BLUR

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Graduate Thesis
Master of Landscape Architecture
Auburn University

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This project would not have been possible without the wisdom and guidance of my thesis professors, Charlene LeBleu and Dr. Rod Barnett. I would also like to thank my parents, grandparents, and sister for their unwavering support over the past 22 years. I could not have gotten through this process without the encouragement and inspiration of my best friend Audrey, who constantly pushes me to do my best and never give up, no matter the circumstances. Lastly, I would like to thank the rest of the faculty and students of the Auburn MLA program who have become my family over the past six semesters. I couldn't have made it this far without you all, and for that I am forever grateful.

How can the constructed edge between the Chattahoochee River and the city of Columbus, GA be blurred to enable porosity, diversity, and inhabitation?

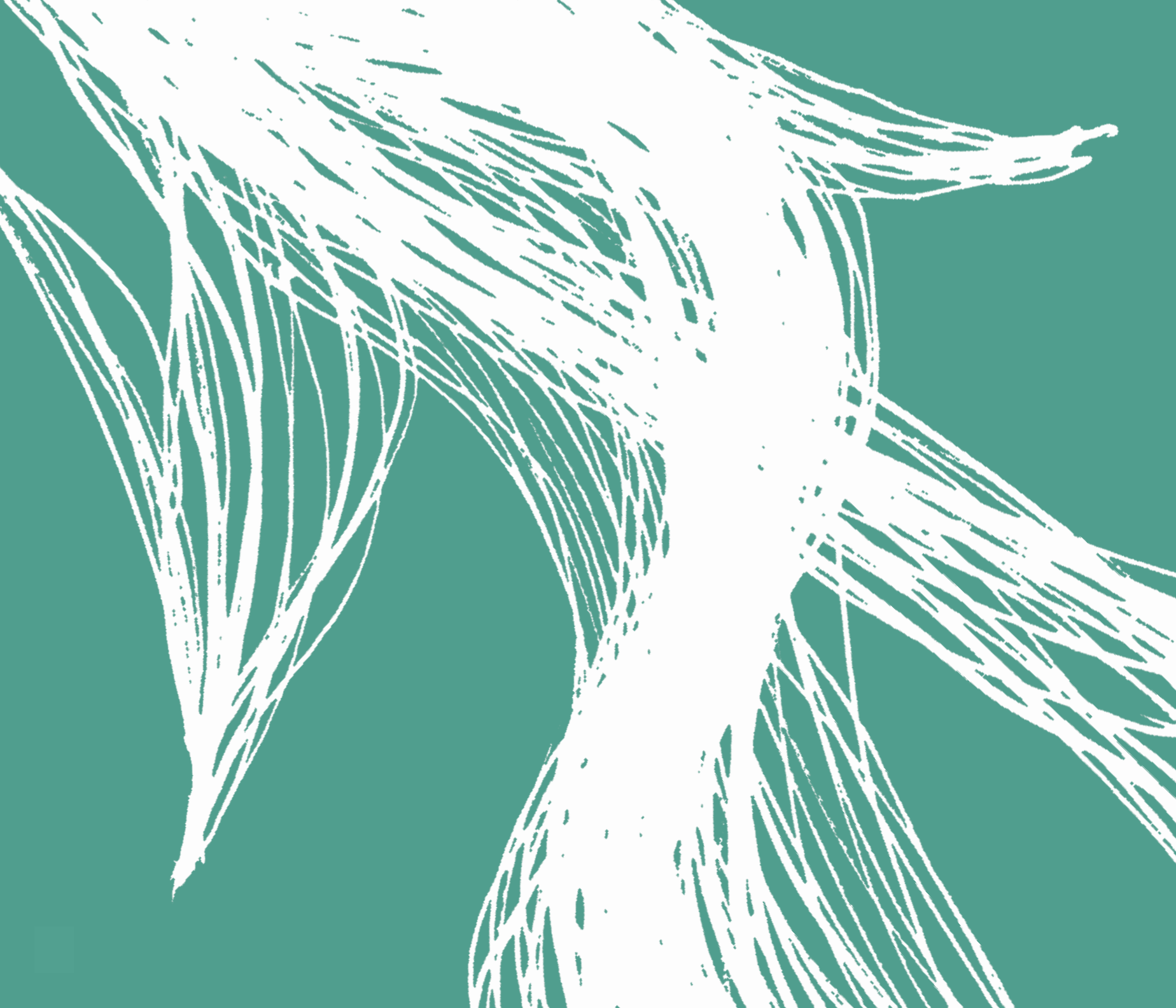
ABSTRACT

The world is not cleanly divided into separate self-contained entities. Rather, the landscape is comprised of components that overlap, interact, and intermingle with each other, creating gradients and ecotones between components. Such is the case when land meets water. The interface between the terrestrial and aquatic realms is infinitely complex, but is often treated as a hard boundary in urban settings. Channelization and impoundment of rivers creates an impermeable barrier along the banks and limits the amount of interaction between the river and the floodplain, often leading to increased flooding, degradation of riparian ecotones, and the perception that the river and the city are two completely separate and independent worlds. This is the case in the city of Columbus, Georgia. The interface between the Chattahoochee River and the urban built environment has the potential to become the hub of social and ecological interactions in Columbus, yet is treated as a type of no-man's land, riddled with utility lines, riprap, and a rarely used pedestrian path along the bank.

Analyzing the habitats of different life forms, water flow, and sediment deposition through mapping reveals the true nature of the relationship between river and city. Activity is concentrated where water and land meet, but the division is indistinct, dissipating outwards and forming a gradient. By embracing the riparian zone as a gradient and center of interactions rather than a hard boundary between two conditions (aquatic and urban), Columbus and the Chattahoochee River will cease to exist as two separate entities. Re-connecting the urban fabric to the river will be unnecessary, as they will be one and the same, intermingling and blurring the distinction between land and water.

This has the potential to change the nature of riverfront design. Altering people's perceptions to embrace the river as part of the city could encourage both cities and designers to take a more responsible approach when interacting with bodies of water, keeping in mind the needs and movement of nonhuman life forms and encouraging ecological democracy.

KEY WORDS: ecotone design, initial conditions, urban rivers, porosity, complexity



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INTRODUCTION

The areas between entities, also known as edges or boundaries, are some of the most complex and thriving areas in the landscape. These zones of overlap and intermingling are known as ecotones, and often contain properties unique to the ecotone that do not exist in either of the adjacent entities (Steiner and Forman 2002). One example of such is the interface between land and water.

The transition between aquatic and terrestrial realms is one of the most ecologically important areas for nonhuman wildlife, but can also act as an amenity for human systems, providing many of the resources needed for cities. In many urban settings, however, this interface is treated as a hard boundary that divides cities from their waterways, leading to damaging consequences for both human and nonhuman systems (Steiner and Forman 2002). The constructed edges of riverbanks can cause erosion problems and habitat loss but also results in the perception that the urban fabric and nearby bodies of water are completely separate. This mindset is a dangerous one, particularly in the case of urban rivers. In today's anthropocene era, human systems have affected everything around them. Urban rivers have shaped the development of American cities, providing food, water, transportation, hydroelectric energy, and many other resources, while human development near rivers' edges have altered the shape, ecology, and flow of these waterways. Cities and rivers have always been inextricably linked, and our treatment of their interface should reflect this intertwined relationship.

CURRENT TRENDS

Many cities are now realizing the wasted opportunities of leaving their riverfronts abandoned and damaged and seek to reconnect with their forgotten rivers. Most of these projects focus on physically connecting the riverfront back into the urban fabric through the creation of public space, placing strong emphasis on open space and recreation near the water (St. Onge 2010). This transforms the riverfront into a recreational destination, somewhere to go to picnic, play ball, or eat lunch. While this does bring activity back to the waterfront, these riverfront park systems do not go far enough. Most of the aspects of these parks can exist anywhere and "conform to conventional understandings of public space, recreation, and commercial opportunities" (Hochhalter 2013).

In order to protect the new public infrastructure from erosion, seawalls, riprap, and channeling hardens the edge of the river and often limit access to the water for humans and wildlife. In this model the river assumes the role of a backdrop or vista rather than an fundamental part of city's history and ecology. A more integrative approach must be taken that blends the city with the river and embraces the ambiguity of water rather than controlling and erasing it to suit human needs (Mathur and da Cunha 2010).

"To seek stability — to settle — is a human condition. For design practice it is important to respond to this need as a negotiated tension between the desire for settlement and the inevitability of change. One way is to construct boundaries, material or representational, and aim to separate, control, predict and manage what's within. Today, sadly, [this] approach dominates design and planning, and we are reminded of its limitations by disasters... which are often intensified precisely because of our efforts to control them."

- Mathur and da Cunha, 2010

A BLURRED APPROACH

Blurring the divisions between rivers and cities embraces the realm between land and water as a center of ecological and social activity. Over time this treatment will become a porous and diverse ecotone where the needs of humans are not valued over those of nonhumans, where the river is recognized as part of the city, and where greater ecological democracy can occur in the landscape. This can be achieved by taking away the physical divisions between river and city, setting up initial conditions for novel interactions, and allowing the river's edge to form itself.

Initial Conditions

Blurred ecotones cannot be simply placed down into the landscape in their final form. Rivers create their own form without waiting for an outside force to create one, shifting and changing over time. Landscape architects can, however, "manipulate the processes, elements and conditions that enable ecologies to develop and evolve" (Barnett 2009). This is best illustrated by Van Gerwen's "stick in the sand" analogy: Instead of building a mound of sand that will require intense maintenance due to water flow and wind, place a stick in the sand (Barnett 2009). The processes of water and wind will then work with the stick to create a mound of sand on its own. The mound may fluctuate and evolve a bit over time, but the stick accomplishes the same task of building a mound "but is much less exhausting, gives a less predictable result, and is more dynamic. It is also bottom-up" (Barnett 2009).

This approach can be applied in the realm of riverfront design. By setting up a few initial measures that embrace the uncertainty of the river rather than divide it from land, the riverbank can be allowed to shape itself over time, accommodating fluvial processes such as erosion and sedimentation. Using the right "sticks" unravels and strengthens the processes of the riverbank. The result is more energetic and vibrant, allowing for porosity between land and water and enabling novel interactions to occur between humans and nonhumans, cities and rivers. As time progresses, different plant species will colonize the riverbank, providing habitat and food sources for a wide variety of wildlife while nearby communities inhabit the water's edge through recreation, exploration, and social gathering. This approach values human and nonhuman systems equally, treating them as one whole system rather than dividing them.

By acknowledging urban rivers as a vital part of the city rather than a separate entity, cities can be encouraged to take a more responsible approach when engaging the river, keeping in mind the needs and movement of nonhuman life forms and encouraging ecological democracy between human and nonhuman systems.

Hunt's Point Landing

H2GR0W

Isle Brevelle

Courtland Creek

PHYSICAL GRADIENT

BLEND HUMAN + NONHUMAN SYSTEMS

ENGAGE COMMUNITY

CASE STUDIES

Hunt's Point Landing
South Bronx Greenway, NY

H2GrOw
Gateway National Park, NY

Isle Brevelle
Natchitoches Parish, LA

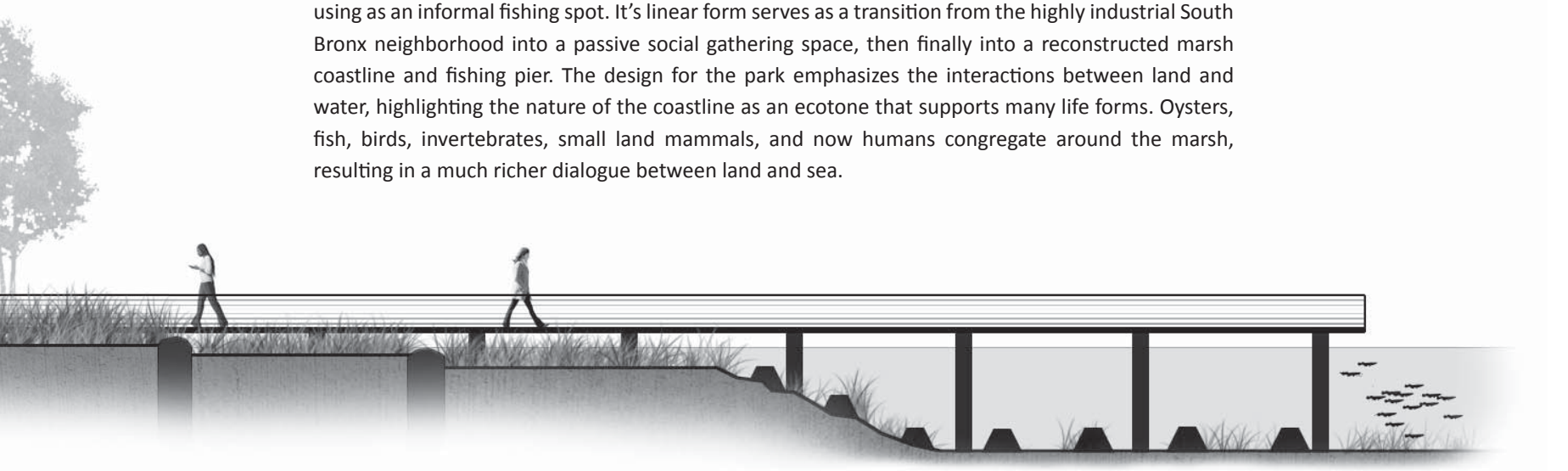
Courtland Creek
Oakland, CA

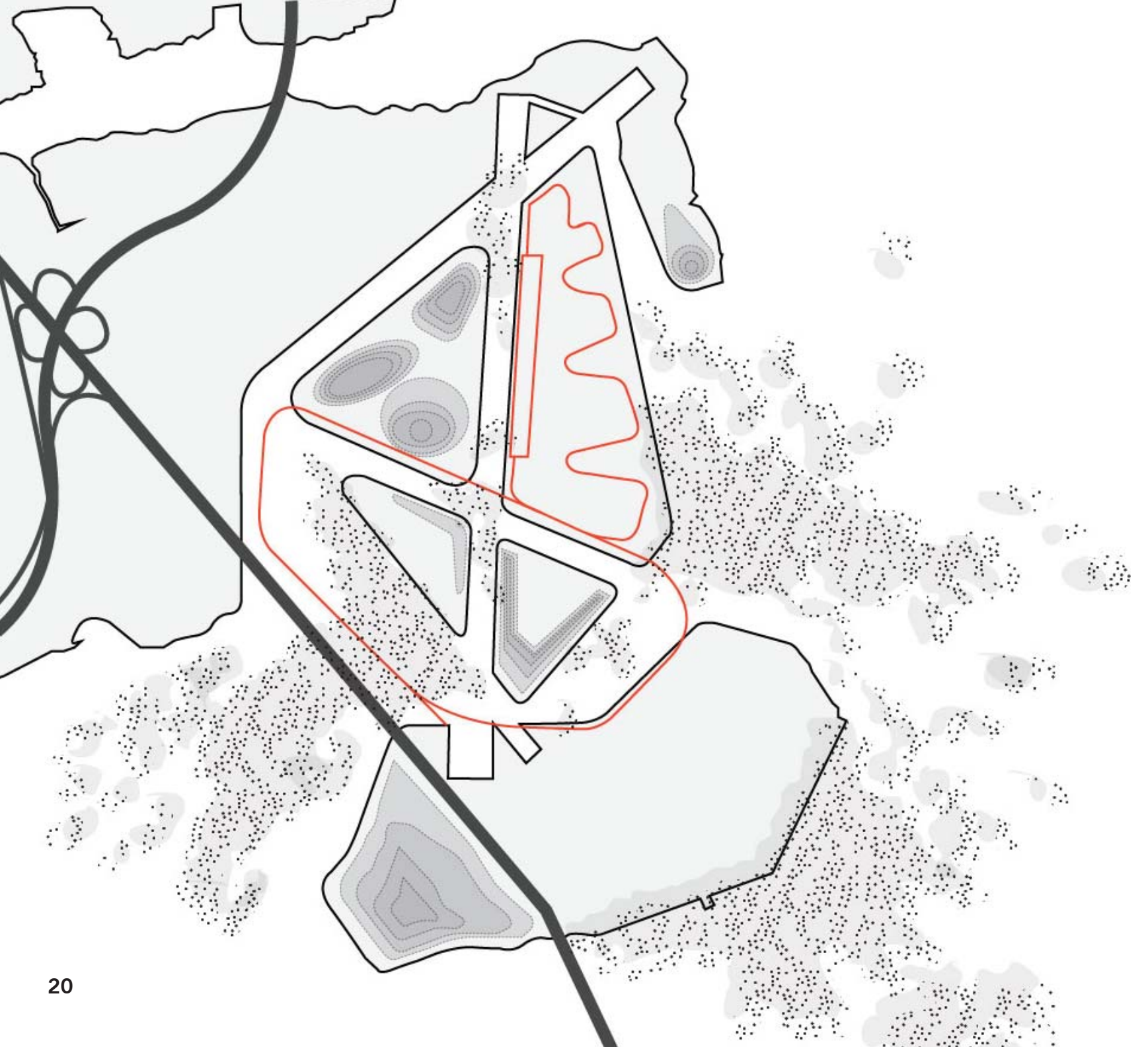
HUNT'S POINT LANDING

Location: South Bronx Greenway, NY
Designer: Mathews Neilsen Landscape Architects
Project Size: 1.5 Acres
Date of Completion: September 2012

Hunt's Point Landing is a public park along the banks of the East River in New York City. The East River is an estuarine strait connecting the Upper New York Bay and the Long Island Sound. Heavily influenced by tidal activity, the river reverses flow direction about 4 times every day, but does not typically fluctuate in water level. Like most waterways in New York City, the East River has a long history of pollution and industry, leaving the waters heavily impaired. As a result, it has developed a false reputation of an ecological wasteland. However, the river's estuarine condition allows it to support a diverse array of ecological communities. Through past remediation efforts, the water quality of the East River has improved over the past few decades, increasing health and biodiversity dramatically.

Hunt's Point Landing was developed along a dead-end road in a brownfield site that many locals were using as an informal fishing spot. It's linear form serves as a transition from the highly industrial South Bronx neighborhood into a passive social gathering space, then finally into a reconstructed marsh coastline and fishing pier. The design for the park emphasizes the interactions between land and water, highlighting the nature of the coastline as an ecotone that supports many life forms. Oysters, fish, birds, invertebrates, small land mammals, and now humans congregate around the marsh, resulting in a much richer dialogue between land and sea.



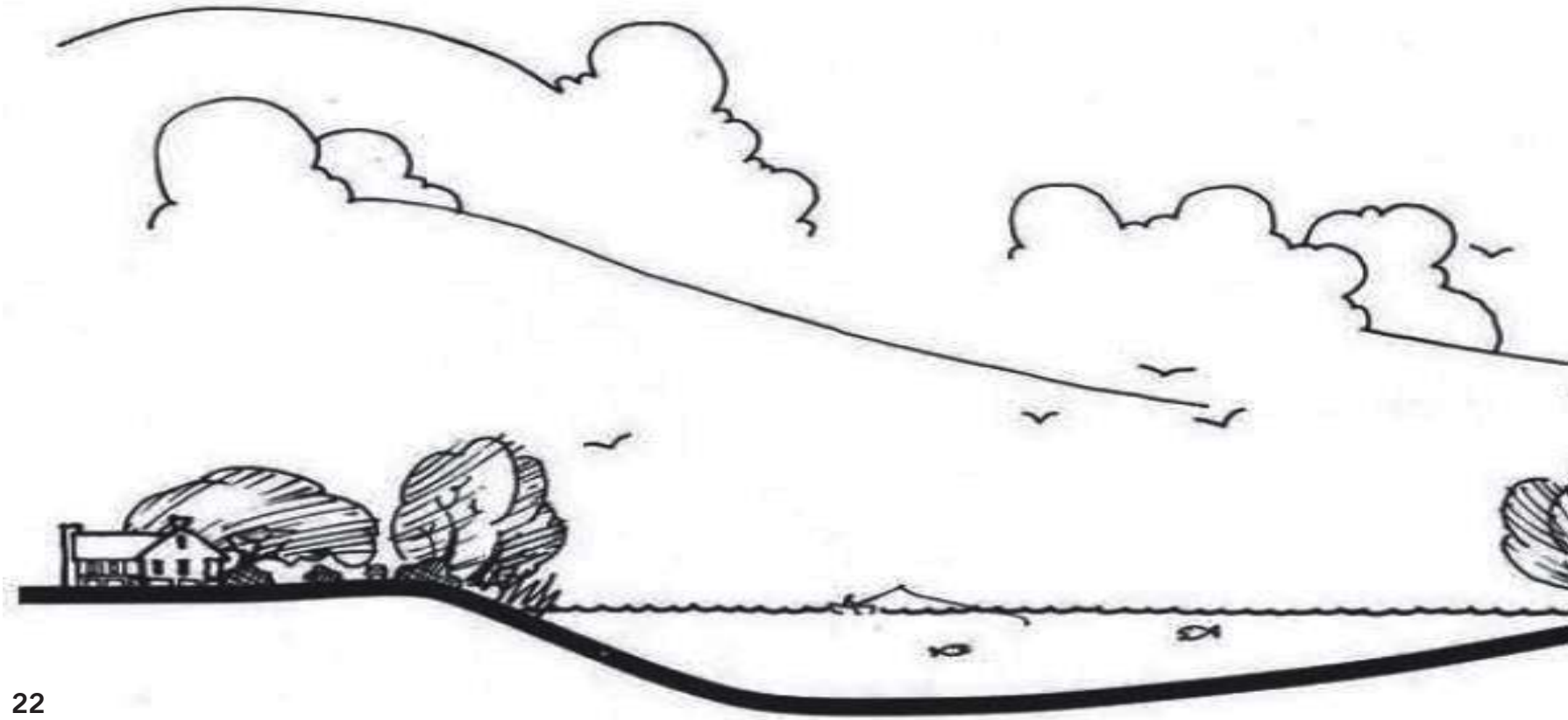


H2GR0W

Honorable Mention, Envisioning Gateway Competition
Location: Gateway National Park, NY
Designer: EFGH Architectural Design
Project Size: 26,000 Acres
Date of Submission: 2007

H2gr0w, an entry in the Envisioning Gateway Competition, proposes a dynamic and ever-changing coastal landscape. Gateway National Park, the design area, is situated on the coasts of Jamaica Bay in New York. Most of the bay is considered an estuarine ecotone, always changing and shifting with the tides, sustaining human and nonhuman life along its coasts. Like most urban waters, Jamaica Bay and Gateway have a long history of industrialization, pollution, and neglect. The city of New York is once again reaching out to embrace the islands, beaches, and marshes of the bay, merging the urban with the wild.

H2gr0w uses a system of large hydroponic floating pods measuring 140x75ft. Without soil, they are not quite land, but neither are they water, creating a sort of "in-between" state. These pods are planted with different types of plants, some providing habitat for aquatic life while others produce food for the people onshore. The pods are set out to float and intermingle, constantly shifting and moving with the tidal fluctuations of the bay. The myriad of pods are allowed to self-sort and interact with the shore, water, and each other, celebrating the novelty of each interaction and embracing the uncertainty of change. The pods are predicted to gather near the shores, creating a "blurred boundary between solid ground and fluid terrain" that encourages us to rethink our relationship with the water (Brash, Hand, and Orff 2011).

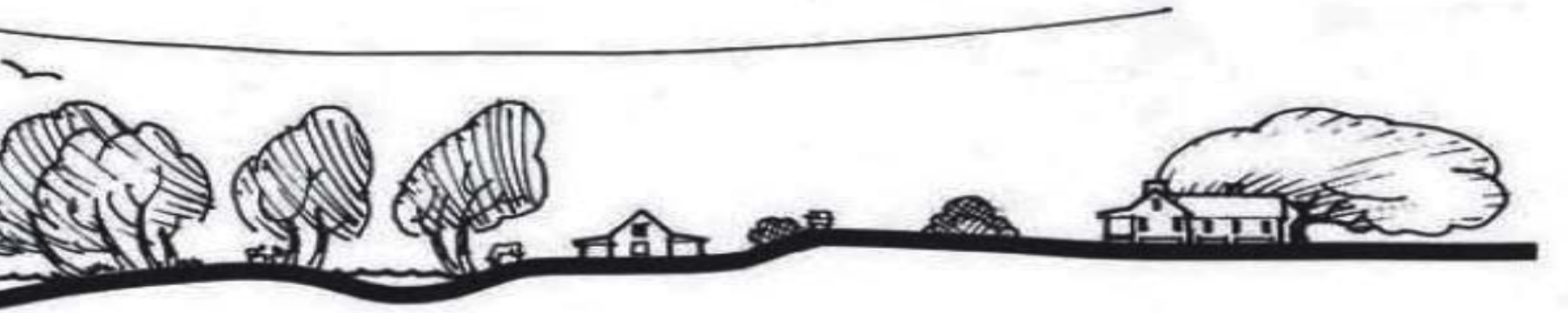


ISLE BREVELLE

Location: Natchitoches Parish, LA
Project Size: 18,000 Acres
Established Community since the late 1700s

The Isle Brevelle is an island of land between the channels of the Red River and the Cane River in Nachitoches Parish, Louisiana. The Cane River Creoles have historically built their homes along the gently sloping banks of the cane river on the natural levees called battures. As the river changed course over hundreds of years, so did the settlements change position, passing down their property through the generations. Houses and porches typically address the river itself, treating the batture as a sort of front porch where visitors come and go by boat frequently, although automobile traffic is also employed on the nearby road. People's yards and docks blend seamlessly into the water's edge and wild areas rich in biodiversity.

This case study is significant in that it encompasses geological time and accounts for the flux and change of the Cane River's ecosystems over time. Frank Chaffin's article for Landscape Journal "Dwelling and Rhythm," describes how the resources and morphology of the floodplain shaped the very culture that still exists in Isle Brevelle today, achieving an almost sacred status (Chaffin 1988). The descendents of the original Creoles of the area have an innate connection to the river. It is a sustainer of life, center of social life, and a true home where they dwell.

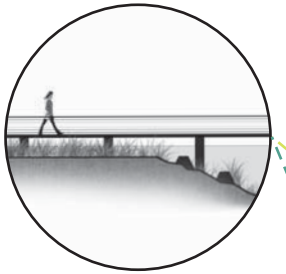


COURTLAND CREEK

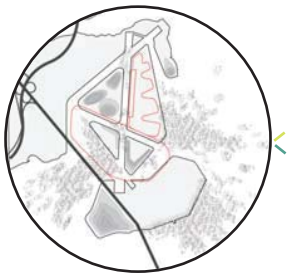
Location: Oakland, CA
Designer: Walter Hood
Project Size: 5-block linear park
Date of Completion: May 1997

The Courtland Creek Project by Walter Hood utilizes stream restoration as a tool for strengthening neighborhood bonds. Courtland Creek, an impaired stream in Oakland, California, had been used primarily as a dumping ground for trash and debris for many years. Concerns for the ecological health of the stream had been long overshadowed by issues of crime, employment, safety, and maintaining the character of the neighborhood (Hood 1995). The proposal for the creek restoration takes all of these issues into account, seeking to engage the community in the project rather than taking a purely ecological approach. Hood's design is based off of the daily patterns of the residents, designing hangout spots and park space near the creek, providing "an awareness of place through contact and use," and giving the stream a presence and voice in the neighborhood (Hood 1995).

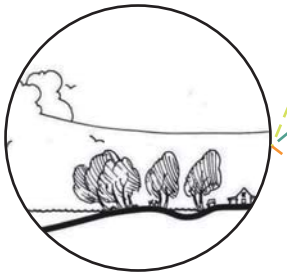
The restoration project also relies heavily on community participation. Aligning with various community organizations at the beginning of the project has allowed the residents of the area to take ownership of their landscape. The local neighborhood organization eventually became administrators of the project, orchestrating cleanup days, tree planting, block parties, workshops, and charrettes (Hood 1995). Working on the project has created close bonds between members of the community, and their cooperation is beginning to stretch out beyond the creek. A neighborhood watch program has been established, more police and city officials patrol the area to increase safety, and more community events and parties have begun to take place since the restoration of Courtland Creek (Hood 1995). This type of community involvement and ownership of neighborhood landscapes helps to create a dialogue between residents, resolving conflicts, building relationships, and improving surroundings through bottom-up methods. Through these practices, ecological restoration can not only improve the health of a waterway, but it can actually change people's views of their surroundings to ensure a stronger future for all beings.



Hunt's Point Landing



H2GR0W



Isle Brevelle

Courtland Creek

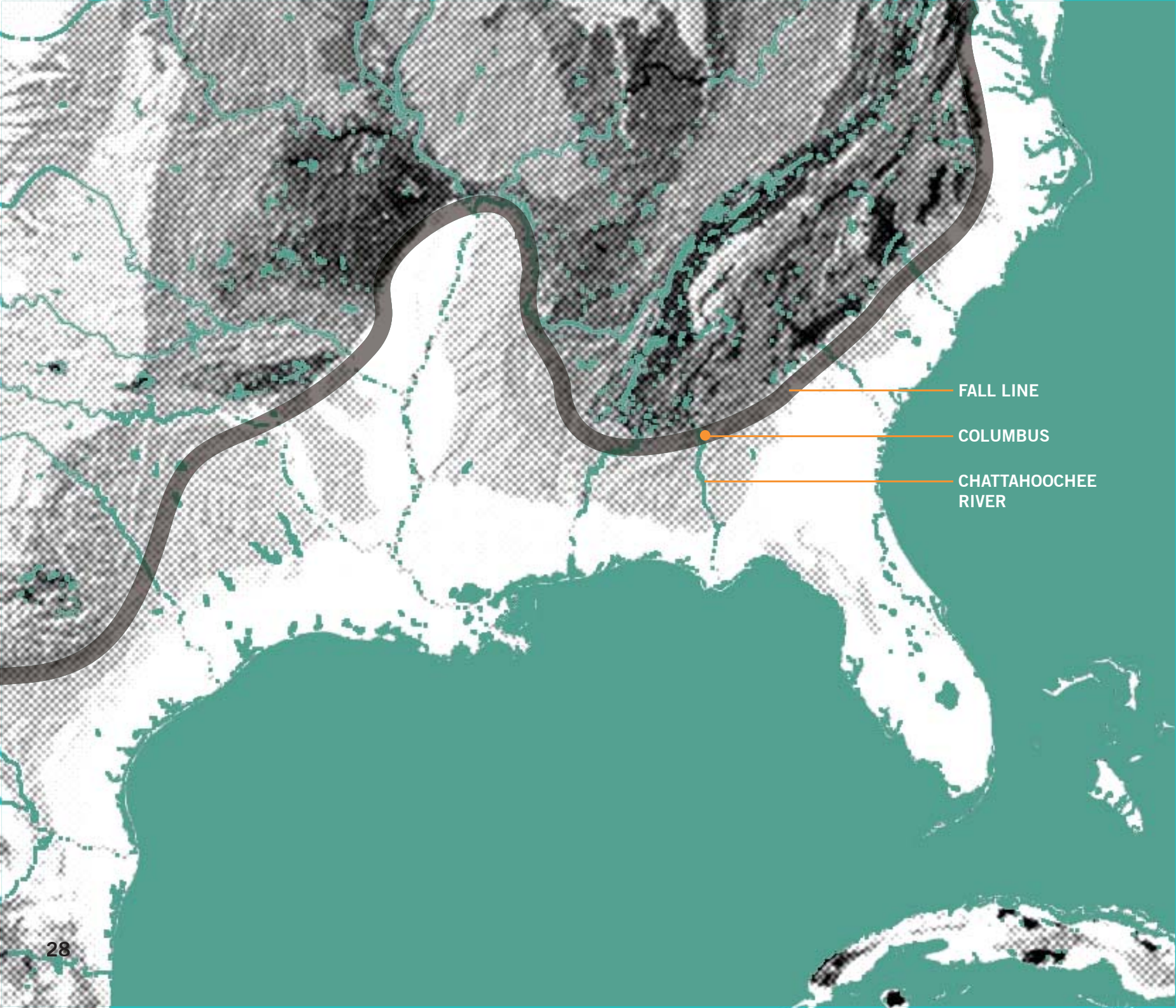
- PHYSICAL GRADIENT
- BLEND HUMAN + NONHUMAN SYSTEMS
- ENGAGE COMMUNITY

EVALUATIONS

From these case studies, three overall strategies for creating a dynamic ecotone at the water's edge can be identified. The first is to physically create a gradient between land and water, taking away hard boundaries and providing gradual changes in level. As shown at Hunt's Point Landing, H2Gr0w, and Isle Brevelle, this blurring results in a variety of habitat types for wildlife, more complex and resilient shorelines, and improve water quality.

The second strategy is to remove distinctions between uses of waterfront land. The intermingling of recreation, wildlife habitat, and infrastructure blends human and nonhuman use to create an environment that is healthier for all beings. This is especially true of the Isle Brevelle, where the residents live, play, graze cattle, travel, and even run businesses right on the riverbank while wildlife flourishes around them, strengthening their sense of place and dwelling.

The third strategy engages the community in the formation of their landscape. The Courtland Creek project not only strengthened relationships within the neighborhood, but it allowed community members to truly understand their connection to their surroundings and claim the creek as a valuable part of their neighborhood. By setting up initial conditions for the landscape using these three strategies, the perception that the river and city are two separate entities might be altered, allowing the intermingling of land and water to become a thriving ecological and social ecotone. Through this, perhaps the river and city could be thought of as one whole, with both human and nonhuman activity melded into one cohesive ecosystem.


FALL LINE
COLUMBUS
CHATTAHOOCHEE RIVER

SITE BACKGROUND
COLUMBUS, GA

The Chattahoochee River, originating at the foothills of the Blue Ridge Mountains, meanders through the Piedmont region of north Georgia and eventually merges with the Flint River in the Coastal Plain region to form the Apalachicola River. The transition from the Piedmont into the Coastal Plains is marked by a drastic change in elevation, soil type, climate, and ecology, creating an rich ecotone known as the Fall Line. At the Fall Line, the Chattahoochee River tumbles over several miles of shoals and waterfalls, surrounded by a diverse population of native wildlife. It is here that some of the earliest North American civilizations settled, creating what would one day form the modern-day city of Columbus, GA.

HISTORICAL CONTEXT

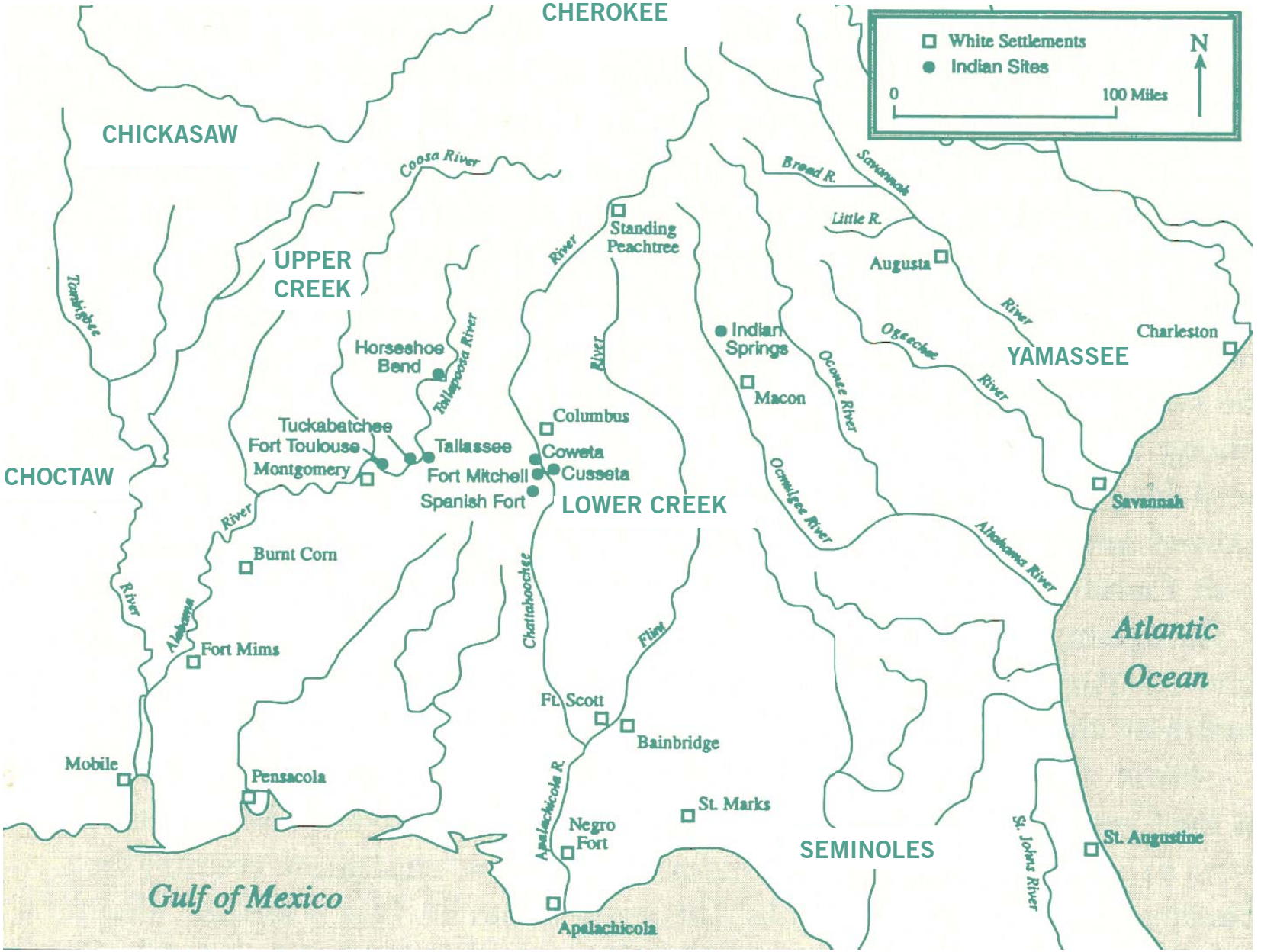
First Residents

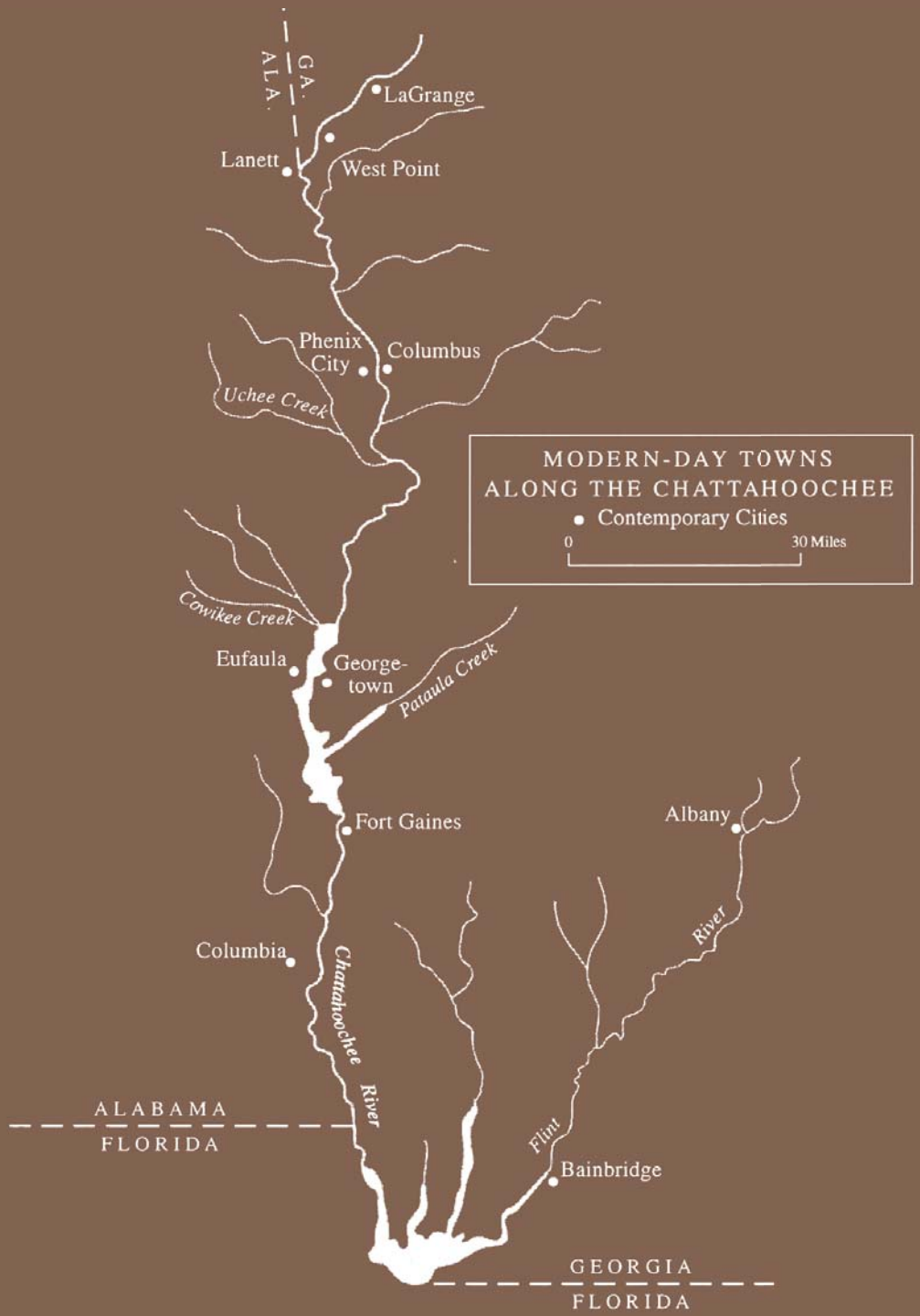
The first human inhabitants of the Chattahoochee River basin were groups of nomadic hunters, following herds of mastodons and mammoths with their flint spears, never lingering in one place for too long. Around 8,000 B.C., the groups of wanderers began to be replaced by more permanent hunters and gatherers who came to depend on the Chattahoochee River for fish, clams, mussels, waterfowl, and smaller game that lived near the riverbanks. The Woodland Period of Native Americans, lasting from 1000 B.C. to 700 A.D. were some of the first residents to harness the river's capacity for transportation, using the river systems and tributaries as a roadmap of the region and for floating heavy loads downstream (Willoughby 1999). This intense reliance on the river earned a central spot in the core of Native American beliefs and religion, shown especially by the honor and burial of their dead along the riverbanks. The Mississippian Indians from the west soon replaced the Woodland Indians and were some of the first to use the river's water to irrigate systematically grown crops.

The Mississippians eventually banded together to form the Creek Confederation centered around the capital cities of Coweta and Cusseta near present-day Columbus, Georgia (Willoughby 1999). Like the people before them, the Creeks used the water for transportation, fishing, and irrigation, but also saw it as a link between the physical and spiritual worlds, a portal for underworld creatures (Willoughby 1999). Religious festivals centered around Coweta Falls, most notably the annual Green Corn Celebration and fishing festivals where groups would use buckeye roots to stun giant sturgeon and cook them as a community affair (Kyle 1986). The Chattahoochee River was not just a source of food, water, and transportation, but rather a cultural and spiritual center that connected all inhabitants of the river valley.

RIGHT: Map depicting the Native American and European settlements of the 1600s and 1700s

Map taken from *Flowing Through Time: A History of the Lower Chattahoochee River*, 1999


CHEROKEE
CHICKASAW
UPPER CREEK
CHOCTAW
LOWER CREEK
YAMASSEE
SEMINOLES
White Settlements
Indian Sites
N
0
100 Miles
Coosa River
Tombigbee River
Tallapoosa River
Horseshoe Bend
Tuckabatchee
Fort Toulouse
Montgomery
Tallassee
Alabama River
Burnt Corn
Fort Mims
Mobile
Pensacola
Gulf of Mexico
Standing Peachtree
Columbus
Coweta
Cusseta
Fort Mitchell
Spanish Fort
Chattahoochee River
Flint River
Ft. Scott
Bainbridge
Apalachicola R.
Negro Fort
St. Marks
Apalachicola
Broad R.
Savannah River
Little R.
Augusta
Indian Springs
Macon
Ocmulgee River
Oconee River
Ogeechee River
Charleston
Savannah
Altamaha River
Atlantic Ocean
St. Johns River
St. Augustine



LEFT: Map showing the locations of currently existing cities on the Georgia and Alabama sides of the Chattahoochee River

Map taken from *Flowing Through Time: A History of the Lower Chattahoochee River*, 1999

Europeans began to arrive in Creek territory in the late 1500s. Spain, England, and France soon began to quarrel amongst themselves over trading rights with the Creek Indians, prompting various fights and wars to break out over the next 300 years between different groups. Through continued exposure to the white settlers and encroachment onto Creek lands, the Creek Indians began to take up aspects of European culture, such as yeomen farming and forming a centralized Creek government. The European settlers began to move farther into Creek lands, often illegally seizing property. After the War of 1812, the Creeks were forced to sell all land east of the Chattahoochee and move west, but would soon lose that land to the white settlers as well.

Early Columbus

As the Europeans settled along the banks of the Chattahoochee, new developments in river travel and transport were abundant. The first export of cotton was sent downstream to Apalachicola in 1827, with the first steamboat trip upstream occurring later that year (Willoughby 1999). The city of Columbus was laid out and founded in 1828 near Coweta Falls and became a major center of commerce. Soon after the founding of the city, some of the first major physical changes were made to the river in the form of wing dams intending to make the river deeper and improve navigation. This practice would continue for the next 100 years with much damage to the river and detriment to navigation. After pushing the entire Creek Confederation west, the main economic driver in Columbus was cotton production and shipping. Entire forests near the river were clear cut in the 1830s to make farmland, causing massive amounts of soil erosion and runoff to enter the river. For the first time in recorded history, the Chattahoochee River's water was no longer clear.

By the mid-1800s, Columbus had become the largest city on the Lower Chattahoochee River due to its major role in cotton production and textile manufacturing (Lupold 2004). In 1828, Jones' City

Mills was the first to harness the flow of the river and use it to power machinery by means of a small dam and waterwheel. Other mills and plants quickly sprang up along the riverbanks and followed suit, building small dams to power their textile machinery and becoming the primary employers of Columbus.

Around the same period, the steamboat industry boomed. Shipment arrivals became a huge community affair. When the steam whistle sounded, people from all over Columbus would gather on the wharf and watch the steamers load and unload their cargo, swapping stories and news with the crewmen (Kyle 1986). Over 20 steamboats continuously ran along the Chattahoochee River, but the work was dangerous and river navigation was unsafe. Many steamers sank in the river, causing more navigation issues and most likely polluting the water. This problem worsened with the major droughts that plagued the 1850s, slowing water flow and dropping sediment. With the coming of train lines to Columbus in 1853, the steamboat trade was threatened by the alternate trade method, lessening dependence on the river (Lupold 2004).

The Civil War Years

The coming of the Civil War brought many changes to the Chattahoochee River region. During the Union raids on Apalachicola in 1862, frightened citizens fled to Columbus for refuge (Willoughby 1999). Fearful that the Union boats would attempt to come upriver to seize Columbus itself, Confederate troops and local grassroots defense efforts constructed blockades in the river in the form of chains, debris, and fallen trees. In some places, these obstructions actually changed the physical course of the river and formed new channels. With river travel to the coast virtually halted,

RIGHT: Perspective Map of Columbus, GA
H. Wellge. Beck & Pauli Lith. Co, 1886


EMPIRE FLOUR MILLS.
G.W.WOODRUFF, PROP.
SWIFT MANUFACTURING CO.
G.J.PEACOCK.
CLOTHING MANUFACTORY.
CHATTAHOOCHEE BANK
CHATTAHOOCHEE
RIVER
COLUMBUS IRON WORKS CO.
GARRETT & SONS.
GEORGIA

Columbus's central location and booming textile industry made it an invaluable asset to Confederate troops, providing uniforms and tents. Columbus Iron Works (also located on the riverbank) produced cannons, weapons, steam engines, and boilers for the war effort. The city soon overtook Apalachicola as the symbol of the "New South."

The Steamboat Age

The end of the Civil War reopened river travel along the Chattahoochee. Steamboats were built to be safer and able to run in shallower water, lessening the impact of droughts and periods of low water. They were also more comfortable, and passenger cruises rose in popularity among the more luxurious boats in the 1870s (Kyle 1986). These river excursions soon became a staple in recreational activity, ranging from men's fishing trips to the bay, couples' cruises, and even daylong pleasure outings consisting of dinner, dancing, and music. In order to accommodate passenger docking, the wharves at each city's landing were drastically improved. Each wharf had its own identity and character, and the river landings began to act as the front doors and entryways into cities along the river.

Although river travel was relaxing and fun for passengers, the steamboats' crews had a very different experience. The work was very grueling and often dangerous. The boat's captain was required to have great knowledge of the river itself, boat mechanisms, crew management skills, and geography. The crewman, known as "stevedores," were also held in high regard by the public and treated as celebrities when landing at the wharves (Willoughby 1999). River work was lonely, however, and long periods of being cooped up on a ship brought out the violent side of many a stevedore. The benefits

LEFT: The *Naiad* (left) and *Fannie Fearn* (right) on the Chattahoochee River at the Columbus, GA Wharf. The *Naiad* reportedly made more trips down the Chattahoochee than any other steamer

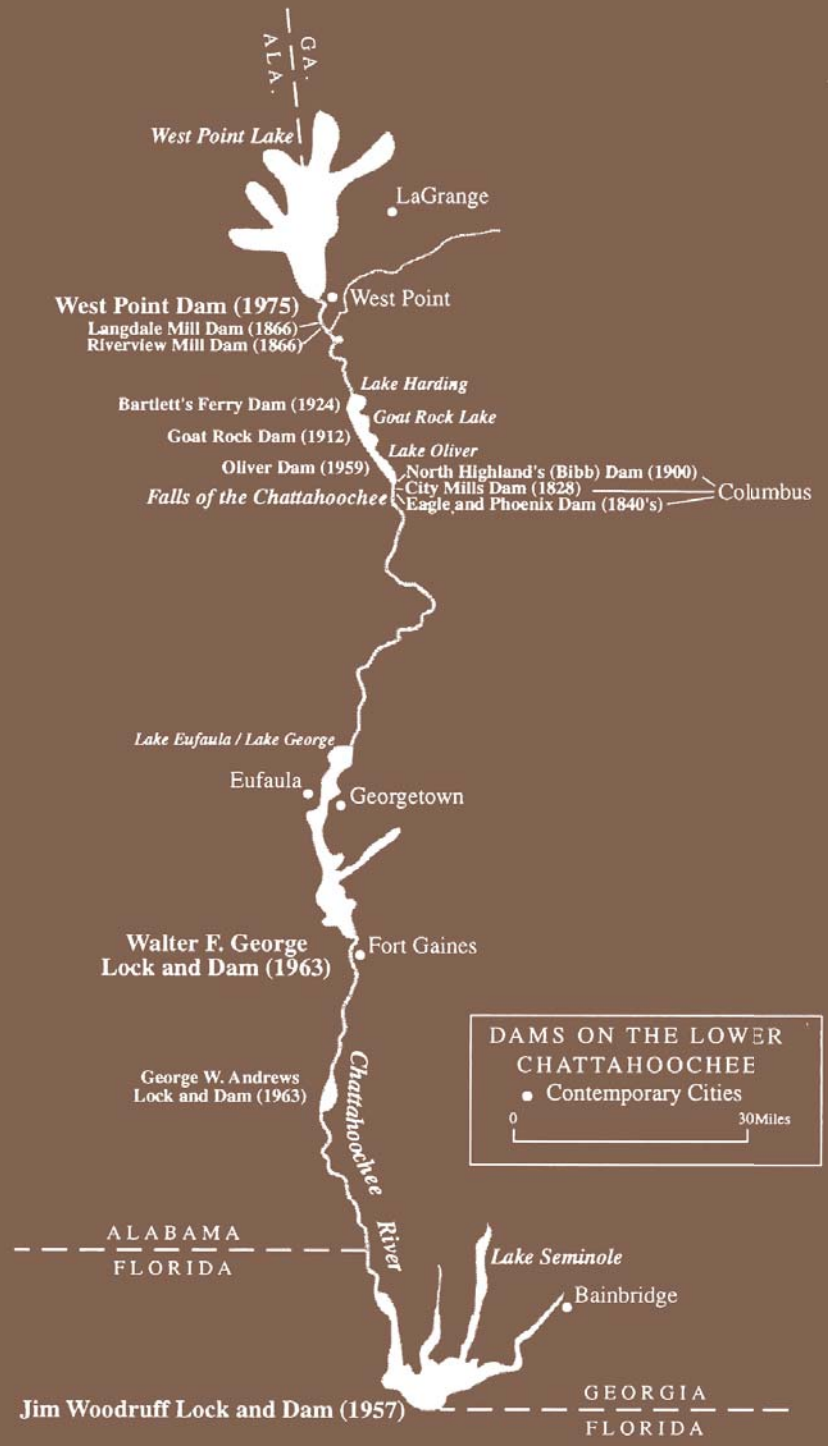
Photograph taken on May 30, 1900.
From the State Archives of Florida

of working the river were numerous though; the admiration of civilians, decent pay, and abundant food and liquor drew many young men into the steamer lifestyle.

Numerous dams, blockades, and periods of drought over the years had left the Chattahoochee River in an almost un-navigable state by the late 1800s (Willoughby 1999). Many of the shoals near Columbus were completely impossible to pass during low water, and newly formed channels from the Civil War blockades were treacherous. Surveys were made in the 1870s to investigate the potential for improvements to the waterway. Various dredging and wing dams were implemented to deepen the river, but sorely backfired. Sandbars formed above each dam and more sediment washed into the river faster than it could be dredged out, actually making the river shallower. Red clay filled the river channel, making it difficult for even partially loaded steamboats to get through. The dangerous nature of the river from sediment pollution and "improvements" by man rendered steam trade unreliable. Only four boats were left running by 1916, and steamboat trade was all but gone by the 1930s (Willoughby). The fall of the steamboats marked the beginning of the decline of people's intimate connection with the Chattahoochee River.

Ecological Decline

The decline of the steamboat era made way for the river to be used in a new way. Hydroelectric power was generated from several small mill dams along the riverbanks, powering the first electric light bulb in Columbus in 1882 (Willoughby 1999). Major improvements were made to the dams, and the City Mills dam soon became Columbus's first central hydroelectric power station. Several other dams were built, generating enough electricity to power things farther away from the river. This lessened



RIGHT: Map showing the locations, names, and dates of construction of the dams of the Chattahoochee River

Map taken from *Flowing Through Time: A History of the Lower Chattahoochee River*, 1999

the city's dependence on proximity to the waterfront and placed Columbus at the forefront of power production in the south. Impeding the natural flow of the river, however, brought several negative impacts to the region. What was left of the steamboat trade quickly died out due to low water levels and inability to navigate the entire river. Above the dams, the city of West Point experienced decades of periodic dangerous flooding until the West Point Dam was completed in 1975 to control water levels (Willoughby 1999). By this point in time, Columbus' relationship with the river was one of control and extraction of resources, and people soon began to realize that the river was suffering.

By the early 1900s, intense alterations had been made to the Chattahoochee River in the form of damming, dredging, and sediment erosion. The city of Atlanta, resting near the headwaters, had also been dumping untreated sewage directly into a tributary of the river for decades. Even more serious than the sewage was the industrial waste discharged from several cities along the river, including Columbus. By the turn of the century, water quality and suitability for drinking was under serious scrutiny, and people refused to eat fish caught in the Chattahoochee (Kyle 1986). In the mid-1960s, the river was a veritable cesspool with high fecal coliform densities, resulting in two fish kills in Andrews Lake and levels of nitrogen and phosphorous too toxic for even phytoplankton to tolerate (Willoughby 1999). Even today, the Chattahoochee is still perceived as dirty.

Several measures were taken in the 1960s and 1970s to stop pollution of the river. The people of Columbus began treating their sewage and waste in 1964 and added a secondary treatment step in the 1970s. Although the Chattahoochee was intended to be restored to a "fishable and swimmable" state by 1983, EPA still found dangerous levels of PCBs and chlordane in the river in 1989 (Willoughby 1999). Cleanup measures were heightened with the hiring of the Chattahoochee's first Riverkeeper, Karen Plant, in 1992 and the founding of the Turner Foundation to help fund grassroots cleanup

LEFT: A fish kill caused by a sewage overflow in Tanyard Creek, a tributary of the Chattahoochee River, 2013

organizations. Although the ecological health of the Chattahoochee River was still greatly impaired in the late 1990s, people were now aware of the drastic need to clean up the river and change their practices to avoid further detriment.

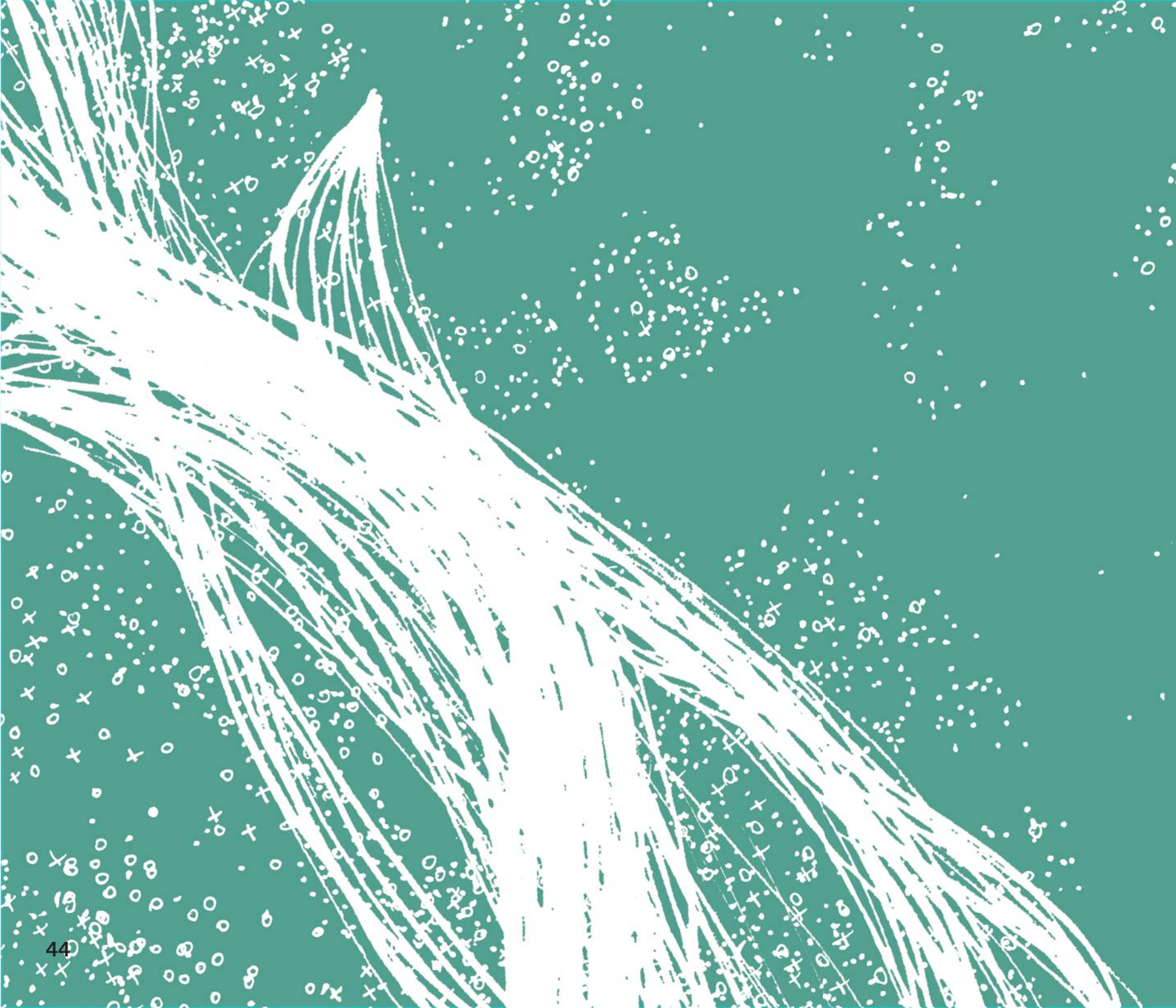
Current State

In the past decade, Columbus has reached out to once again embrace the river as part of their city by building a riverside promenade, improving housing near the waterfront, breaching two dams that once stretched across the water, and other measures. The return of the Chattahoochee River's flow as a shallow, shoal-type river has begun to bring back native species, such as the shoal bass, purple bankclimber mussel, and the shoal spider lily. The restoration of the natural riffles and rapids has also made the Chattahoochee River a popular white water rafting destination for the southeastern United States, and some social activities have begun to take place in Woodruff Park at the waterfront.

However, a hard boundary still exists between the city and the river. Most of the riparian zones remain obliterated in central Columbus, replaced with walls or riprap due to intense development in the floodplain. Even though the quality of the water has improved dramatically, many people still fear the river, refusing to swim or eat fish caught in its waters. Despite the improvements, people's perception of the river remains the same. The Chattahoochee River is still widely treated as a separate entity from the rest of the Columbus, a destination for rafting or a pretty backdrop as people walk along the RiverWalk, but not an integral part of the city's identity.

RIGHT: View of the Columbus RiverWalk near downtown.
Photograph taken by Cameron Brooks, 2011


STEWARTS



DESIGN INVESTIGATIONS

The goal of this project is to blur the constructed edge between the Chattahoochee River and the city of Columbus, GA in order to enable porosity, diversity, and inhabitation of the ecotone between river and city. The design process begins with a series of mapping exercises to investigate the patterns of nonhuman, human, and fluvial habits of the area in order to understand the river/city system as a whole. A harsh divide between wildlife populations and human settlements identified through the mapping process provides the perfect site to test the concepts outlined in this thesis. Setting up an array of initial conditions in this site creates a physical gradient between land and water, blends human and nonhuman inhabitation and usage of the riverbank, and engages the community. Over time, this will increase the complexity of the existing site ecology, thickening the interface between land and water to create a landscape of novelty and democracy between the river and the city.

MAPPING STUDIES

Wildlife Mapping

Wildlife mapping analyzes the habitats of several different types of animals in Columbus, GA: invertebrates, fish, amphibians, reptiles, insects, mammals, and birds. Three species of each animal type have been mapped: one that is highly threatened, one that is adapted to urban environments, and one that prefers to live within an edge condition.

INVERTEBRATES

Crayfish
(*Cambarus spp*)

Lined Pocketbook Mussel
(*Lampsilis binomiata*)

Purple Bankclimber Mussel
(*Elliptiodeus sloatianus*)

FISH

Shoal Bass
(*Micropterus cataractae*)

Largemouth Bass
(*Micropterus salmoides*)

Channel Catfish
(*Ictalurus punctatus*)

BIRDS

Bachman's Sparrow
(*Aimophila aestivalis*)

Belted Kingfisher
(*Megaceryle alcyon*)

Red-Shouldered Hawk
(*Buteo lineatus*)

AMPHIBIANS

Green Treefrog
(*Hyla cinerea*)

Water Dog
(*Necturus spp.*)

Common Bullfrog
(*Rana catesbeiana*)

INSECTS

Mayfly
(*Isonychia spp.*)

Damselfly
(*Argia spp.*)

Bee
(*Bombas spp.*)

REPTILES

Alligator Snapping Turtle
(*Macroclemys temminckii*)

Southern Painted Turtle
(*Chrysemys picta dorsalis*)

Black Racer Snake
(*Coluber constrictor*)

MAMMALS

Raccoon
(*Procyon lotor*)

Red Fox
(*Vulpes fulva*)

Grey Squirrel
(*Sciurus carolinensis*)

WILDLIFE COMBINED

Human Use Mapping

Human use mapping analyzes the patterns of anthropocentric development near the Chattahoochee River. Residential, Industrial, Vacant, and land set aside for Park usage show the intensification of human habitat near the water's edge, leaving very little room for fluvial process and nonhuman systems. These areas are often the ones that harden their riverbanks to prevent the river from damaging infrastructure and development

RESIDENTIAL

Low Density

High Density

INDUSTRIAL

Mill Sites

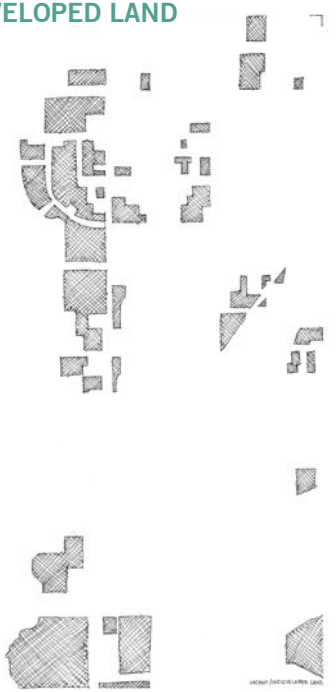
Substations

PARK/CONSERVATION

RiverWalk

VACANT/UNDEVELOPED LAND

Vacant Lots



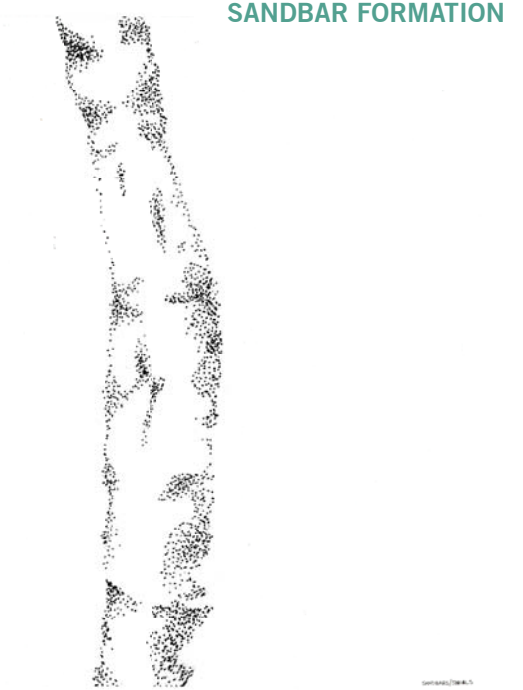
HUMAN USE COMBINED

Fluvial Process Mapping

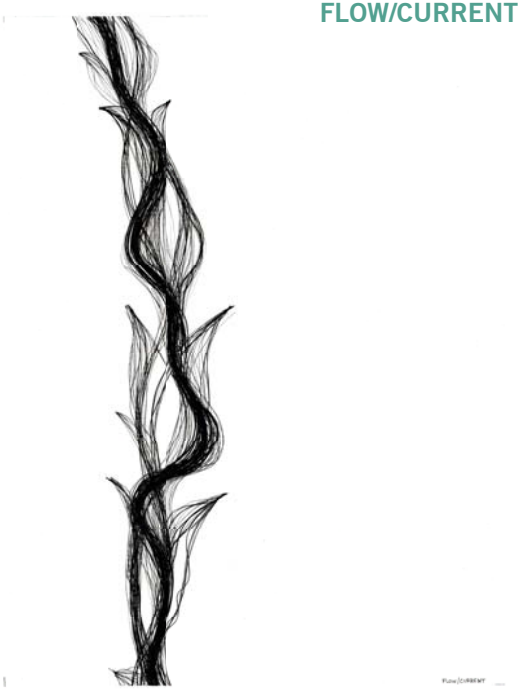
The mapping of fluvial processes reveals the patterns of sedimentation, current, erosion, and the drainage points of the Chattahoochee River's greater watershed. These areas of intensity and exchange are important parts of the river and affect human and nonhuman activity in these areas, as well as identify the potential sources of pollution through upland runoff. Areas such as these show that the river and city will always affect each other as they shift, erode, and deposit landforms over time.

TOPOGRAPHY

SANDBAR FORMATION

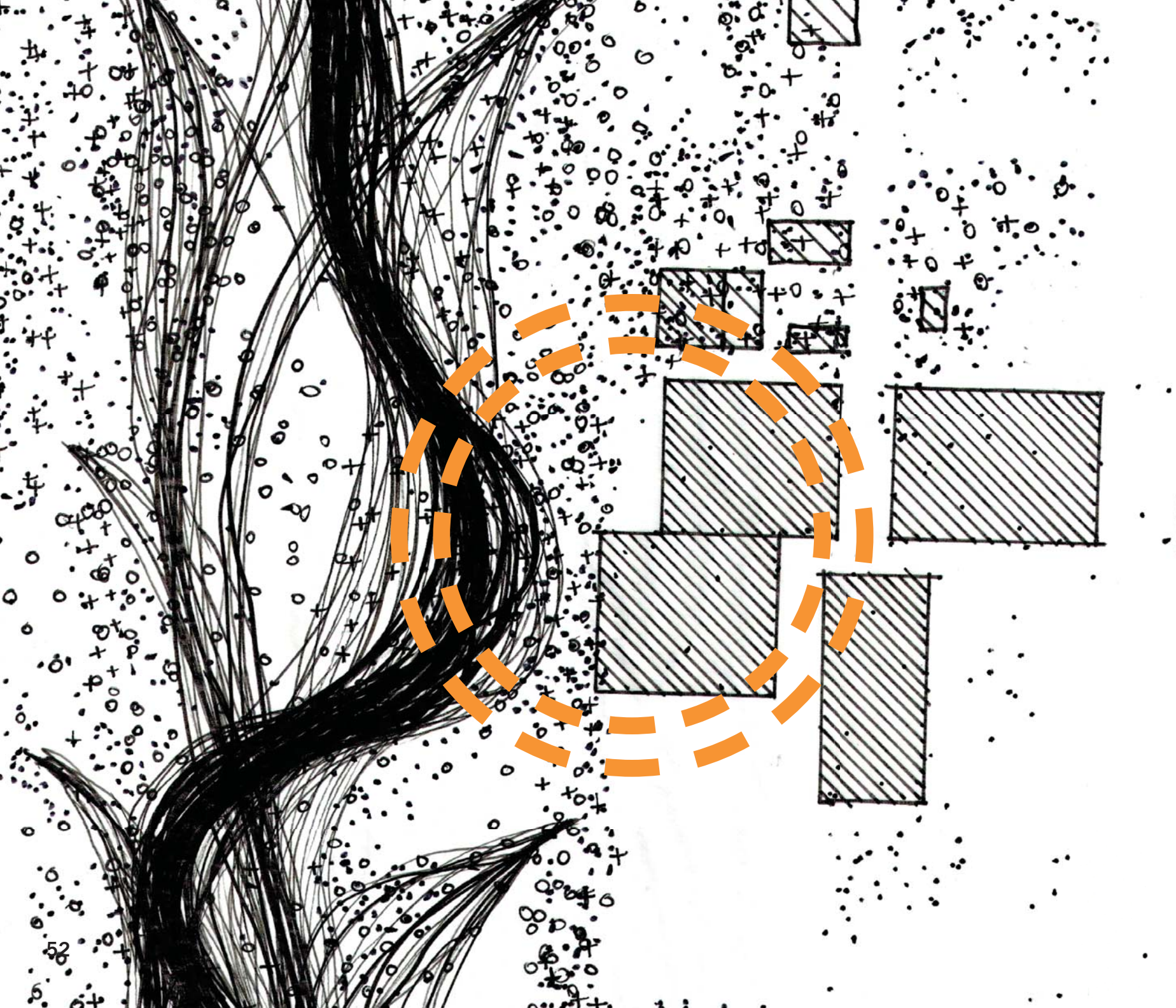


FLOW/CURRENT



RUNOFF PATTERNS

FLUVIAL PROCESSES COMBINED



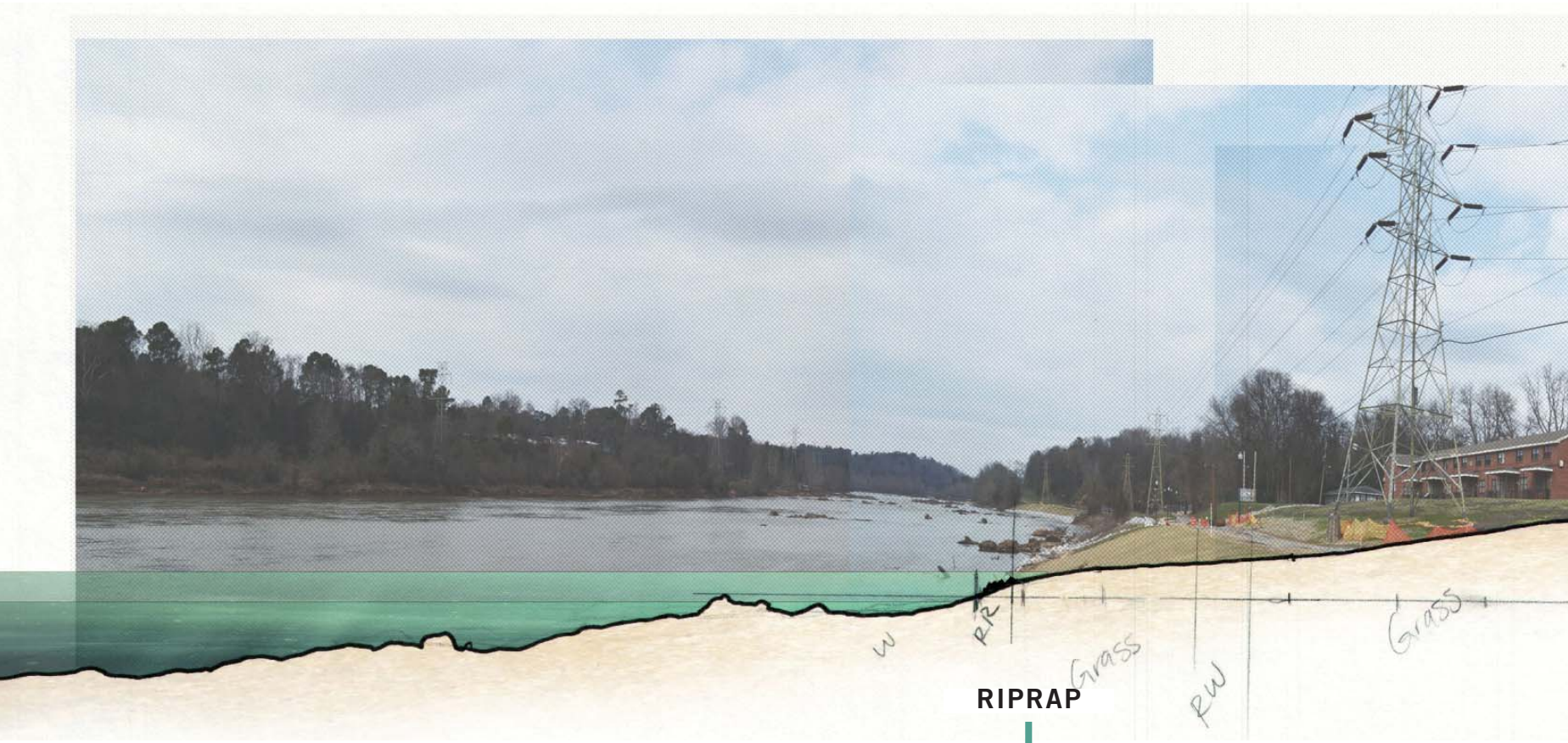
SITE SELECTION

Through mapping nonhuman populations, human use, and fluvial processes, a physical divide can be identified between suitable wildlife habitat and high density residential areas. This location shall serve as a field for experimentation and testing of the ideals put forth in this thesis project. Through blurring the distinctions between the human and nonhuman systems of this site, a rich ecotone can be created that overcomes the physical and perceptual divisions between the city of Columbus and the Chattahoochee River.

DESIGN SITE

The design site for this thesis project is the riverbank that lies between the Chattahoochee River and Chase Homes, a high-density public housing community. The diagram to the right shows the layout and expanse of the site with key existing elements labeled, such as housing structures, vehicular circulation, and erosion control measures.


Existing Riprap
1st Avenue
21st Street
Public Housing
Parking Lot
20th Street
Lawn + RiverWalk


RIPRAP
CHATTAHOOCHEE RIVER

EXISTING CONDITIONS

The section above depicts the existing topography and usage of the site. Currently, the community's social space is partitioned from the river by a steep slope of turfgrass, a riverfront pathway under construction, and mounds of riprap intended to prevent erosion from stormwater runoff.

SITE PHOTOS

The current landscape is a fairly homogenous condition of concrete, brick, and turfgrass with little opportunity for diversity of human activity or wildlife habitat.

The view looking inland into the parking lot shows the current social spaces. Consisting of asphalt and a bit of grass, this lot is primarily anthropocentric with little ability to support nonhuman life.

The site experiences erosion caused by stormwater runoff from Chase Homes. Riprap has been placed along the riverbank to remediate this process with little success. The water's edge has been under construction for over two years, increasingly cutting off access between the river and land for both humans and wildlife and eliminating amphibious habitat.

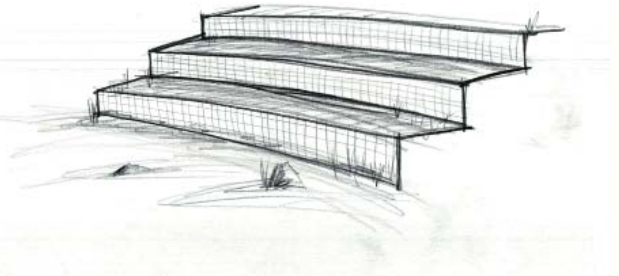
TOP: View of the design site from across the Chattahoochee River
BOTTOM: Looking north towards the design site

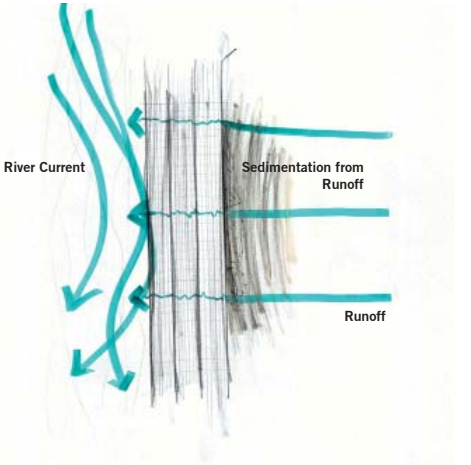
GABION INVESTIGATIONS

Gabions are commonly used as inexpensive retaining walls but can be utilized in a different way. The coarse texture of the rocks and rubble that fill the gabions give a porosity that allows water to freely flow through the walls rather than impeding it. Larger particles such as soil and debris, however, can be gathered behind the wall sections to prevent catastrophic erosion and form landmass.

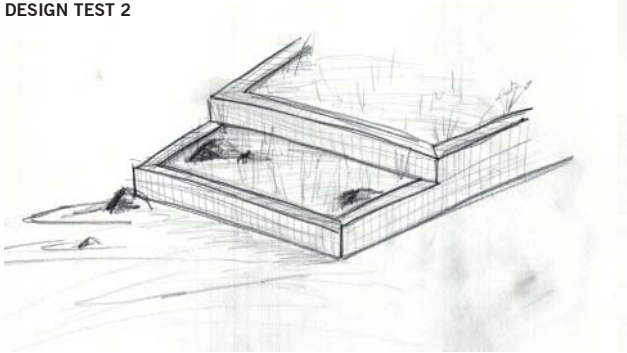
The diagrams on the opposite page test different arrangements of gabion wall sections, examining their potential for accommodating river currents and stormwater runoff while accumulating eroded soils. The third strategy of separated segments of gabions was evaluated as the most effective and will be further explored as tools of designing for initial conditions.

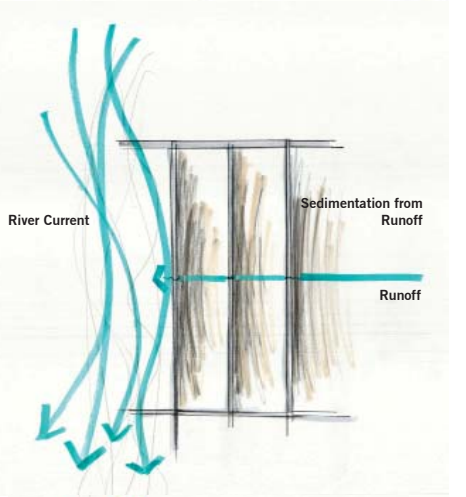
DESIGN TEST 1



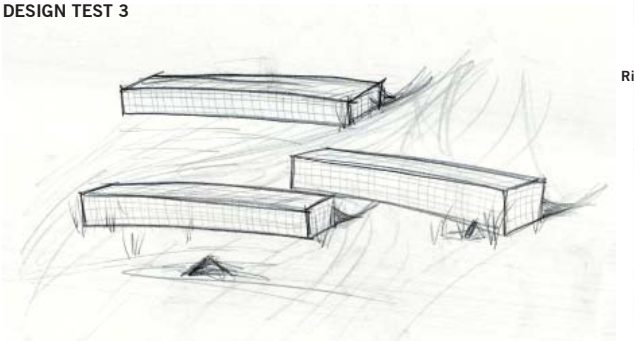


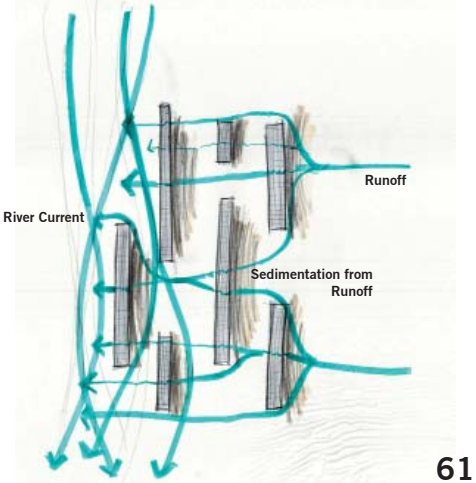
DESIGN TEST 2



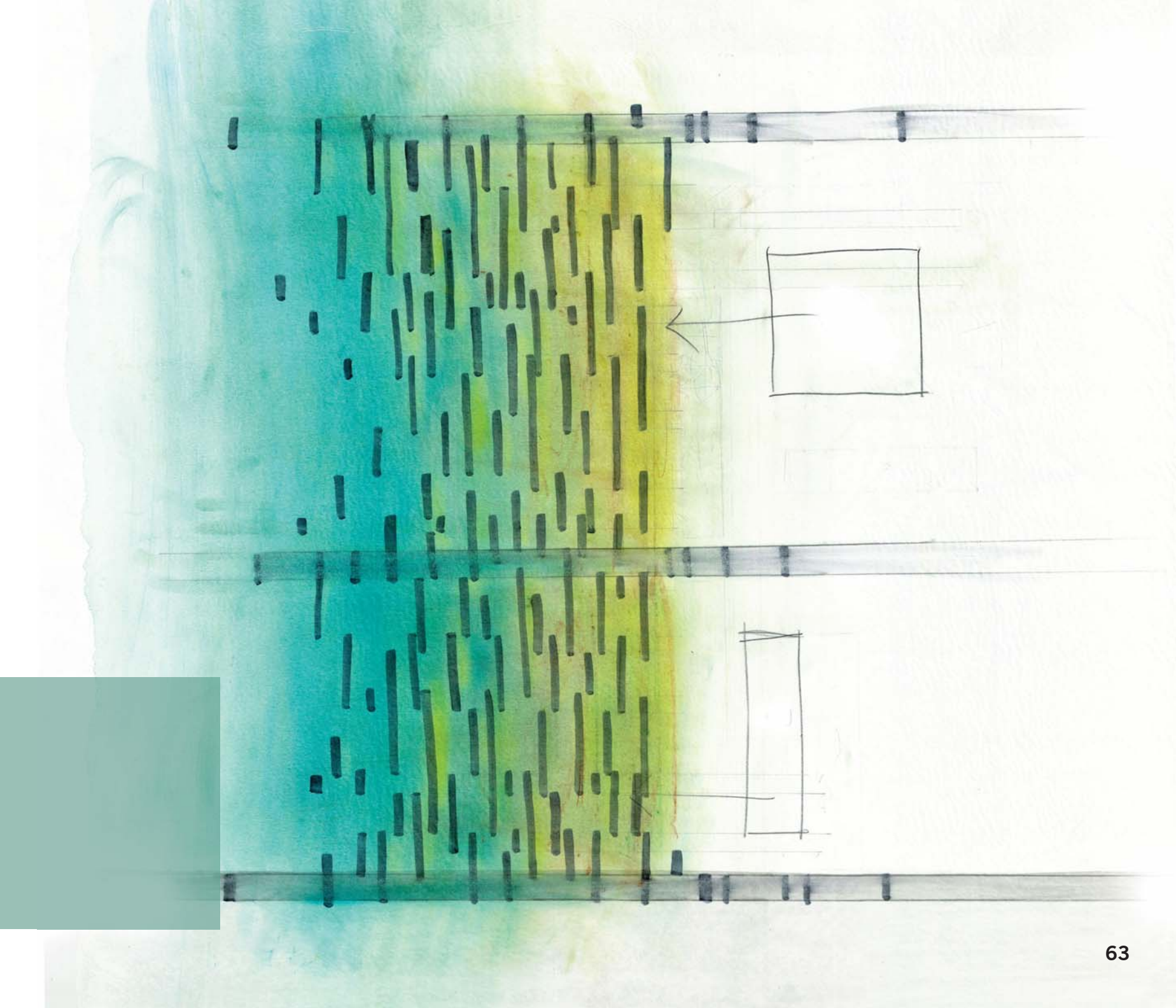


DESIGN TEST 3

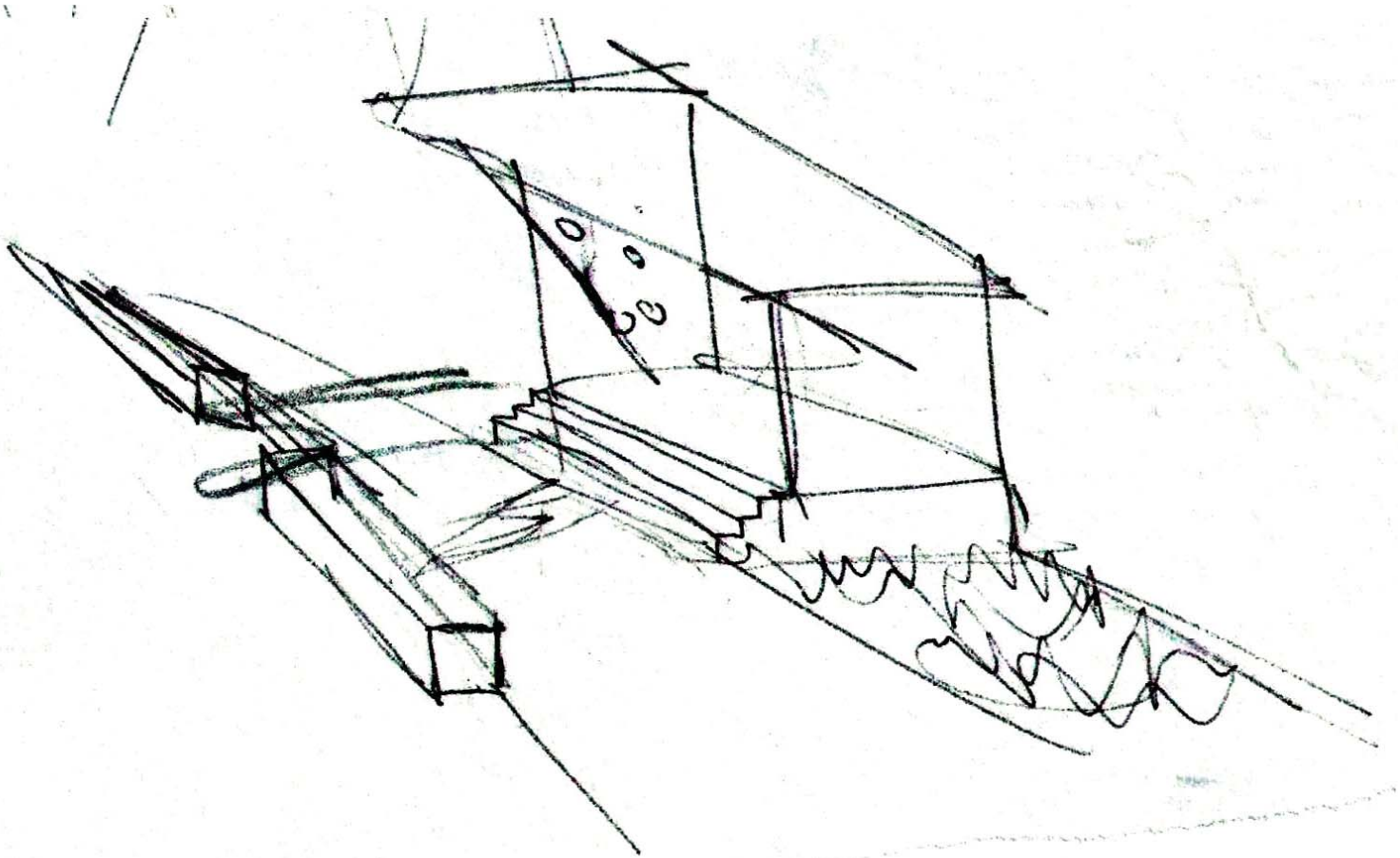


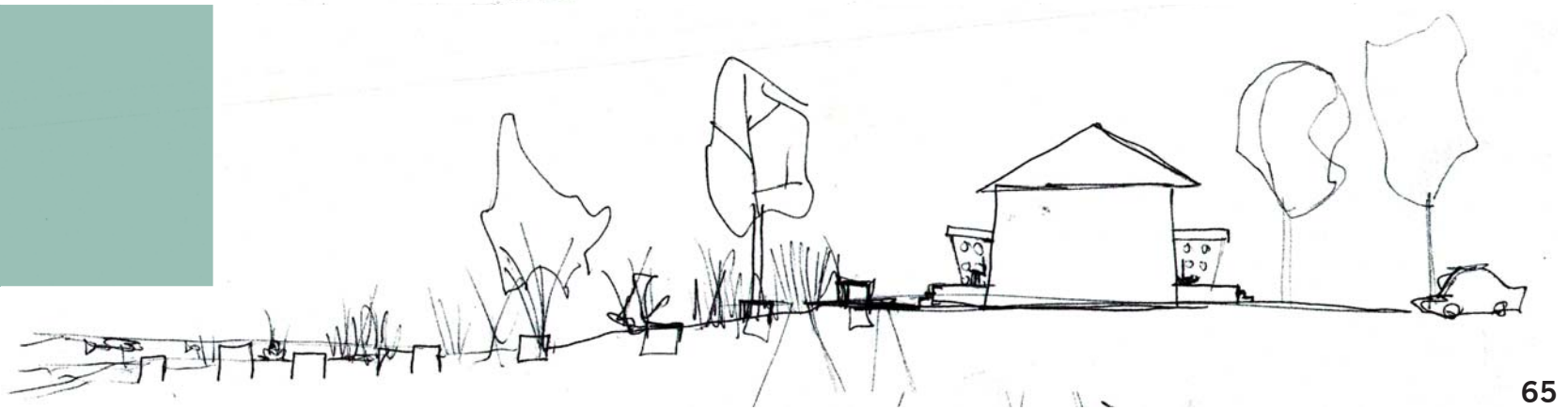


The scattering of gabion walls across the site is the first step in setting up the initial conditions for the formation of a dynamic ecotone between land and water. As stormwater runs off the land and the river floods, soils and sediments will gradually accumulate behind the gabion walls, forming mounds and depressions in the landmass of varying size, shape and height depending on the length and spacing of the walls. As plants root and begin to grow and re-colonize the riverbank, a diverse array of habitats such as wetlands, marshes, riparian thickets, and other types will form, increasing the biodiversity and propensity for novel interactions between life forms.



In addition to the variety of terrain types and porosity, the gabion wall system allows for gradual grade change that restores access to the Chattahoochee once more. Opening up this interface increases the encounters between river and city systems that were once considered separate, intermingling the two into one ecotone with unique qualities that don't exist in either the river or city alone.



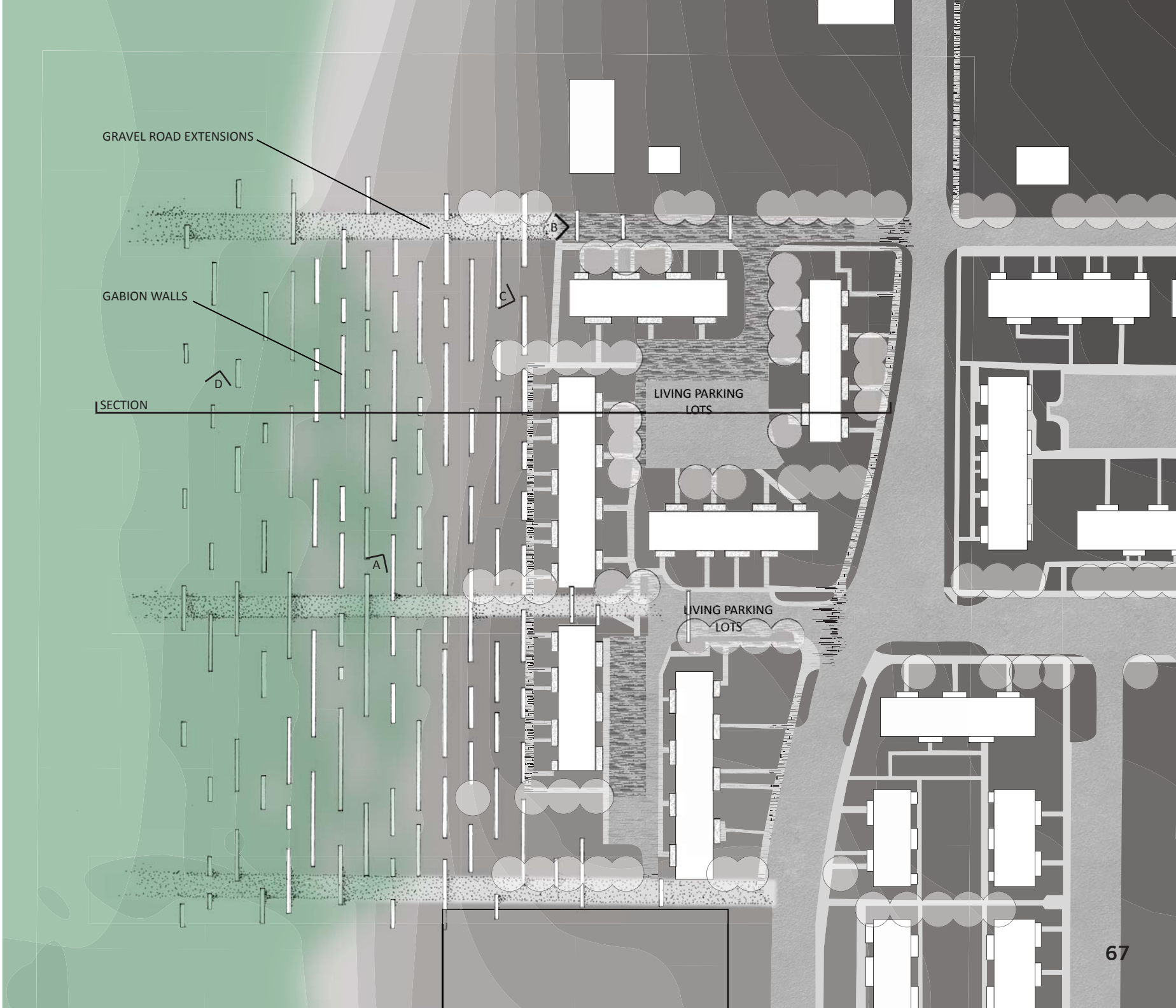


DESIGN PROPOSAL

The design proposal for this site is a set of initial conditions meant shape the self-organization of the landscape into a rich ecotone of not only ecological diversity, but social vitality as well. The goal is to generate a blurred region that is neither river nor city alone, but both at once. The edge between terrestrial and aquatic ecosystems will integrate and thicken, becoming a porous, diverse, and ecologically democratic zone where both human and nonhuman systems are treated as one.

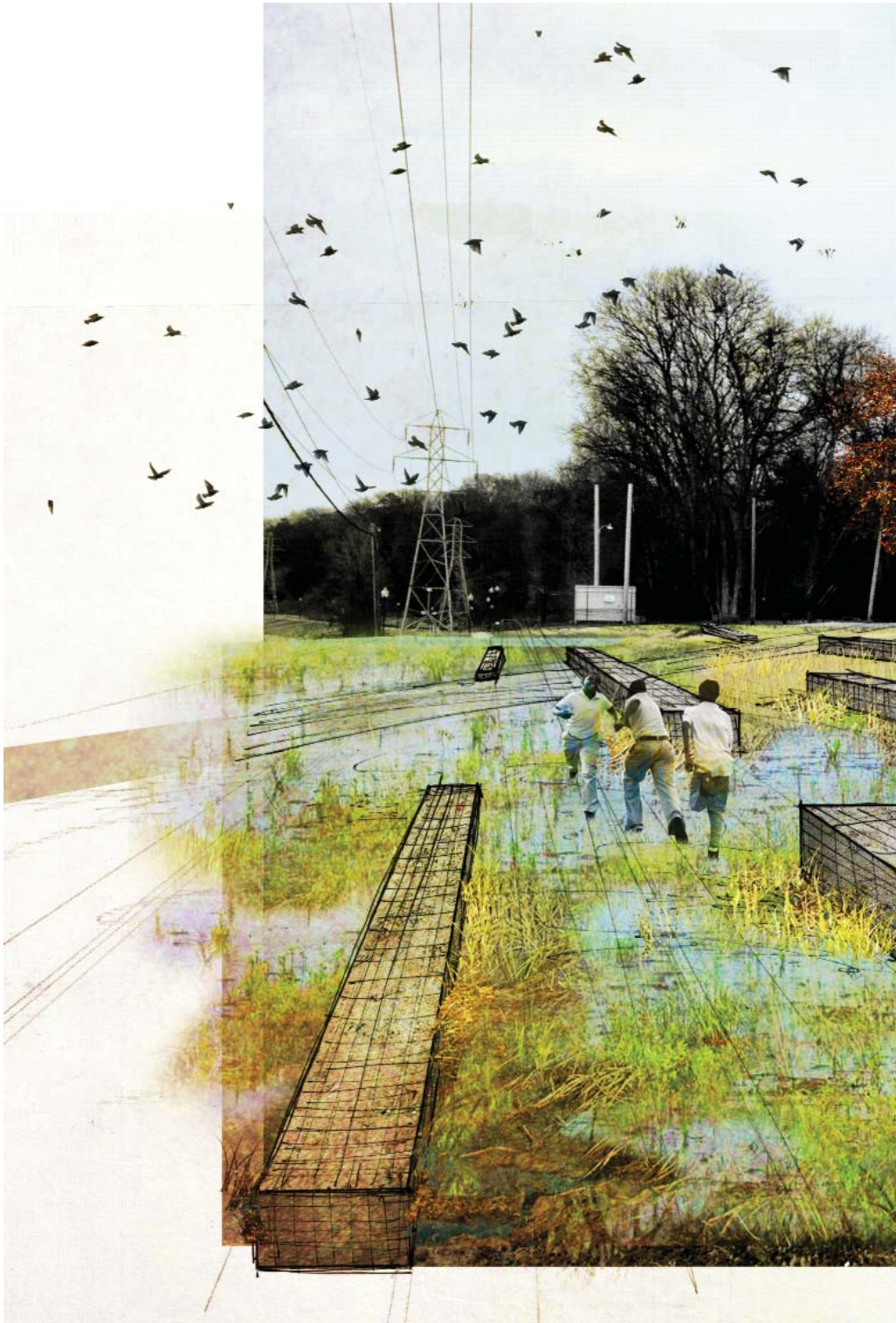
This design takes the form of several elements that create a physical gradient, blur human and nonhuman systems, and engage the community. Gabion walls, as explored earlier in this thesis, are spread across the riverbank to generate a gradual grade change and encourages fluvial processes while alleviating erosion concerns. Dead end roads on the site are extended as gravel paths, forming a visual transect between the urban fabric of the city and the wilderness of the river. These roads, coupled with linear rows of trees, pull visitors towards the vibrant riverbank. The existing parking lots and roads are scored, removing pieces of asphalt and concrete to fill the gabion walls. Opportunistic native flora will colonize the leftover holes and crevices, bringing wildlife into the highly anthropocentric urban landscape and creating living parking lots. Lastly, building relationships within the community during the construction process promotes a sense of ownership amongst the residents of Chase Homes, allowing them to see their part in the overall river/city system and claim the riverbank as part of their landscape.

RIGHT: Plan View of Design Proposal


GRAVEL ROAD EXTENSIONS
GABION WALLS
SECTION
A
B
C
D
LIVING PARKING LOTS
LIVING PARKING LOTS

Riverbank as Ecotone

The field of gabions sets up the initial conditions for the formation of an ecotone. Land and water interact in a way that makes the riverbank ambiguous. It is not river or city, but both at once. Making the river accessible and diversifying the riverbank provides opportunities for human engagement that were previously difficult or impossible, such as fishing, swimming, hunting for bugs and trinkets, birdwatching, explorative play, and outdoor learning (Kondolf and Yang 2008). Such meaningful engagement between humans and nonhumans can lead to a greater understanding of their interconnectedness and healthier lives of both parties.



RIGHT: Perspective A, Showing the upper riverbank about a year after the initial seeding of grasses, sedges, rushes, and riparian shrubs


YEAR 1


YEAR 10


YEAR 50

Habitat Formation

Gradual grade changes provide a variety of habitat types for wildlife, restoring the riparian and wetland zones. Initially, several species of tall grasses, rushes, sedges, and shrubs will be seeded, then allowed to spread and diversify over time as new species colonize the riverbank. This not only stabilizes soil, but also acknowledges that the interface between river and city is a democratic space for all beings.

In addition to creating habitat from soil accumulation and plant growth, the gabion walls themselves act as a substrate for the proliferation of three threatened species in the Chattahoochee River: the purple bankclimber mussel, the shoal spider lily, and the shoal bass. All three species were nearly eradicated by the damming of the Chattahoochee during the industrial period. Since the breaching of two downstream dams, the river has returned to its native form: a shallower shoal-type river (Aflac 2012). These three species of flora and fauna have been identified by the city of Columbus as important cultural and ecological members of the Chattahoochee River, and efforts are currently underway to restore these species to their native habitat.

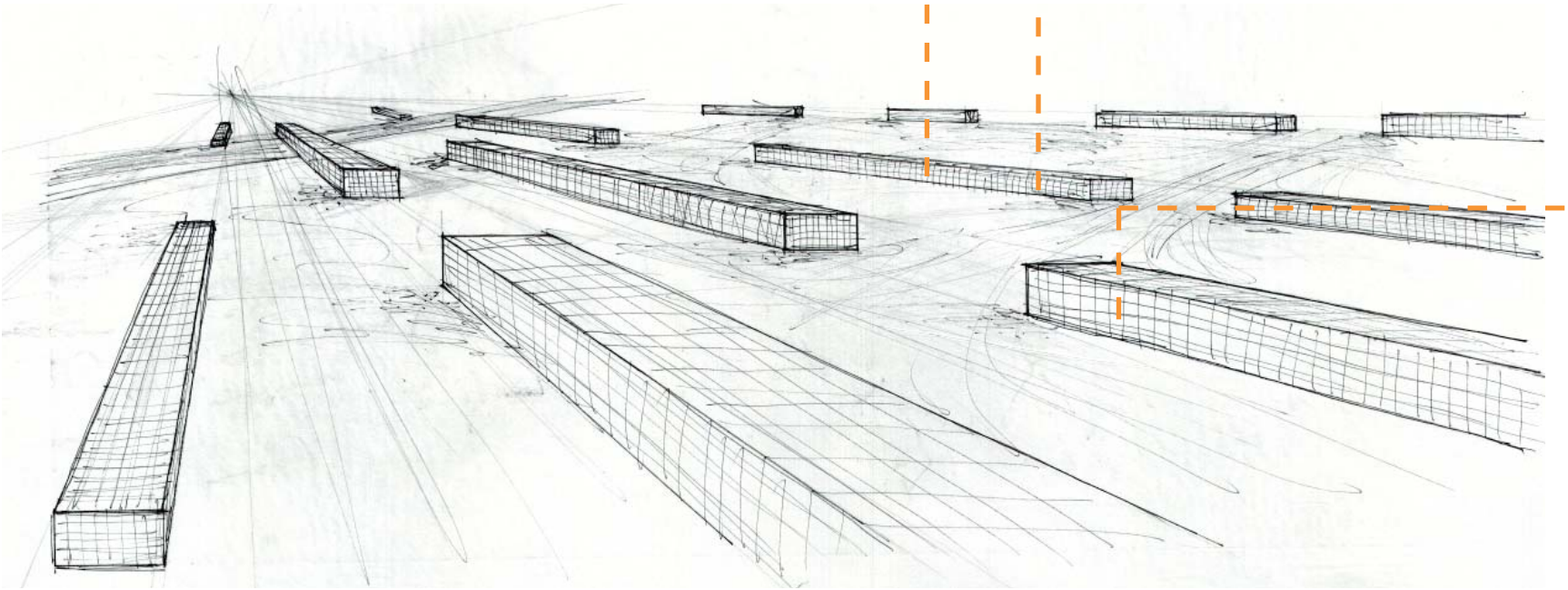
PURPLE BANKCLIMBER
This species of freshwater mussel attaches itself to rocky shoals and alluvial deposits. The rocky gabions that gather sediment and runoff can act as a substrate for this endangered mussel.

SHOAL SPIDER LILY
The bulbs of this threatened flower wedge themselves in between rocky shoals of swiftly moving waterways. The city of Columbus is currently trying to repopulate the shoal spider lily in the Chattahoochee River.

SHOAL BASS
The city of Columbus is currently trying to reintroduce the Shoal Bass into the Chattahoochee River. Gabion structures will provide a suitable surface for spawning and feeding on aquatic insects.

Gabion Materials

A gabion wall's strength lies in the conglomeration of materials that fills it. The fill for these gabions consists of the existing erosion control riprap, asphalt and concrete reclaimed from the site, and found objects from the river placed into the walls by members of the community. Each of these materials holds a history of interaction with the river. Asphalt has increased the amount of runoff that enters the river, erosion control has limited riverine processes and cut off access, and objects such as bottles, tires, bricks, and pottery have been claimed by the river over time. Using these materials brings them back to the visual forefront of the landscape and revalues them as part of one whole system of river and city, creating a visual history of their relationship.

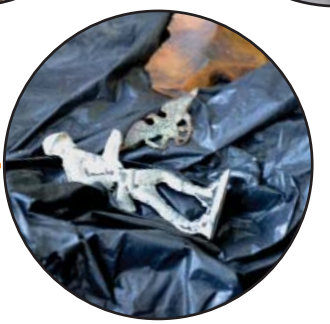


EXISTING ASPHALT / CONCRETE

Asphalt and concrete from the existing parking lots and sidewalks will be scored and relocated.

EXISTING EROSION CONTROL MATERIALS

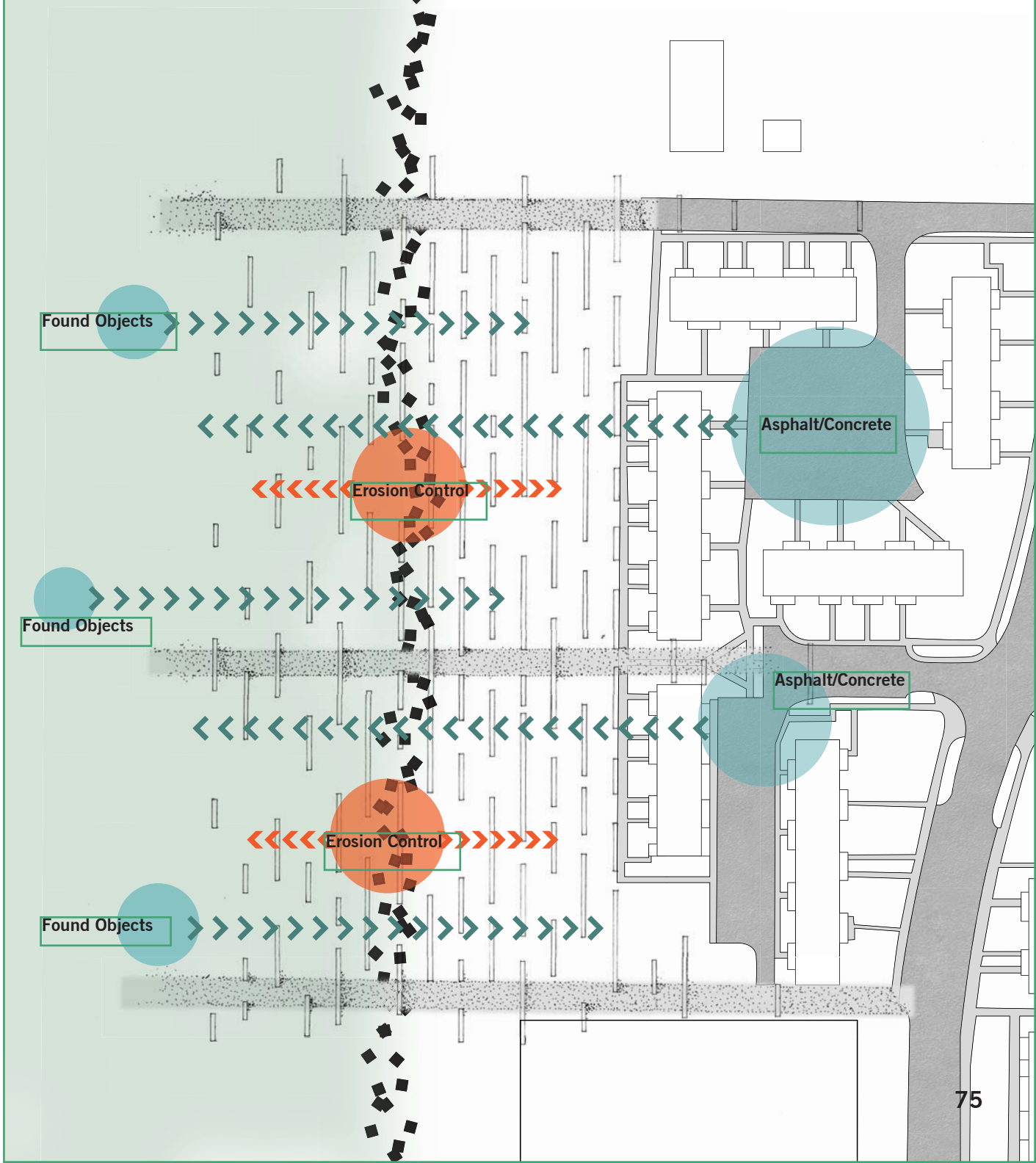
Riprap and erosion control fabric will be spread throughout the riverbank in gabion walls.



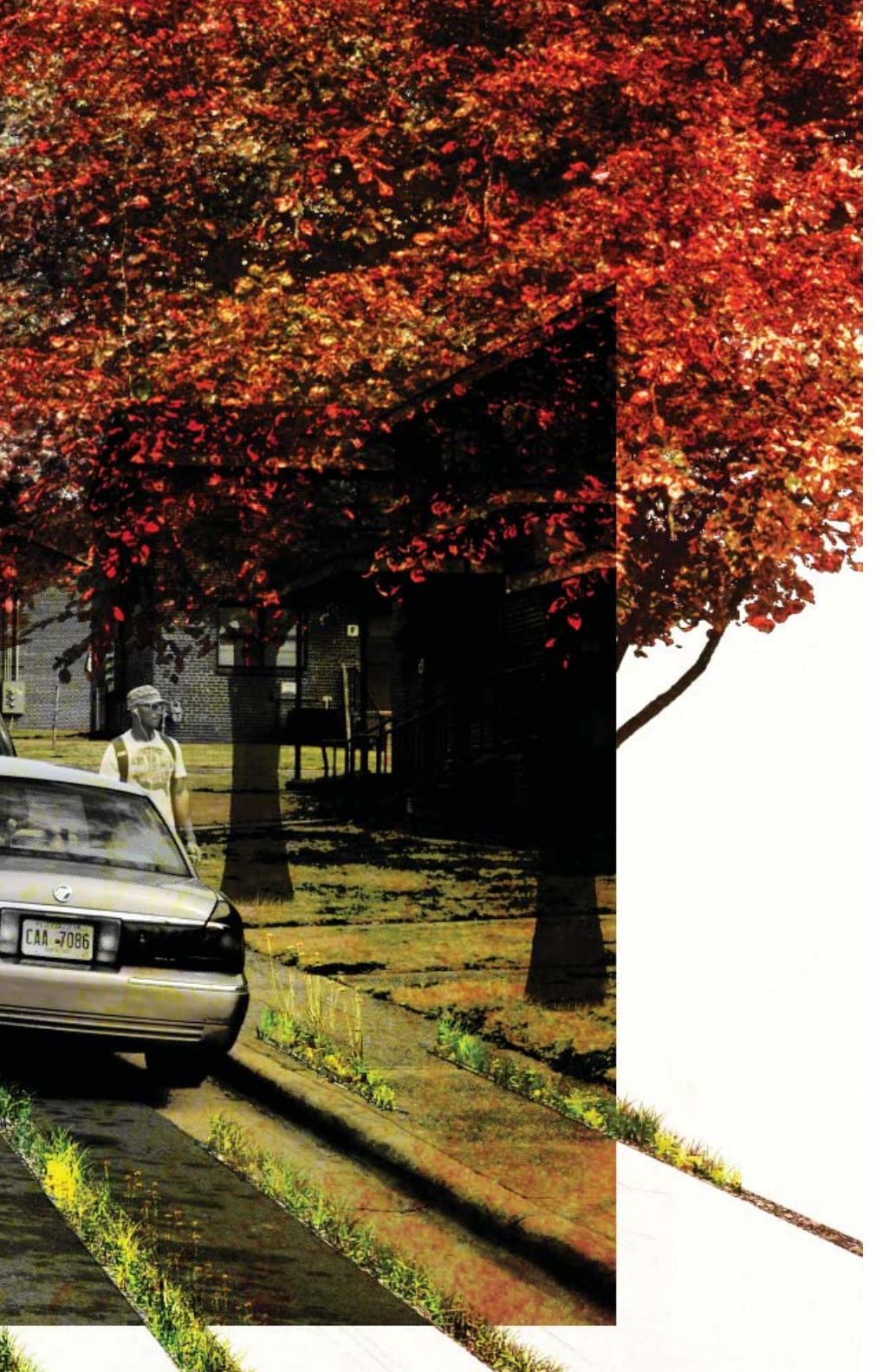
FOUND OBJECTS FROM RIVER

The breaching of downstream dams has lowered the water level of the river, uncovering decades of artifacts. Object collected from the river such as tires, bottles, pottery, and knicknacks will be placed in the gabion walls to help reveal the history of mankind's relationship to the river.

The diagram on the right maps the movement of gabion materials across the site. First, the existing line of riprap is strewn across the site in the wall sections, dissipating the hard boundary between land and water into a gradient. The asphalt and concrete are pulled towards the river as objects are brought from the water back onto land to be revalued in the landscape. Overall, the porosity between river and city is increased, allowing an ecotone of overlap to form.


Found Objects
Asphalt/Concrete
Erosion Control
Found Objects
Asphalt/Concrete
Erosion Control
Found Objects


STOP



Blending Human + Nonhuman Habitats

Removing asphalt to fill the gabion walls leaves linear holes and cracks in the existing pavement. These holes are filled with soil and seeded with heat, traffic, and drought-resistant grasses and perennials. The tough nature of these plants still allow the roads and parking lots to operate for human use, but invites nonhuman life forms such as plants, insects, and small animals into the urban fabric for equal representation. While the gabion field brings the city towards the river, this democratic pulls the river's ecology into the city and forms a street for all beings in a previous anthropocentric space.

LEFT: Perspective B showing 21st street about a year after seeding the grasses and perennials.

Parking Lot Ecology

The lines of the parking lots are scored, creating 4-inch crevices that are filled with soil in a similar fashion to the streets. These gaps are seeded with a mix of goldenrod (Solidago spp.), Blue Eyed Grass (Sisyrinchium angustifolium), Dwarf Fountain Grass (Pennisetum alopecuroides), and Purple Coneflower (Echinacea purpurea). These plants are carefully choreographed to provide food sources and habitat for small mammals, insects, and birds at all times of the year. Over time, these plants will spread into the lawn spaces. As they colonize spaces with more soil area and shade, such as the edges of the parking lot under tree canopies, they will be replaced by later mid to late succession plants. The edges of the parking lot will eventually form an ecotone between the houses, successional lawns, and parking lots that mimic the ecology of a field with activity concentrated at the overlapping of the spaces.

The overhangs of the buildings will be replaced with flatter structures filled with gravel that act as nesting structures for birds. Many bird species such as robins, house sparrows, and starlings are highly suited to urban environments, will build their nest in such structures, and will forage on asphalt for seeds, bugs, and human food scraps (Bellah 2014). Raptors such as red tailed hawks and peregrine falcons use the surrounding infrastructure for hunting, perching on power poles and pylons to scout for prey of small mammals and birds (Bellah 2014). Common nighthawks and barn swallows are nocturnal hunters and congregate around urban light fixtures to catch moths and other bugs.

TOP: Section view of nesting structure overhangs

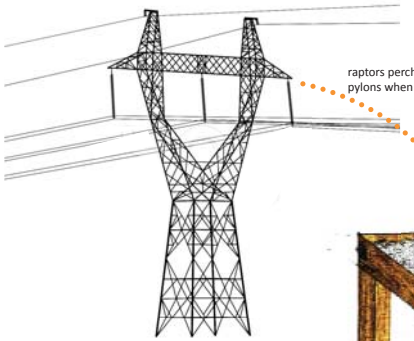
RIGHT: Diagram outlining some of the ruderal ecological relationships of the parking lots at Chase Homes.

RAPTORS

Buteo jamaicensis (Red-Tailed Hawk)
Falco peregrinus (Peregrine Falcon)

NIGHT HUNTERS

Chordeiles minor (Common Nighthawk)
Hirundo rustica (Barn Swallow)



raptors perch on power pylons when hunting

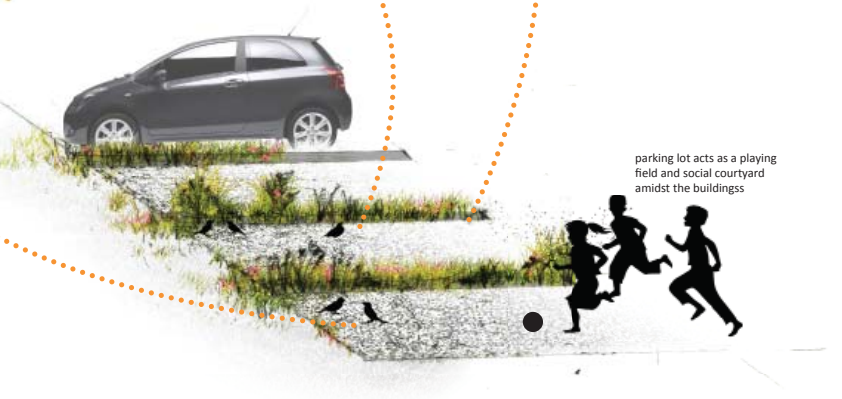
nesting spots for raptors and songbirds near food sources

nocturnal birds hunt flying insects near lights

small birds act as a food source for raptors

insects gather around parking lot during the day and light fixtures at night

nesting spots are located close to the parking lot, allowing proximity to food sources



parking lot acts as a playing field and social courtyard amidst the buildingss

GROUND-FORAGING SONGBIRDS

Turdus migratorius (Robin)
Passer domesticus (House Sparrow)
Sturnus vulgaris (Starling)


YEAR 1


YEAR 10


YEAR 50

EDGE EFFECT
The blending of the herbaceous grasses with the existing lawn and newly planted trees thickens the ecological and social activity near the edges of the parking lot.

WILDLIFE HABITAT
A red-tailed hawk perches on a power pole overlooking the parking lot to hunt.

SOCIAL SPACES
Increased shade, evening lighting, and decreased heat island effect from the addition of plants to the parking lot creates a pleasurable space to congregate.

Living Parking Lots

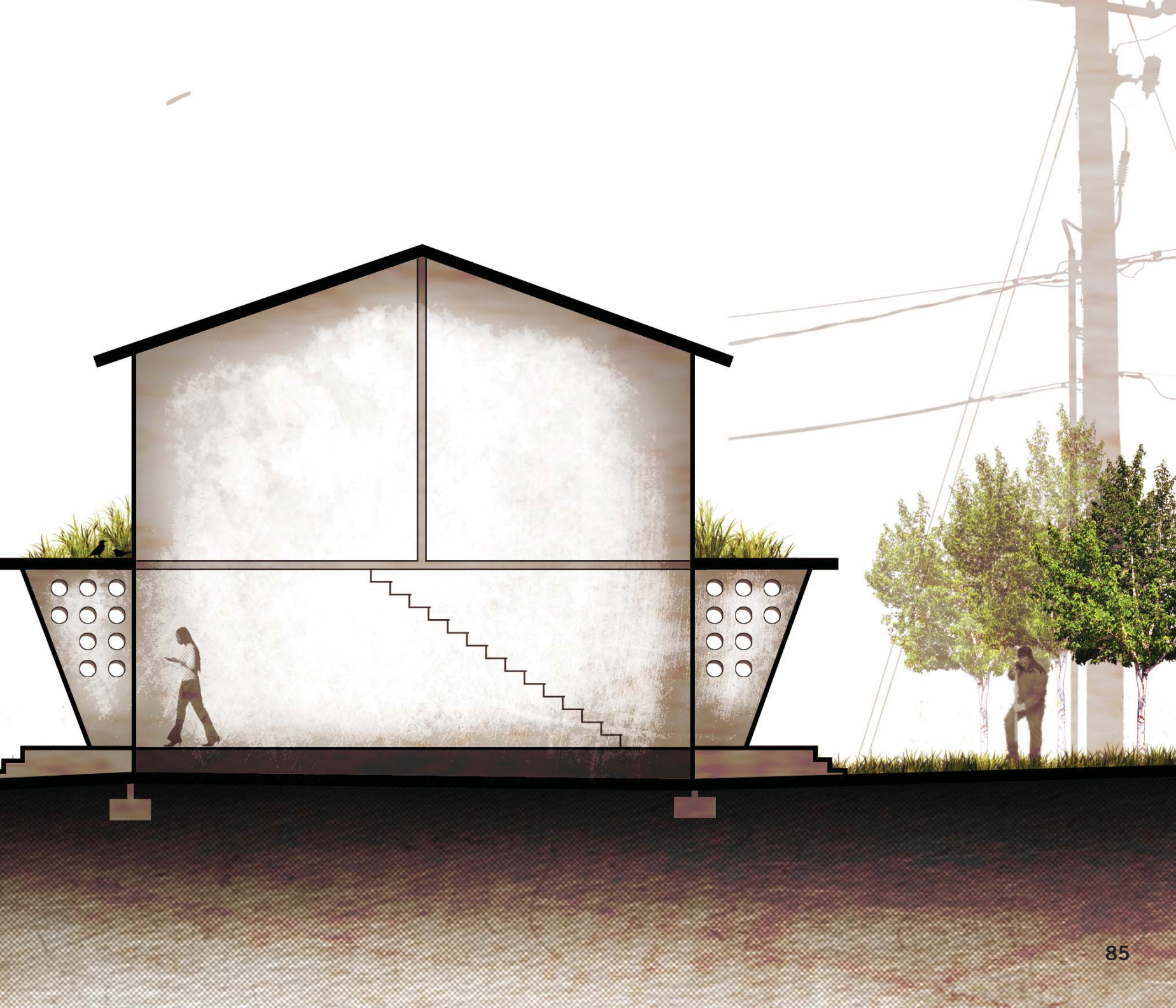
The few simple initial design moves of scoring pavement and improving nesting structures can reveal the existing ecologies of the parking lot and make them legible for the public. Combining human and nonhuman habitation and usage gives the opportunity for up-close engagement with wildlife in an everyday setting. Increased porosity and diversity brings river's ecologies up into the fabric of the city to mesh with the existing urban ecologies. These organisms and processes interact in novel ways not previously possible due to the attempts to divide human and nonhuman areas. Over time, this generates a robust zone that is neither human nor nonhuman, urban nor wild; it is an extension of the river/city ecotone.

LEFT: Perspective C showing the living parking lots that blend bird, insect, small mammal, and human habitats into one cohesive system.

Community Engagement

Perhaps the most vital element of blurring the divides between river and city is the participation of the surrounding community. Residents of the area taking an active role in shaping their landscape is one of the most efficient ways to promote ownership and pride in their environment (Hood 1995). Making connections with local schools, community organizations, church groups, environmental organizations, and universities can forge long-lasting relationships within the community as well as understand their connection with the river.

RIGHT: Sectional view of tree planting as a community event



Education

Local school groups can participate by helping build the initial conditions of the site. Planting trees, scattering seeds, and filling the gabion walls allow young children to leave their mark on the landscape and establish a connection within the ecotone between river and city. Having an area of high biodiversity and porosity so close to the urban core of Columbus also offers the opportunity for outdoor class sessions and field days. These field trips can be conducted every year to educate future generations about the interplay and interconnectedness between river and city. Higher education institutes such as Columbus State University can use the site as a study area for ecology and biology classes to examine the merits of a blurred riverbank over a hardened boundary.

Gradual changes to the ecotone over time will slowly make the human and nonhuman processes legible and easy to understand. These educational relationships give the city of Columbus another reason to protect the river's edge as a treasured part of the landscape rather than the forgotten border between two worlds.

LEFT: Sectional view showing the filling of the gabion walls as a community event and the reclaiming of the riverbank as public space.

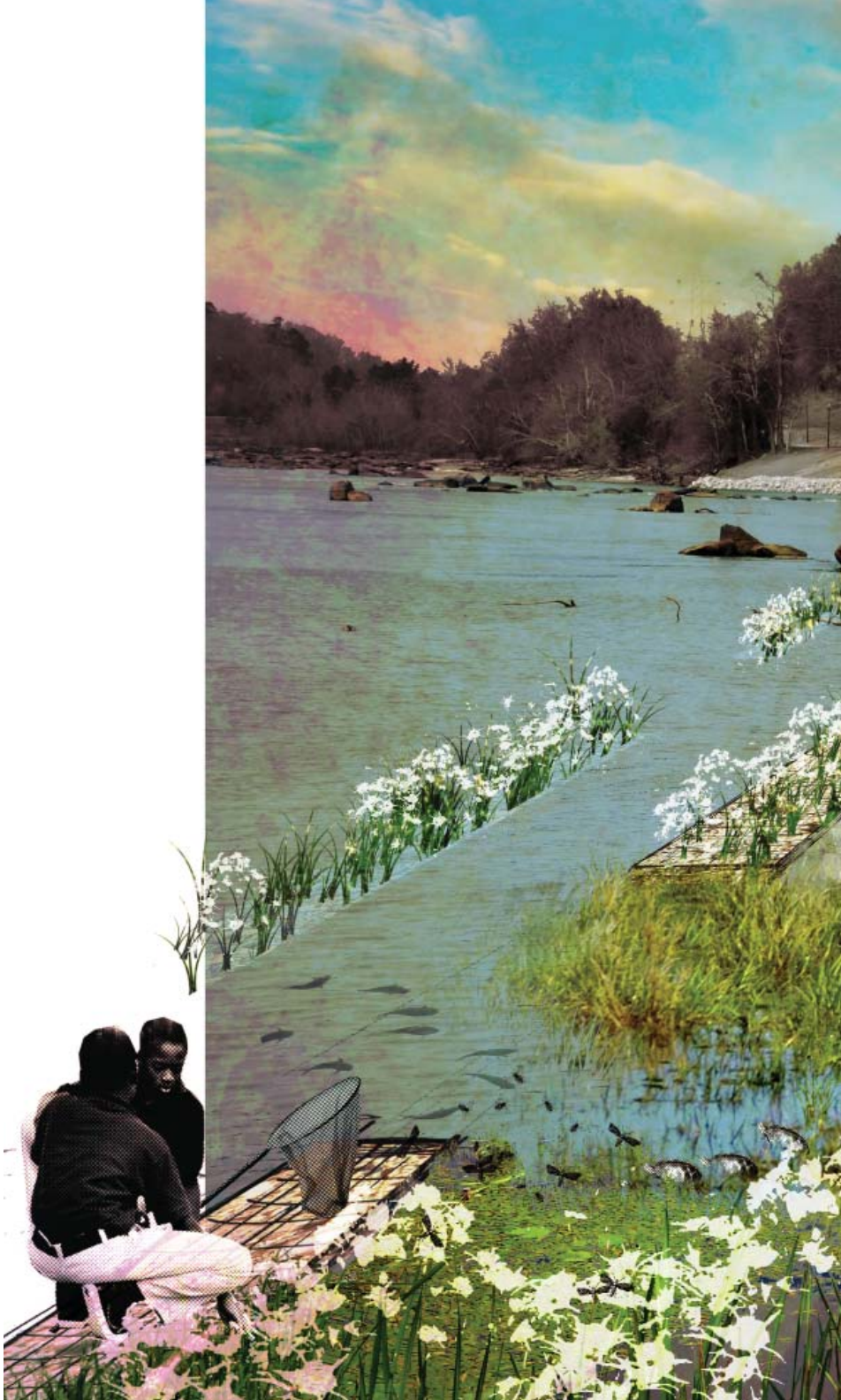
Reclaiming the Riverbank

Blurring the divisions between the Chattahoochee River and Columbus reactivates the long-forgotten riverbank as a center of interactions rather than a divider. Gradual grade changes to the previously difficult to access river gives the residents of Chase Homes a reason to go to the water again. While residents could previously engage the river only if they were extremely able-bodied, activities such as fishing, wading, hunting for frogs and bugs, and the opportunity to play and explore an untamed environment are open to many different ages and groups of people. These activities allow humans to reclaim this zone as part of their cultural landscape, but also share the space with other organisms and systems.

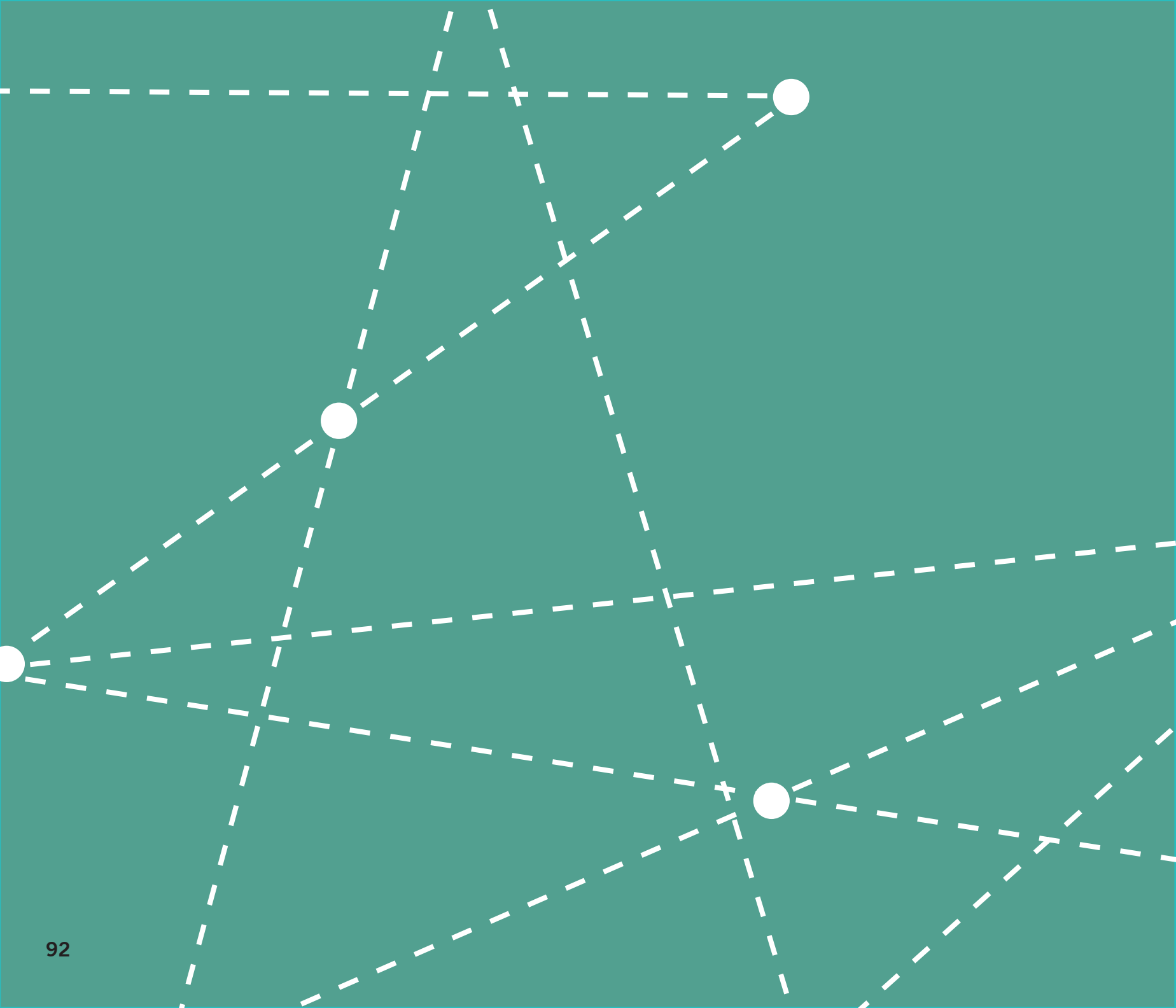
Changing Perceptions

Creating porosity, diversity, and inhabitation along the deconstructed edge between river and city set the stage for revaluing the zones of overlap between entities as centers of interactions rather than edges. Community engagement and reactivation of the riverbank ecotone foster pride, understanding, and ownership of the landscape amongst the surrounding community. Through nurturing the connections between river and city, perhaps the city of Columbus can see itself as part of the river instead of separate from it. Altering people's perceptions to embrace the river as part of the city could encourage both cities and designers to take a more responsible approach when interacting with bodies of water, keeping in mind the needs and movement of nonhuman life forms and encouraging ecological democracy between human and nonhuman systems.

> *"Ecology helps us make connections, reveal relationships. If the interrelationships among bits of information can be understood to produce better knowledge about the world we live in, then we can inhabit an Ecological Age."*
>
> *-Steiner and Forman 2002*



RIGHT: Perspective D Showing the blurred riverbank after several decades of growth and self-organization. Lasting relationships have been formed within the community, and the river has once again been claimed as public space for all beings.



REFLECTIONS

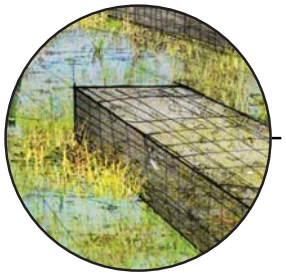
The questions in the following section have been identified through personal evaluation and through the feedback of reviewers over the past two semesters. Due to time constraints and project limits, not every possibility could be explored, but these reflections should give insight into the design decisions made during the thesis process.

1. How can the outcome of this self-organizing project possibly be predicted?

To put the answer simply, it can't. Self organizing systems are by nature unpredictable as they evolve by means of feedback loops and autocatalysis. Any new variables in the system bring novelty and change. Only a few of some of the outcomes have been diagrammed on the opposite page, and the paths leading to those outcomes are complex and subject to change. However, this design is intended to be uncertain. There is a long history of designing "final" landscapes along riverbanks that are predictable in result (people will walk on this pathway, soil will stay behind this retaining wall, etc.). Some of these landscape typologies have led to the very problems outlined in the introduction of this book. Attempts to predict and control nonhuman and fluvial processes often end poorly, with decreased diversity, porosity, and interactions between land and water. This thesis suggests that a different approach should be used: one that not only responds to uncertainty, but thrives because of it.

COMMUNITY ENGAGEMENT

EDUCATION



VISUAL GRADIENT

INCREASED WILDLIFE

STRENGTHENED COMMUNITY

OWNERSHIP

RECLAIMING RIVER AS AN AMENITY

REVALUING THE RIVER

SPREAD TO OTHER AREAS

SEEING RIVER AND CITY AS ONE SYSTEM

UNDERSTANDING

LEFT ALONE

2. What happens if perceptions about the relationship between the Chattahoochee River and city of Columbus do not change?

The success of this project does not solely rest on changing perceptions, although it becomes less effective if a social response does not occur. If the city of Columbus develops no interest in the blurred riverfront, then it would eventually become a space centered around nonhuman ecologies. Without human inhabitation of the riverbank, it would most likely form dense riparian vegetation that provides habitat for a diverse array of wildlife. The physical blurring and ecological diversity are still beneficial to both the river and the city, but the project would do nothing to advance ways of thinking about riverfront development.

3. Why is the design confined to such a small area?

In the interest of time, the breadth of the project was scaled down from its original size. For this thesis, it was deemed more important to delve into the small details of the site rather than creating a larger, more general design. In addition many of the case studies analyzed in this thesis presented the concept that great changes could be accomplished through small design interventions. If this small proposal proves to be effective, similar approaches could be taken elsewhere in the city of Columbus and along the Chattahoochee River to create clusters of vibrant activity rather than a generalized blanket treatment of the whole urban area.

The next steps of this design would be to weave the design further into the fabric of the city, eventually connecting to other similar interventions and creating a blurred matrix of human and nonhuman systems along the river. The concepts could also be applied further inland as general investigations into the realm of designing for naturecultures rather than removing humans from the scope of “natural” systems. The result would be an extended web of ecological democracy and infrastructure that supports all beings.

AREAS OF INVESTIGATION

"As designers, we advocate approaches to water that rather than control its complicated nature, approaches position water as inevitably separate from land, as blue; se Water challenges us to consider ambiguity as a conditio rather than erase. Water constructs a keen awareness of absence + presence; it draws us into a SECTIONAL appreciation of DEPTH.

– Mathur

"desire for settlement vs. inevitability of change"

"Starting points, anchors for the staging of social + ecological processes over time" - A+dC, 2010

"Anchor, not settle" - M+dC, 2012

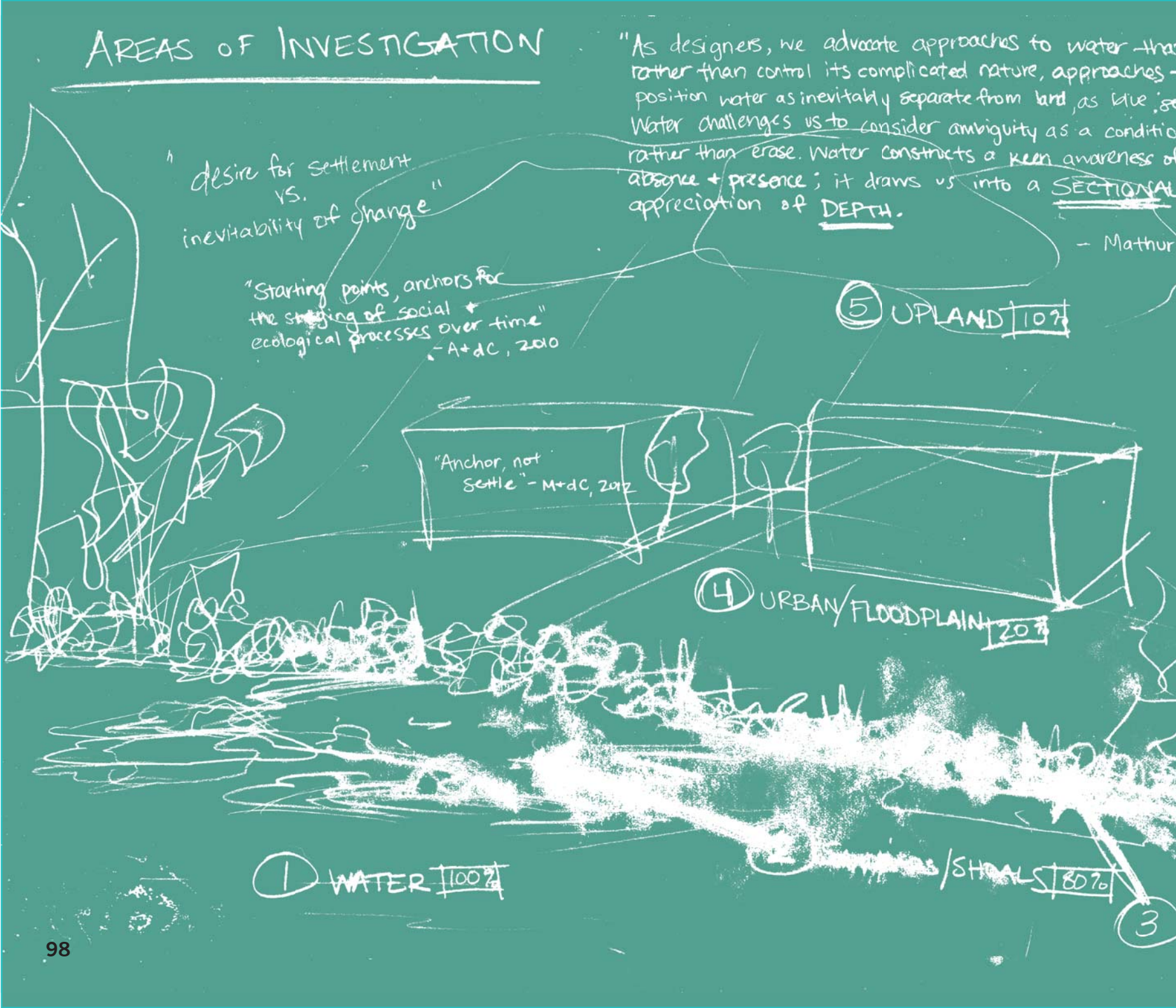
5 UPLAND 10%

4 URBAN/FLOODPLAIN 20%

1 WATER 100%

/SHOALS 80%

3

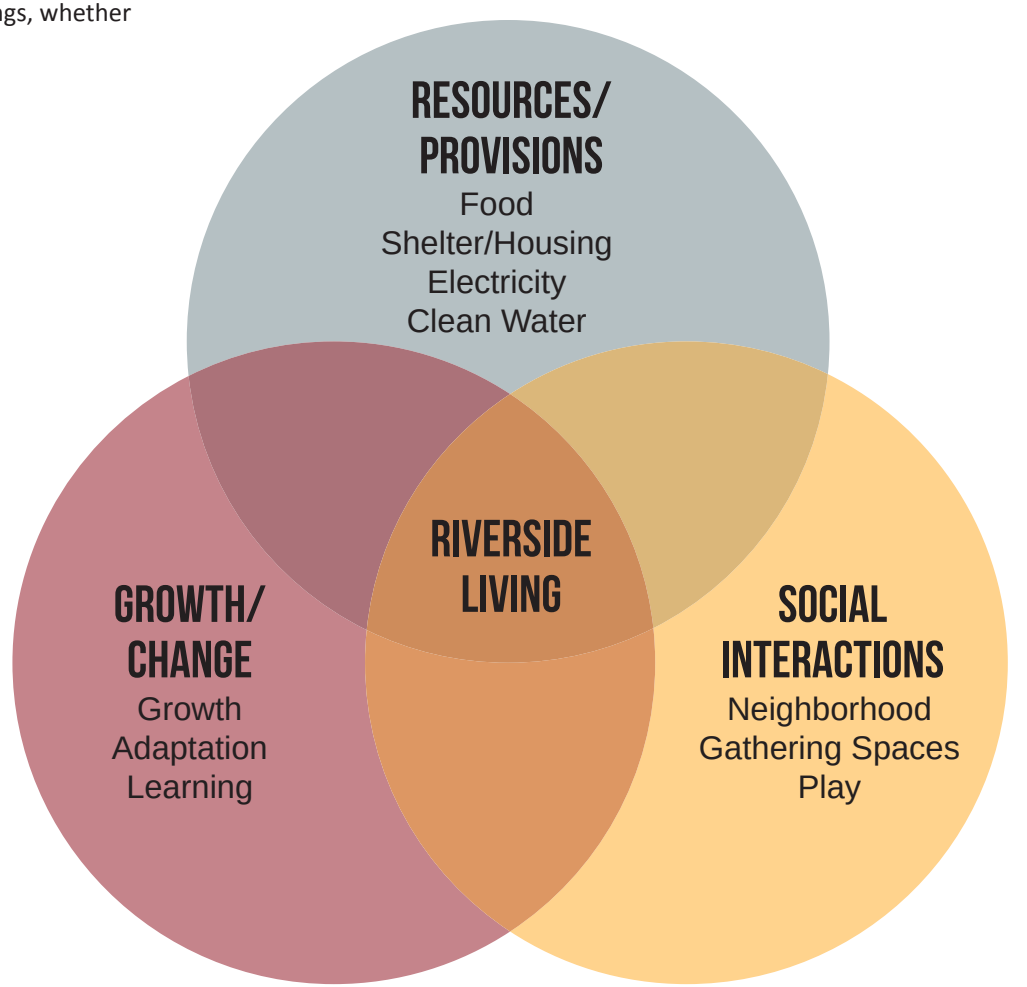


APPENDIX

The drawings in the following section are a small sampling of the many design explorations that led to the design and concept presented in this book. The very nature of research by design involves many pathways that twist, turn, intermingle, and sometimes result in a dead end. Although these investigations were not included as part of the final project for the sake of coherency, they helped to narrow the focus of this thesis. Some pushed the project towards further research, while some simply revealed that perhaps that approach was not the right answer. Nonetheless, these design iterations, sketches, and ideas helped to shape the final outcome of this thesis project and have therefore been included as an important part of the research process.

RIVERSIDE LIVING

This conceptual inquiry explored the role of the river as a provider for basic human needs such as shelter, water, food, exercise, and social interactions. However, it was decided that this thesis needed to be more than just an amenity for humans, but a landscape that supports all beings, whether human or nonhuman.



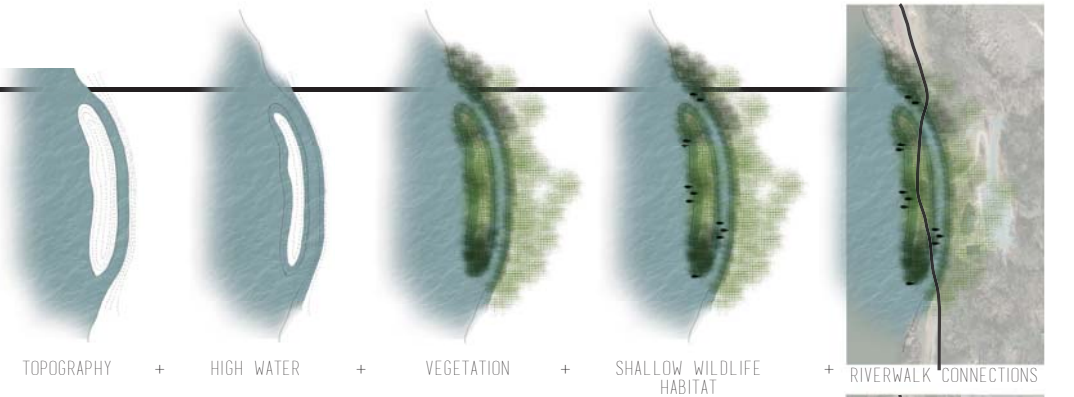
MANIPULATING TOPOGRAPHY

This series of exercises examined the effects and possibilities of topographical manipulation on fish spawning habitats, plant growth, and human circulation by means of the RiverWalk.

01 / BYPASS STREAM

PROS: POTENTIAL FOR FLOW - THROUGH REMEDIATION

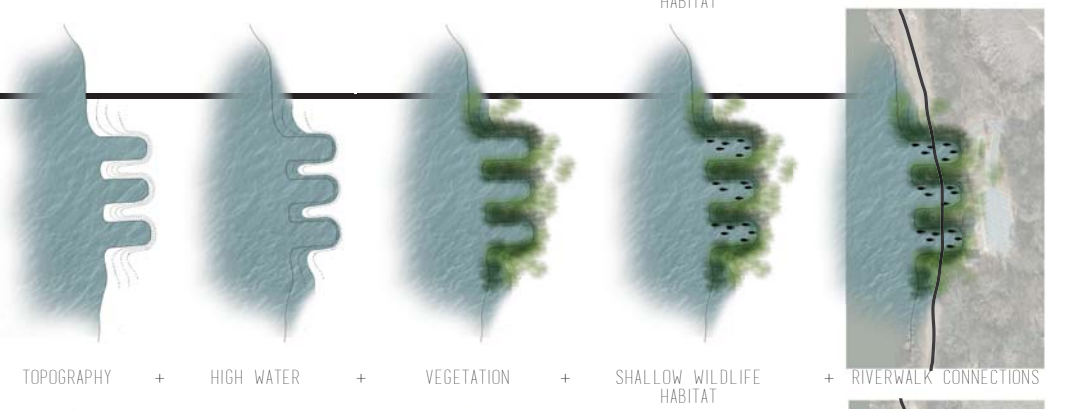
CONS: LITTLE TIDAL FLUX
FEW CALM AREAS FOR AQUATIC WILDLIFE
LINEAR - FEW GATHERING SPACES



02 / COVES

PROS: SMALL GATHERING SPACES AROUND WATER
CALM WATER SHALLOWS FOR AQUATIC WILDLIFE
TIDAL FLUXUATIONS MORE VISIBLE
EASY ACCESS TO WATER

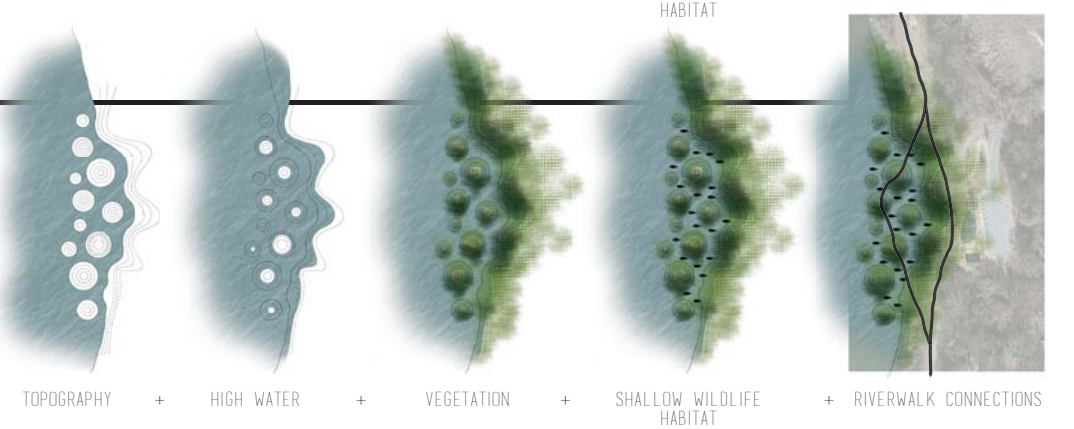
CONS: CALM WATER AREAS UNPROTECTED



03 / ISLANDS

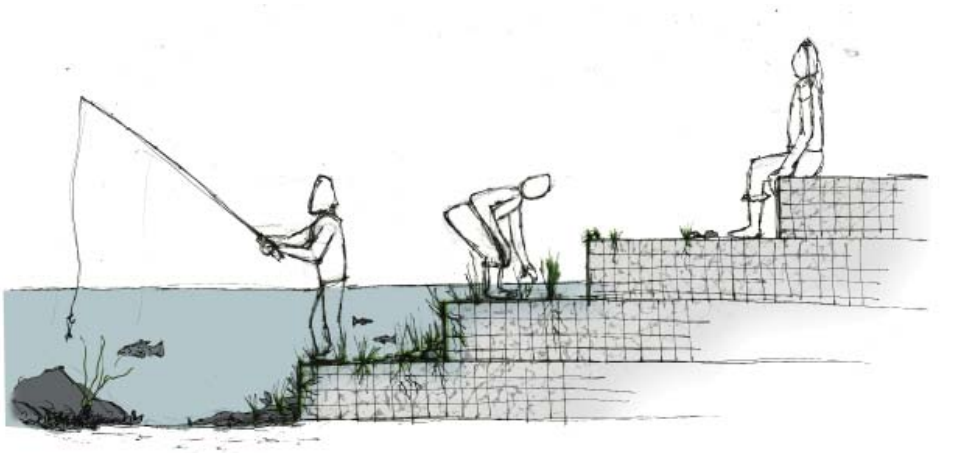
PROS: TIDAL FLUCTUATIONS HIGHLY VISIBLE
POTENTIAL FOR MULTIPLE PLANT HABITAT TYPES
MOST CALM WATER AREAS FOR AQUATIC WILDLIFE
MULTIPLE GATHERING AREAS
PERMEABLE SHORELINE

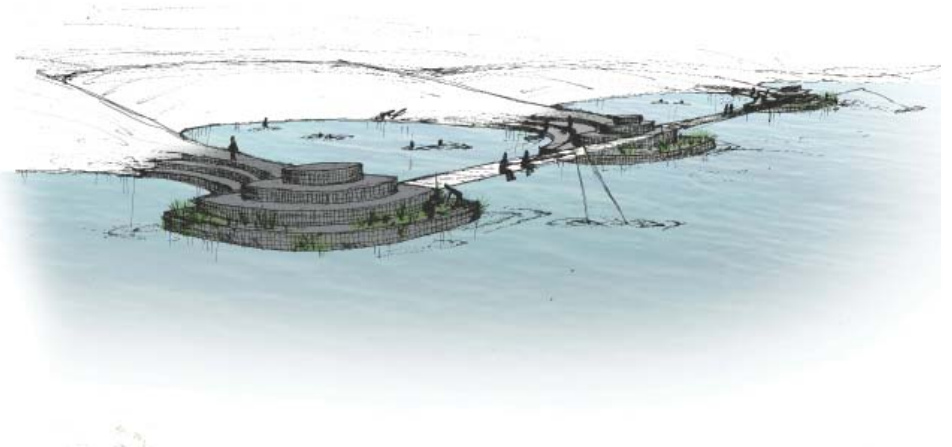
CONS: WOULD REQUIRE MULTIPLE BRIDGES TO ACCESS

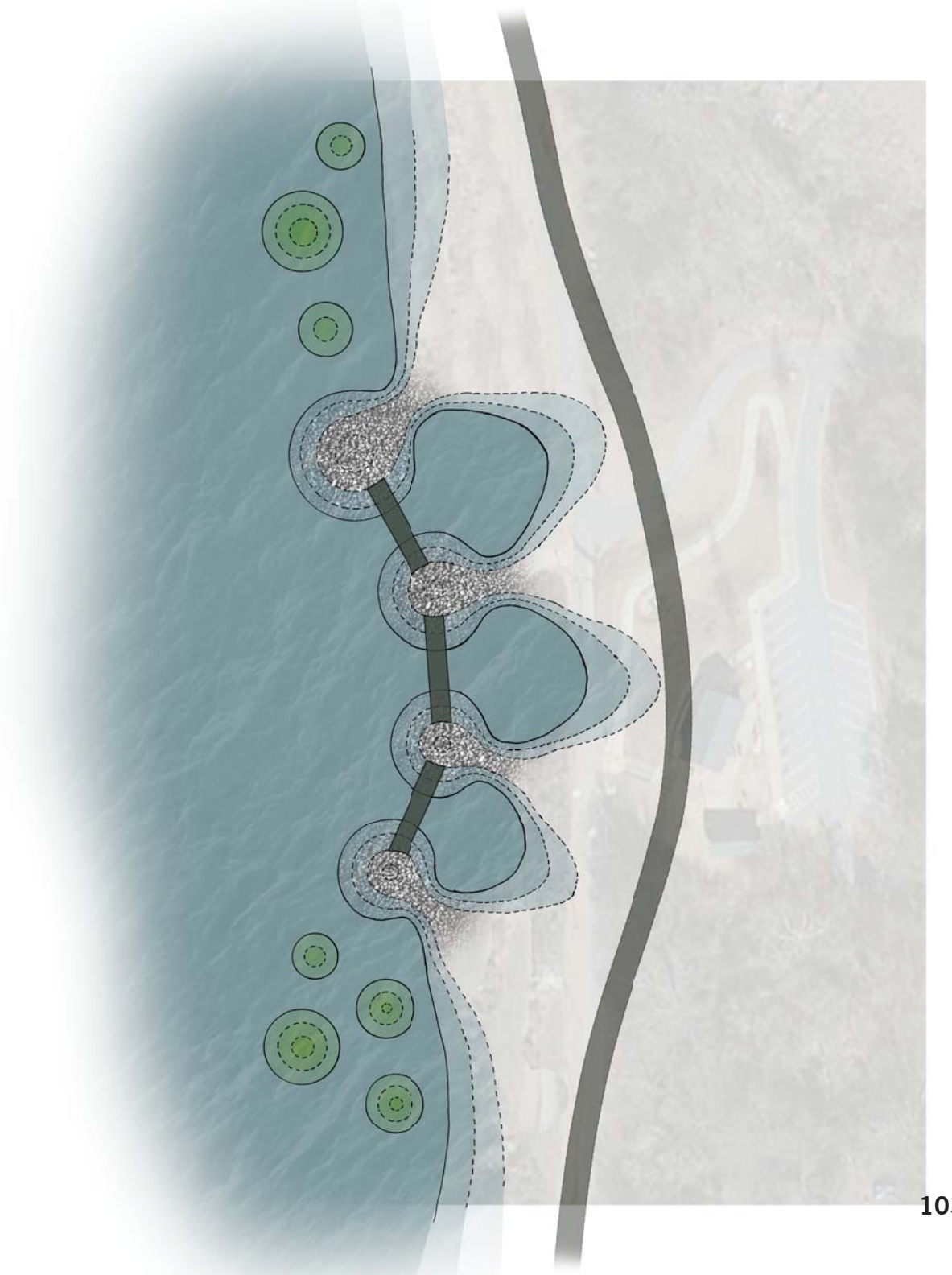


GABIONS + EXCAVATION

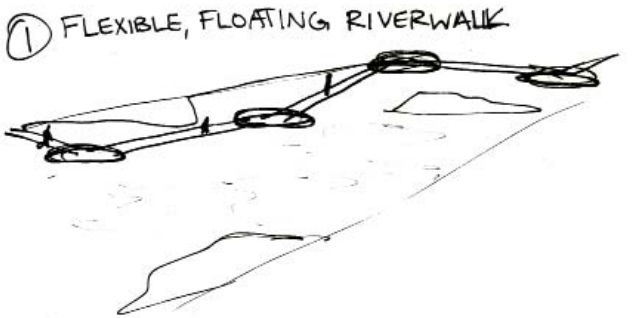
Gabion walls as tools of grade change was a concept explored very early in the thesis process. These investigations revealed the porosity and capability of gabions to catch sediment while accommodating water flow. However, it was also discovered that these designs did not relate well to the site, and that perhaps a more bottom-up approach such as initial conditions should be used.

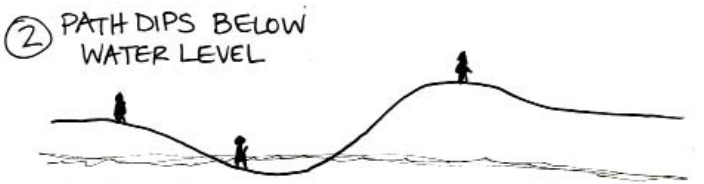


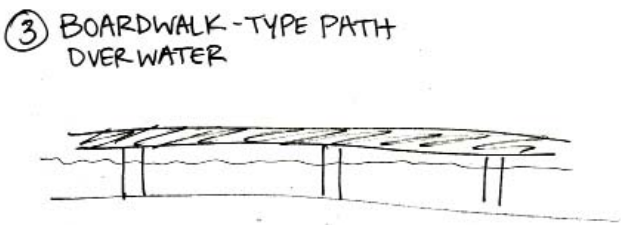


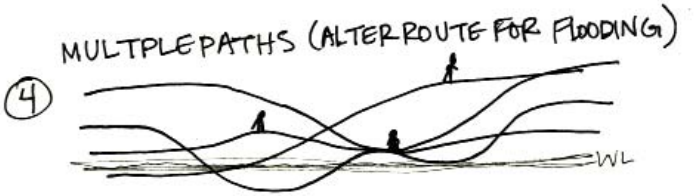


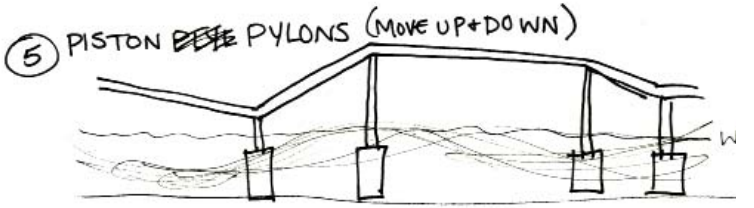
SHIFTING PATHS







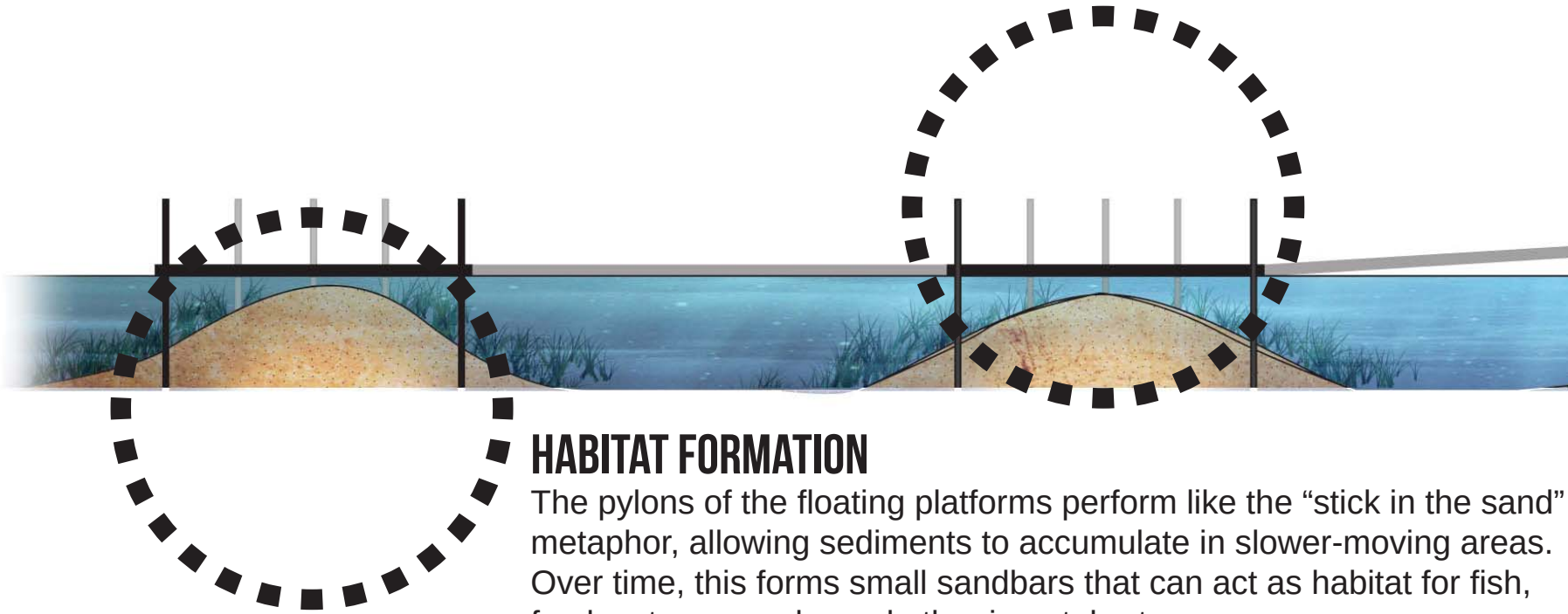




A desire to make river currents legible without actually having to be in the water spurred the generation of these schematic drawings and design. A series of floating pathways would be anchored at several points, but would be allowed to shift and rise with the water flow in other areas. Through these investigations, it was realized that demarcating “human zones” with pathways was further separating humans from the river. This led to the elimination of the RiverWalk in my final design, as it did not lend itself to the porosity and ecological democracy that was the goal of the project.

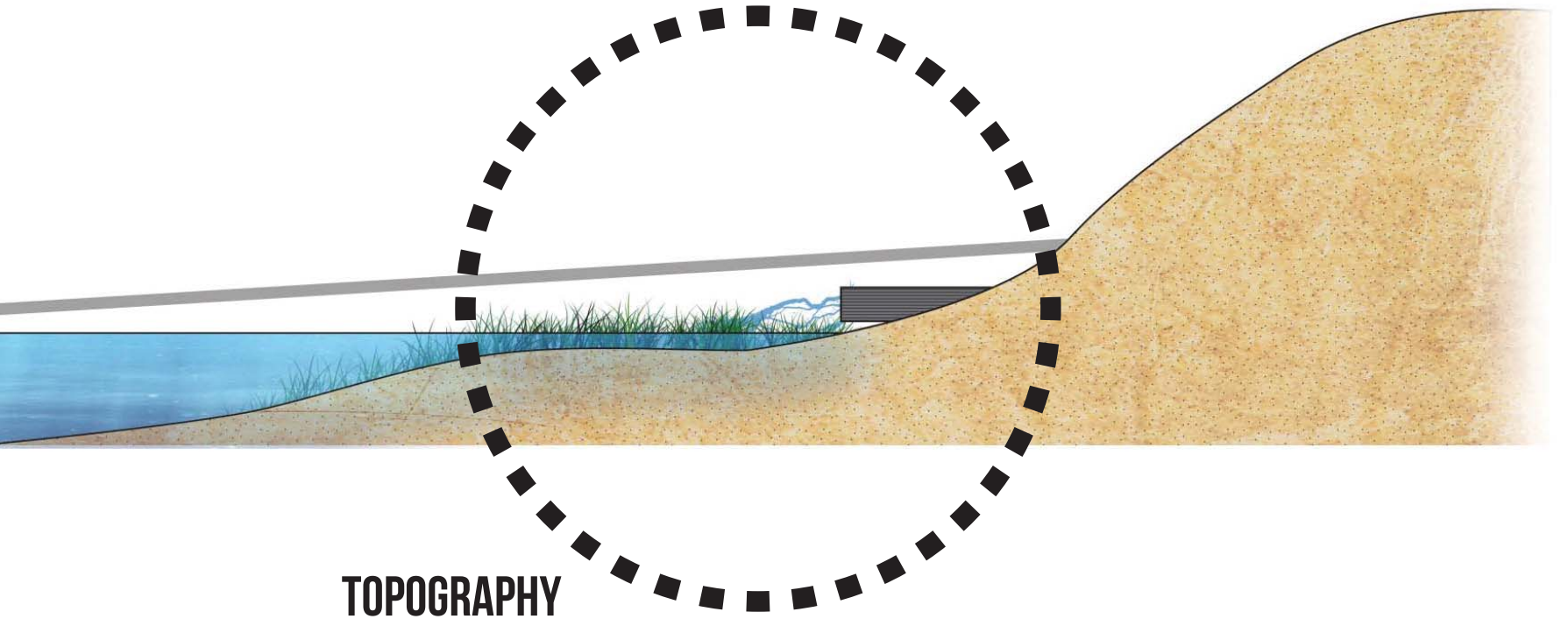
SHIFTING GROUND

Shifting ground explorations brought about the concept of initial conditions design. Using the “right sticks in the right sand” to unravel and set up a system of self-organization is a method that continued throughout the thesis process.



HABITAT FORMATION

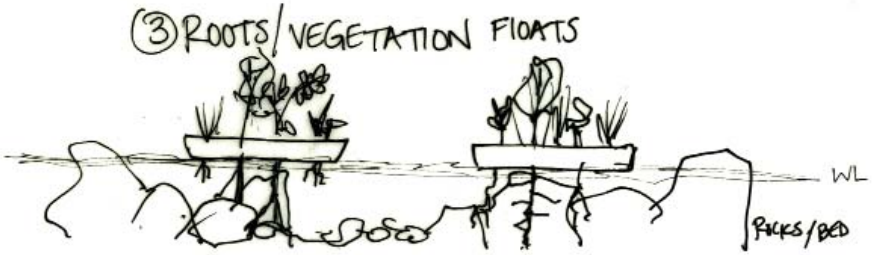
The pylons of the floating platforms perform like the “stick in the sand” metaphor, allowing sediments to accumulate in slower-moving areas. Over time, this forms small sandbars that can act as habitat for fish, freshwater mussels, and other invertebrates



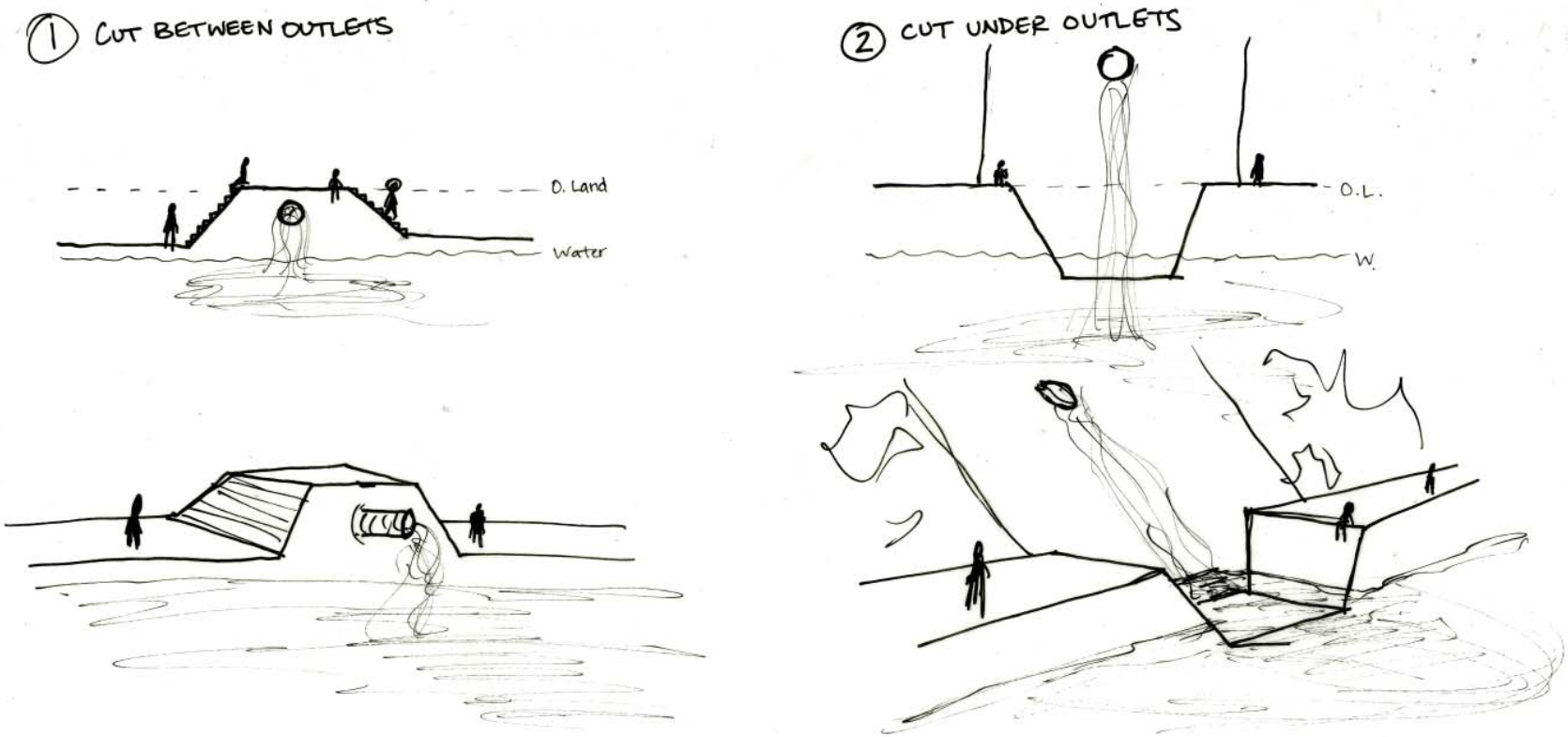
TOPOGRAPHY

Topographical manipulations around stormwater discharge points can alleviate the current overflow and sediment pollution problems from upland stormwater. Instead of perpetually placing more and more riprap, stabilizing the banks, and overflowing over the existing pathway, these areas of confluence will be allowed to erode or deposit, shaping the riverbank themselves.

ANCHOR POINTS

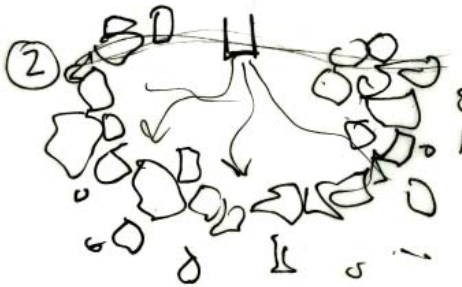


Mathur and da Cunha's theory of anchor points involves elements that are rooted within the landscape. They shift slightly, but mostly remain constant as other factors transfer and change around them. This idea was eventually translated into the field of gabion walls, allowing the landform to move around it. Earlier concepts of anchor points in this thesis are included in these sketches, analyzing the abilities of infrastructure, built structures, and rocky shoals to serve as anchors in the landscape.


1 CUT BETWEEN OUTLETS
O. Land
Water
2 CUT UNDER OUTLETS
O.L.
W.
3 BOTH

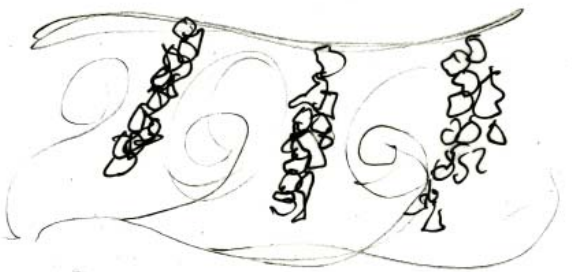
(1) SHOALS RELOCATED TO OUTLETS

(2)



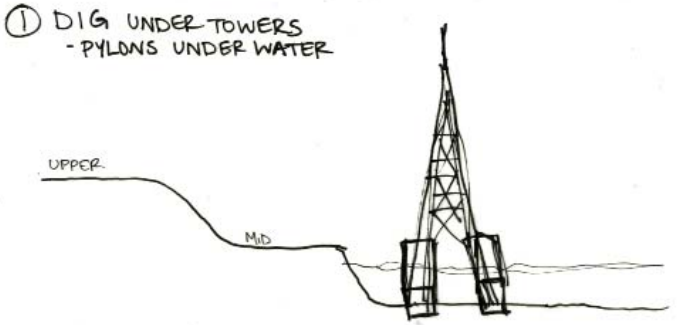
SHOALS IN RING AROUND OUTLETS

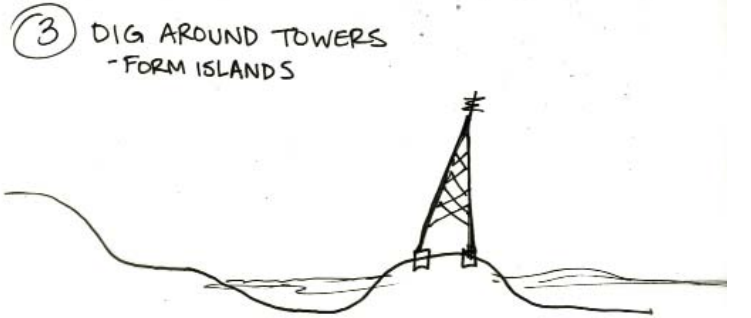
(3) SHOALS BECOME LINEAR

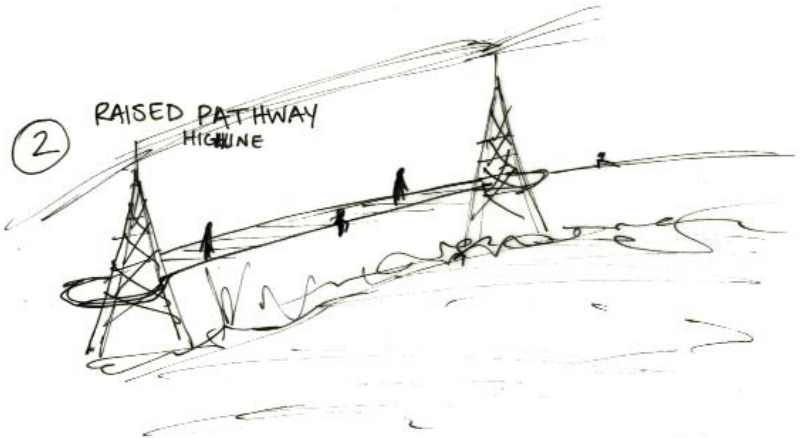


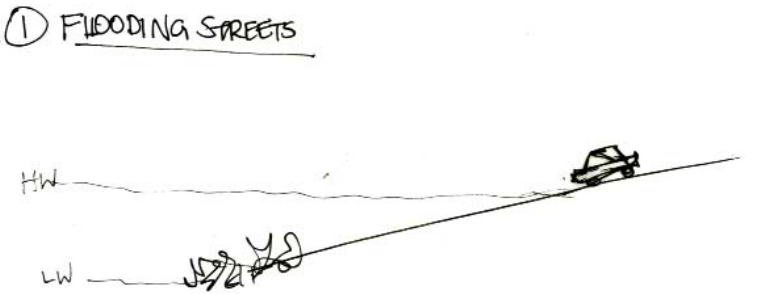
(4) SHOALS AS LEVEL CHANGE

SECTION


1 DIG UNDER TOWERS
- PYLONS UNDER WATER
UPPER
MID


3 DIG AROUND TOWERS
- FORM ISLANDS


2 RAISED PATHWAY
HIGHLINE


1 FLOODING STREETS
HW
LW


2 ELEVATED STREETS
WL

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IMAGE CITATIONS

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