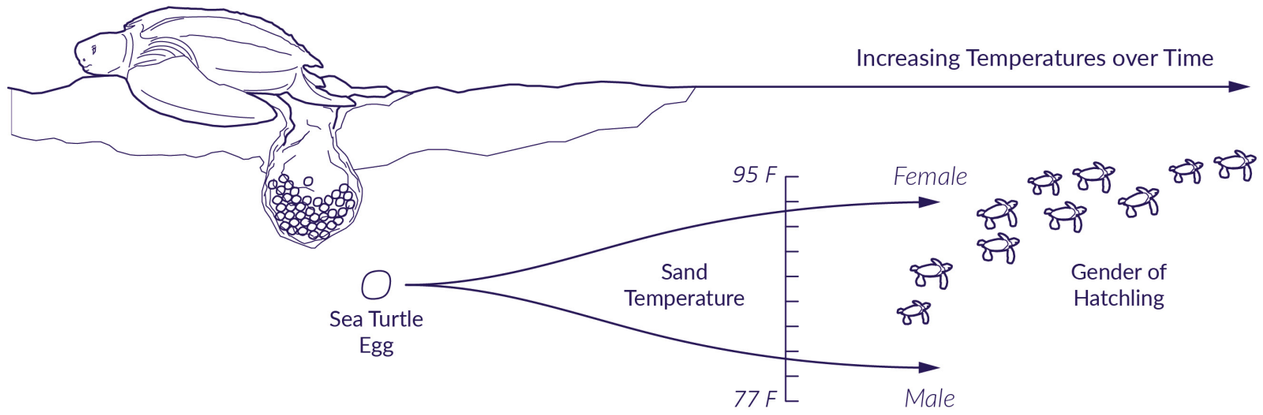
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66

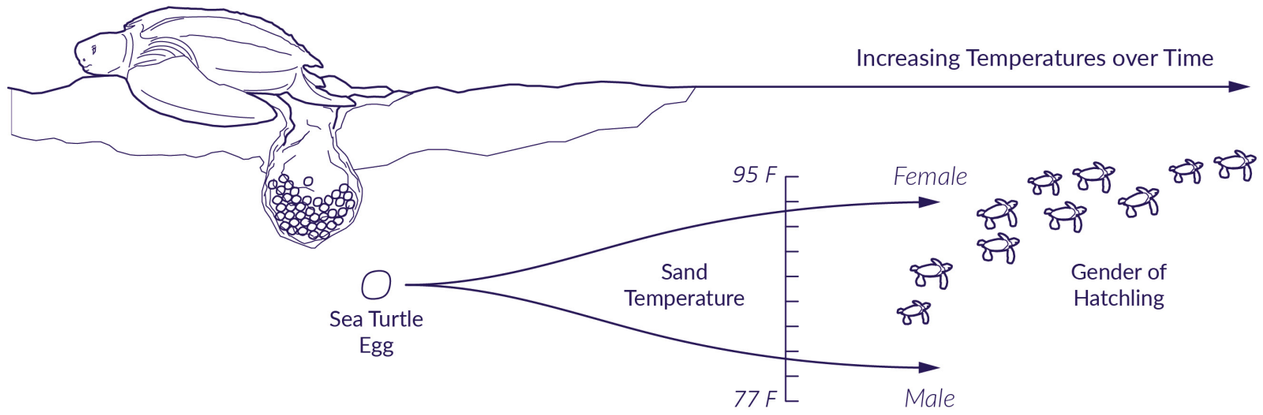
The county's beaches are critical nesting sites for sea turtles, who, like the manatee, overlap with humans in sites of paradise. They crawl up the beach to lay eggs in holes they have dug in the sand.

Sand Temperature and Hatchling Gender

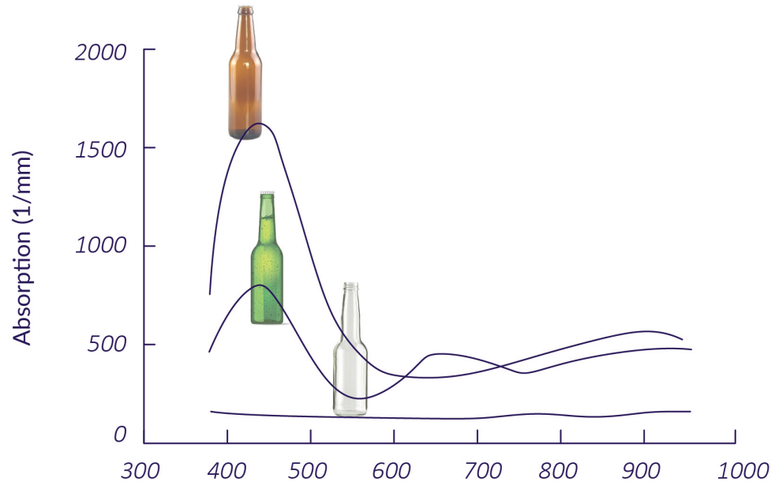


The gender of hatchlings is influenced by sand temperature. With global warming and increasing sand temperatures, more and more female turtles are being born. This may not be a good thing for the species' long term prospects, which are already threatened.[23]

Sand Temperature and Hatchling Gender

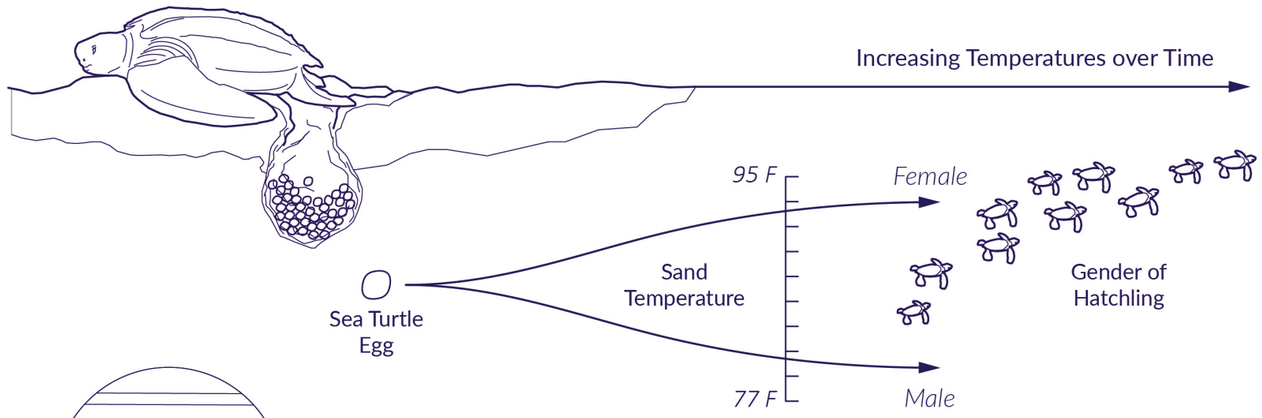


Heat Absorption Capacity of Standard Beer Glass Colors

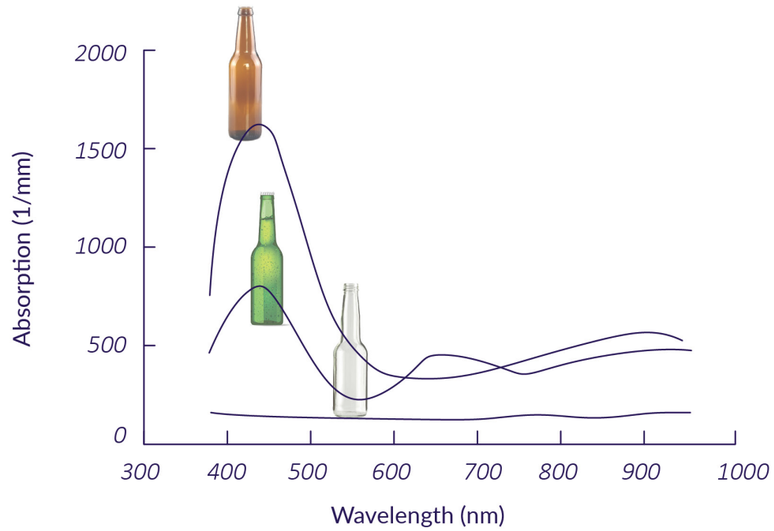


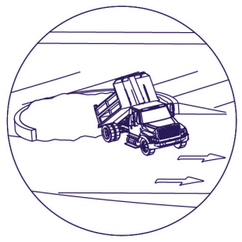
Here, the differences in heat absorption capacity between different colored beer glass comes into play, with brown colored glass absorbing more heat and clear less.[24]

Sand Temperature and Hatchling Gender



Heat Absorption Capacity of Standard Beer Glass Colors

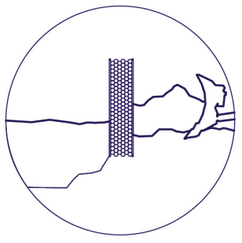




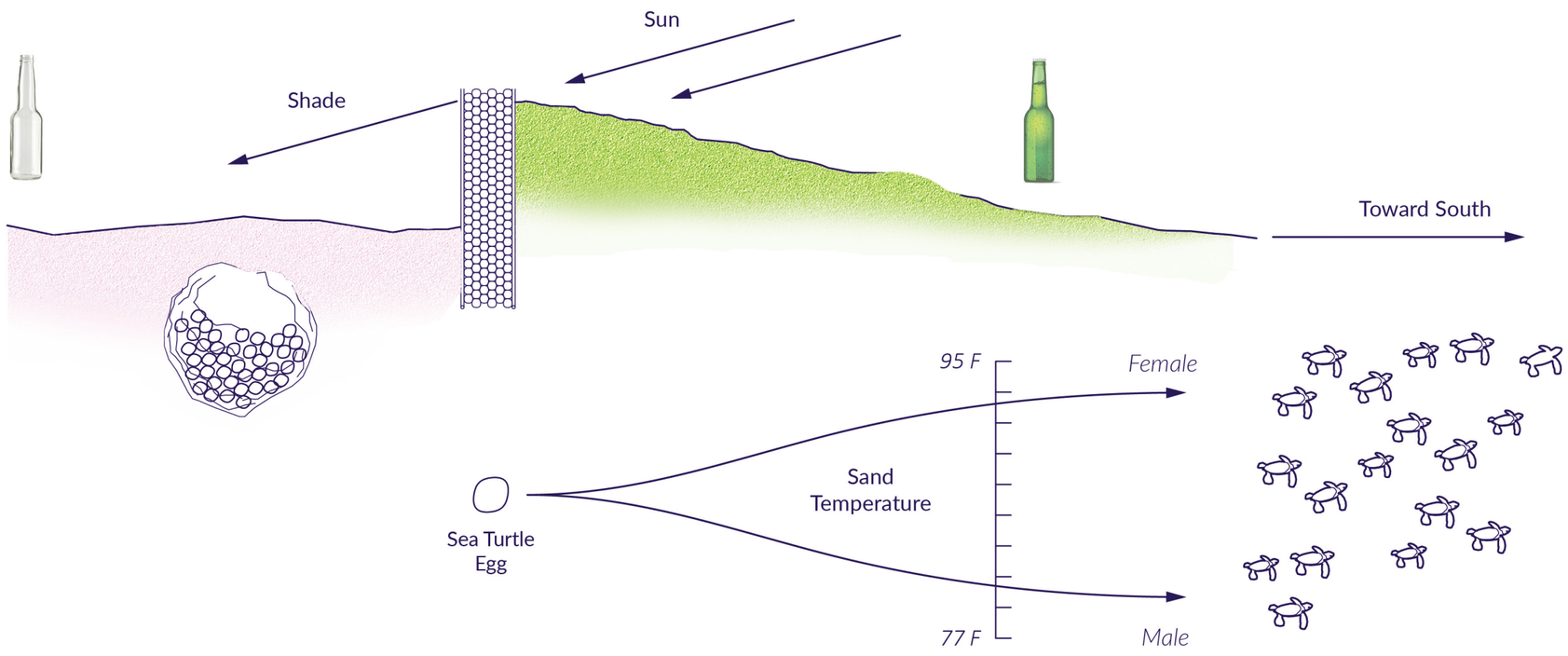
Glass sand is placed at Margaritaville Beach Club



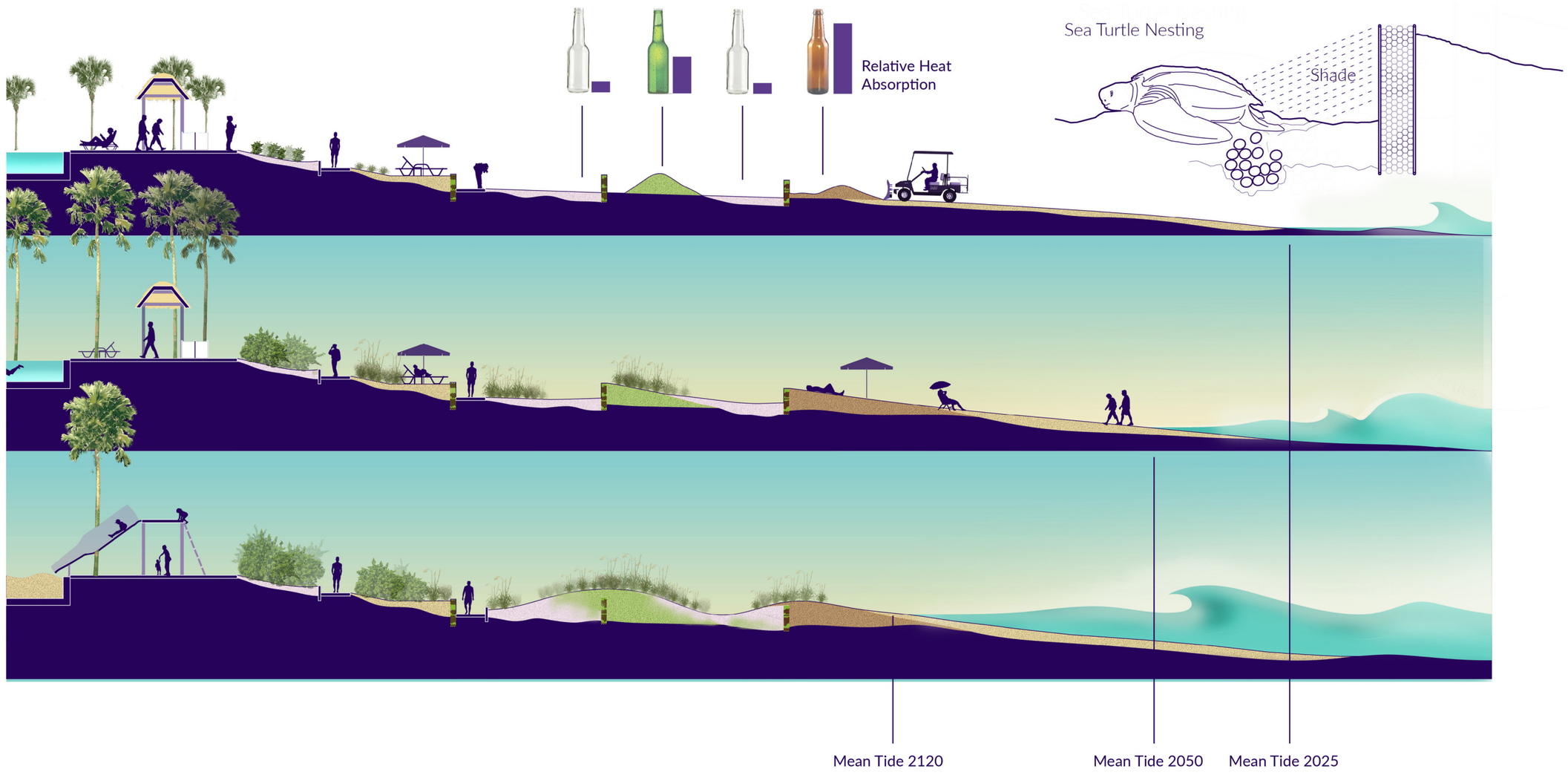
Glass sand pushed against gabion walls



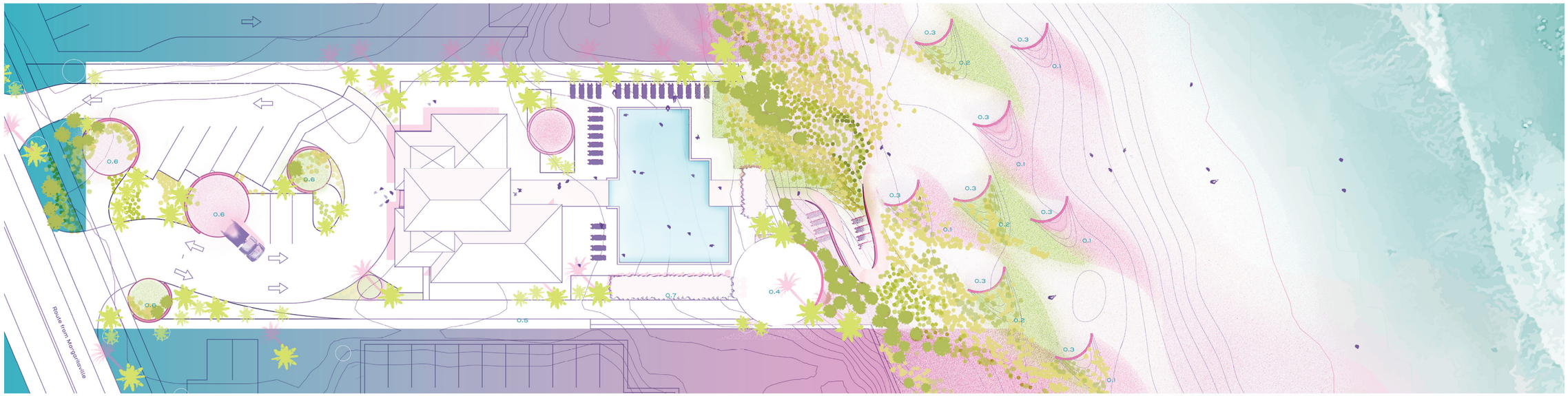
Glass sand is arranged by color



Darker colored glass sand – from Heineken or Budweiser, for example – is laid against short gabion walls. Clear glass is laid behind. Differences in heat absorption, plus shade form the gabion wall, creates cooler pockets of sand for sea turtle nesting.



Here we see the beach's construction and evolution in section.

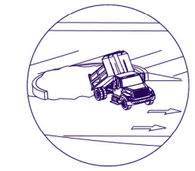


Margaritaville Beach Club

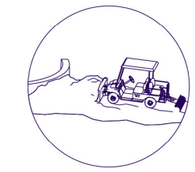
0.1 Glass Sand (Higher Heat Absorption)
0.2 Glass Sand (Moderate Heat Absorption)
0.3 Glass Sand (Low Heat Absorption)
0.4 Primary Glass Sand Drop-Off Location
0.5 Dump Truck Route
0.6 Demonstration Glass Sand Dump Sites
0.7 Bar

0 20 40 Ft N

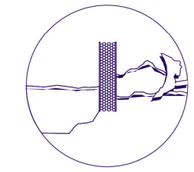
In plan, we can see how these elements come together. The beach club has been reorganized around the reception and distribution of the glass sand.



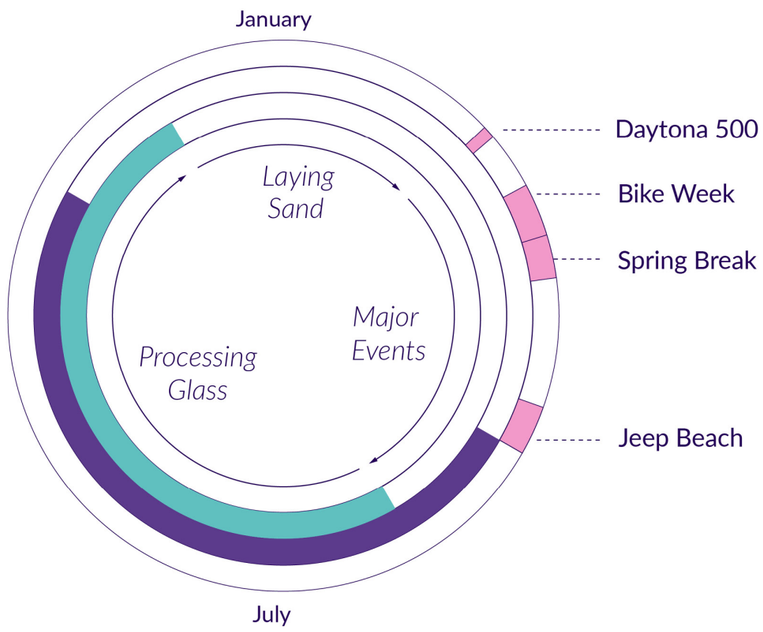
Glass sand is placed at Margaritaville Beach Club

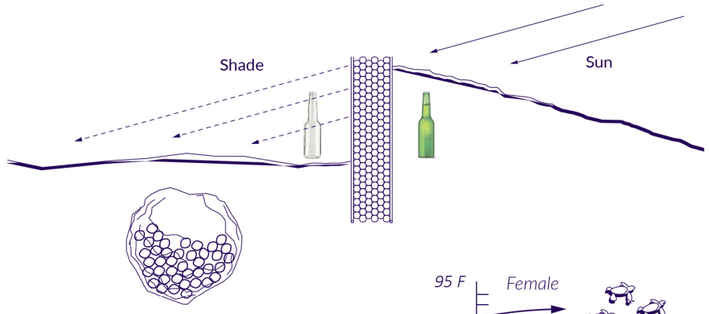


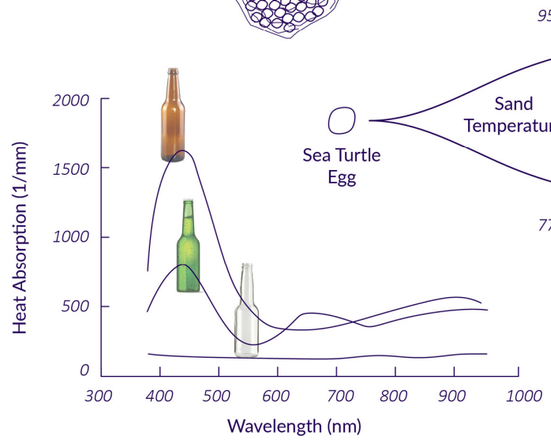
Glass sand pushed against gabion walls



Glass sand is arranged by color



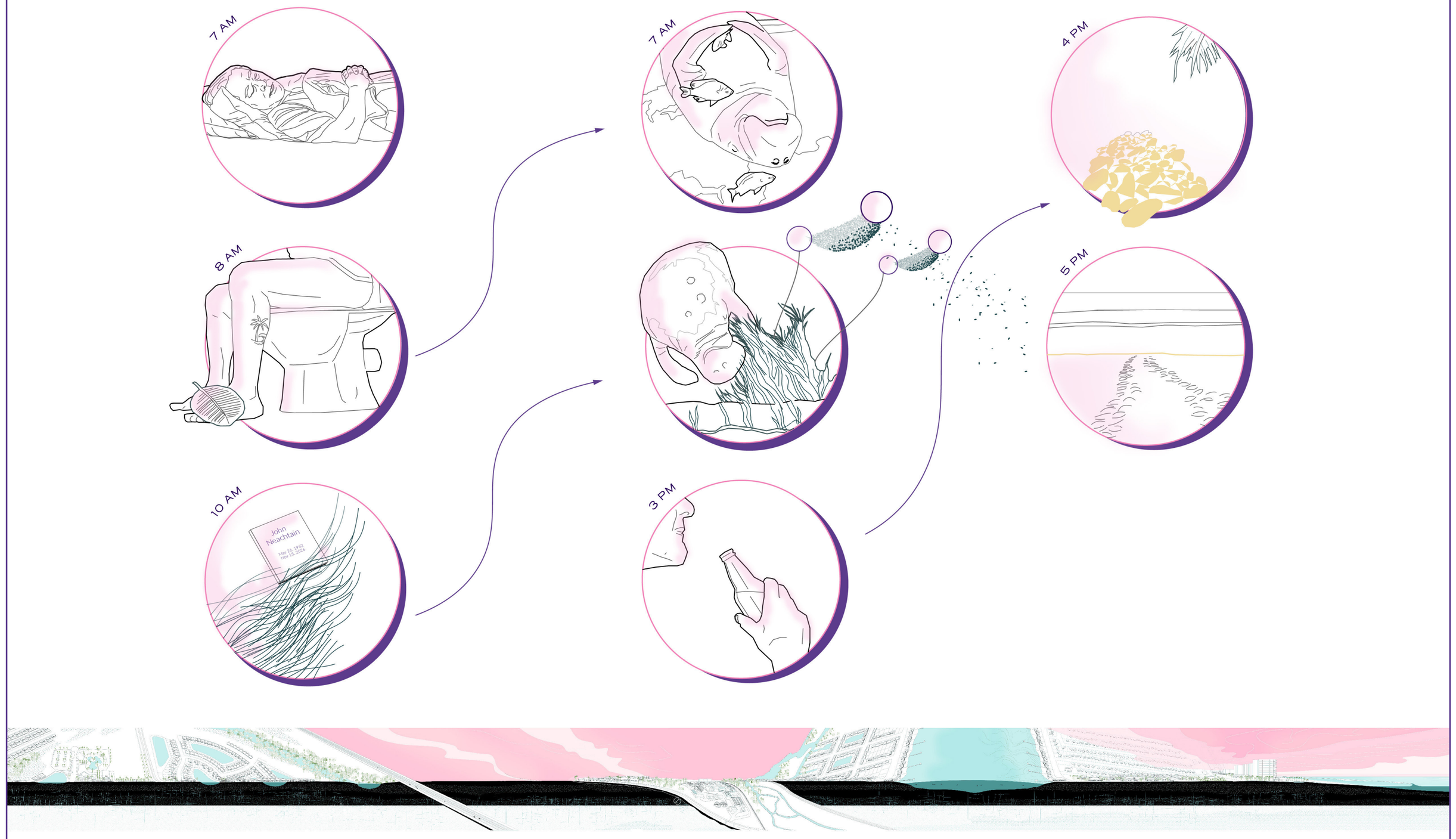




Additional glass comes from the area's social calendar – from the beer consumed at events such as Daytona 500 and Spring Break. Paradise is constructed on a schedule between these events, hurricane season, and sea turtle nesting season.



Over time, storm surges grow more frequent, the hard lines between colors – between the natural and the unnatural – begin to blur more quickly after the sand is laid.

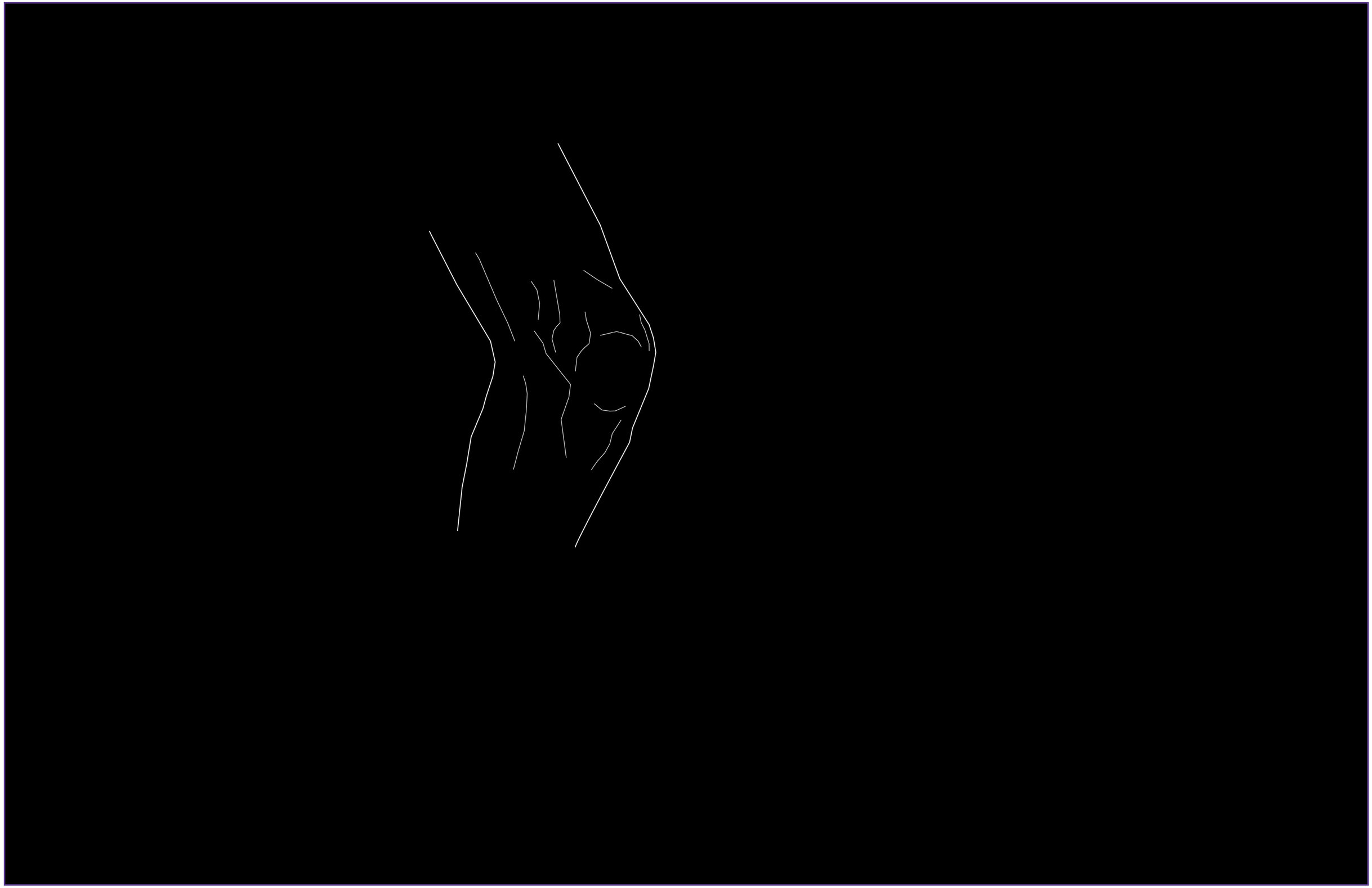


Now though, we return to Bob, the retiree.



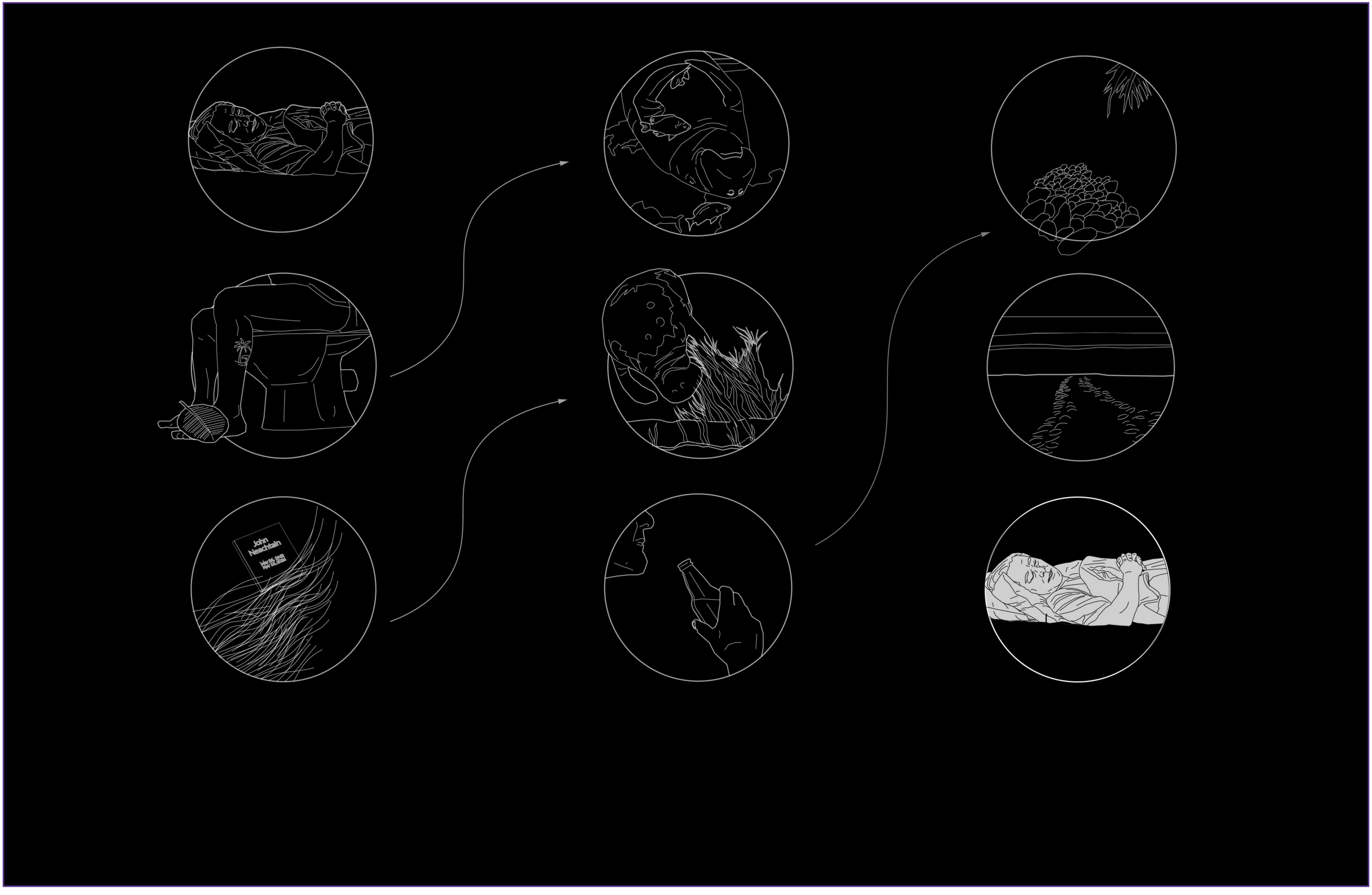
67

Bob leaves the Beach Club as the sun sets. He stops by the Manatee Club on the way home for a night swim.

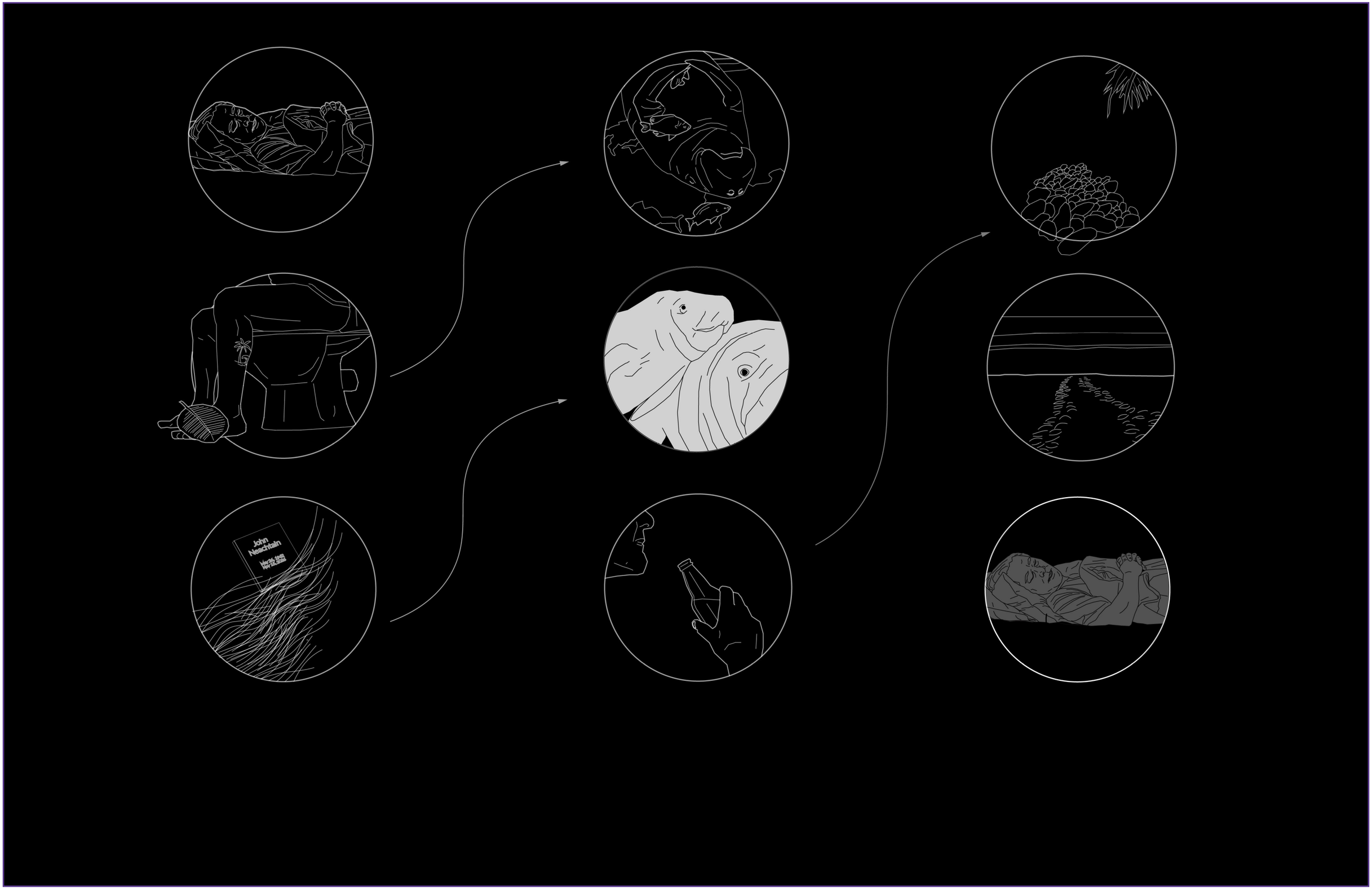


He enters the dark water. He can’t see but feels something against his leg.



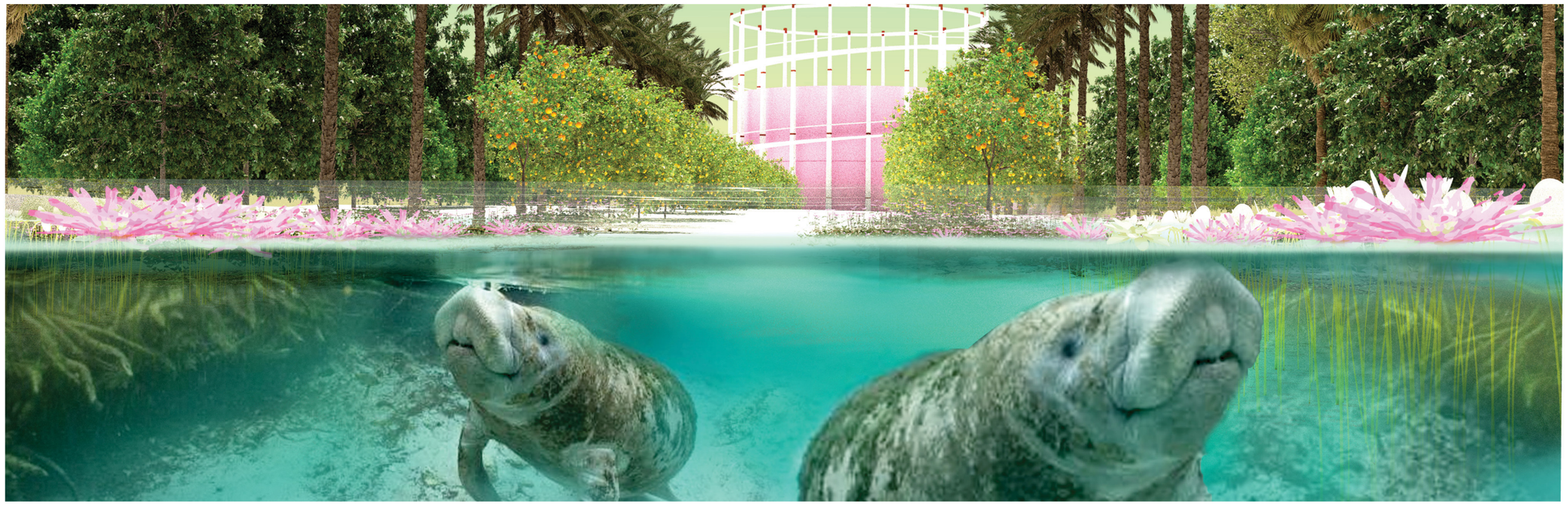


Lying in bed, Bob thinks how grateful he is to be alive. And then he dies. His composted remains are added to the community's gardens.



Mandy settles into a warm cove for the night. A calf will be coming soon.







Across these sites, the obscene has entered the garden – eventually becoming the garden itself - and generating visions of a strange new paradise. Or, if not quite a paradise, then the closest thing we can get on earth – a messy, complicated, sometimes beautiful, coexistence.

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