NEW JERSEY
PENNSYLVANIA
MARYLAND
VIRGINIA
NORTH CAROLINA
SOUTH CAROLINA
GEORGIA
ALABAMA
MISSISSIPPI
LOUISIANA
TEXAS
FLORIDA

APPALACHIAN TRAIL
EXISTING GAS CORRIDOR
PROPOSED SABAL TRAIL





# | ECO | REVELATORY DESIGN

Making legible the local implication of a national energy infrastructure.

*Para mi Familia.*

*To my Family.*

**Gabriela Arevalo**

**Auburn University**

**Master of Landscape Architecture**

**2016**

# ABSTRACT .

This year The National Park Service is celebrating its 100-year anniversary. Since the creation of the first National Park America has shown its interest in preserving and protecting the nation's cultural and natural resources. Consequently, ideas like Yellow Stone National Park or the Appalachian trail responded to one radical idea that has evolved into a cohesive national effort to maintain the natural world and its relationship with humans. These decisions were a direct consequence to the notion that people have about "nature" or "wilderness" at that time. They are always trying to find new areas to protect. In this rapidly changing world, where environmental concerns and resources management are a matter of the utmost importance, generating a new radical idea about nature-human relationship is needed. This is the moment to consider other types of landscapes (that are highly manipulated by and for humans) as sublime and beautiful places.

Extraction sustains our society; cities rely on energy but we are disconnected from the landscapes that are being exploited in order to yield that energy. As the world population increases, urban areas or consumption landscapes expand correspondingly but spatially removed from landscapes of extractions. As a result, a vast area of earth is being exploited, and the network to transport those resources is growing as well. Meanwhile, our relationship to energy landscapes recedes ever further from daily view.

The USA government is investing in the development of other types of renewable energies regimes like solar and wind on vast stretches of landscape all across American West. (Bureau of Land Management). This shift is an opportunity for designers to rethink landscapes of energy regimes with the goal of generating a shift in the way humans interact with these places. Americans, in particular, are the biggest consumers of electricity and thus produce more harmful greenhouse gases that can accelerate global climate change (Revkin). This is the reason why creating value in places of extraction transmission and consumption can generate a change.

Considering utility corridors as part of the Park National Service, is an important and radical idea that can provide a great amount of land to the benefit of humans and other species. In an attempt to reexamine the use of utility corridors, this study explores the possibility of creating a regional hiking Armature for people that want to experience a new idea of nature and wilderness, and its relationship with energy infrastructure regimes. The trail is designed as an ecologically landscape that, when viewed and experienced holistically can mediate the disparity between postcard nature, real nature, and manipulated nature by creating spaces that reveal more nuanced understanding of wilderness and energy regimes infrastructure landscapes. Once the idea of a utility corridor has been determined, it is necessary to think about what kind of experience the visitor should have in order to generate an impact on interaction of people with natural resources and landscapes of energy regimes. In order to accomplished a ground breaking experience that will influence that change of perspective this thesis studies transmission landscapes through the lens of revelatory design with the purpose of making legible the local implication of a national energy infrastructure. In the state of Alabama, the Sabal Trail, a 515-mile proposed Interstate underground pipeline which crosses different ecosystems of various land-uses and ecological conditions, is the ground for exploration. This local example is an opportunity to test the ideas. This thesis in a one year investigation that explores different strategies of revelatory design to show the local implications of energy Regimes.

# CONTENTS .

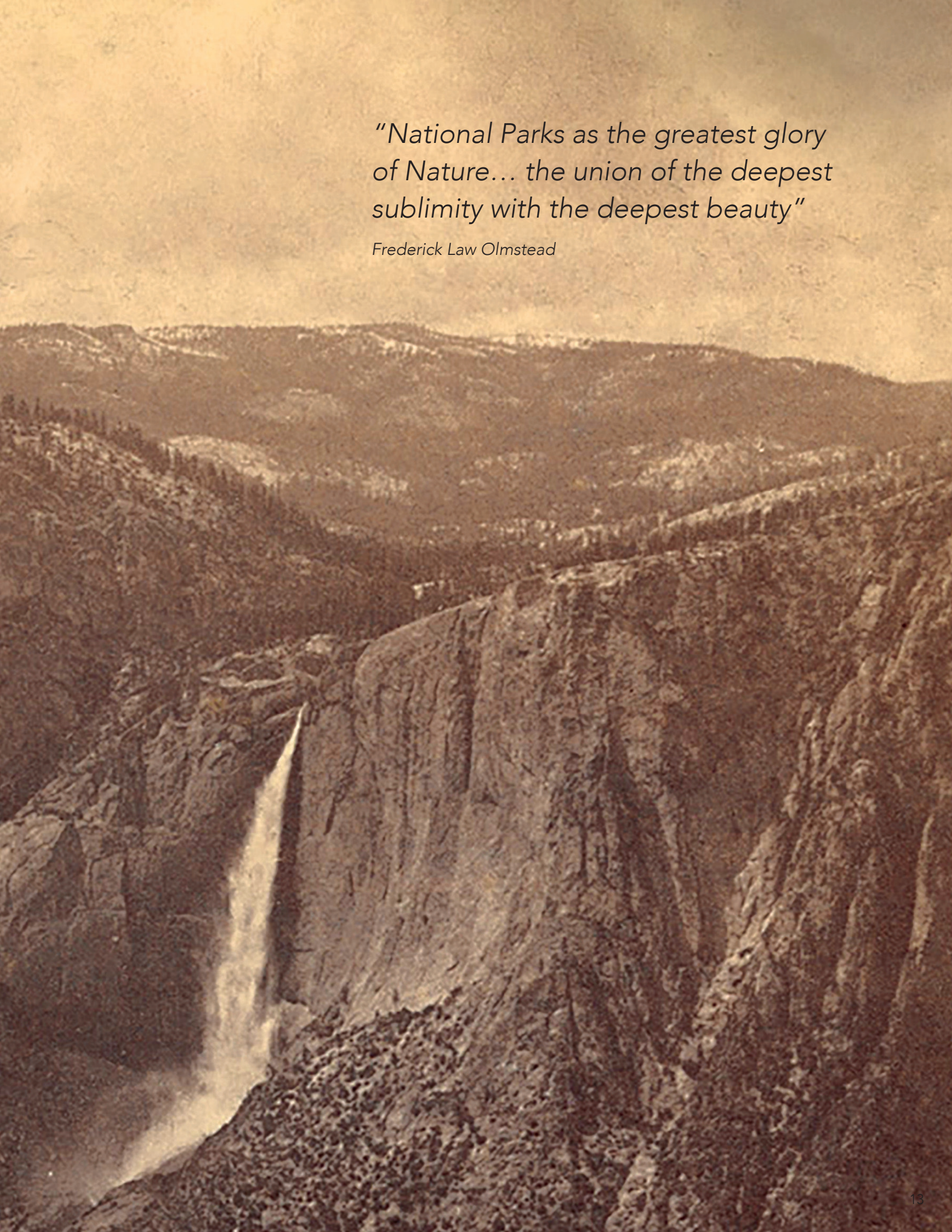
# PART 1 **[RATIONALE]**

Current Situation

# [RATIONALE]
# National Parks, Humans, and the Wild.

The National Parks. America's best idea and The need for challenging thoughts. This year The National Park Service is celebrating its 100-year anniversary. Since the creation of the first National Park America has shown its interest in preserving and protecting the nation's cultural and natural resources. Consequently, ideas like Yellow Stone National Park or the Appalachian trail responded to one radical idea that has evolved into a cohesive national effort to maintain the natural world and its relationship with humans. These decisions were a direct consequence to the notion that people have about "nature" or "wilderness" at that time. Landscape architects historically have been the pioneers of these thoughts. As an example, Frederick Law Olmstead, wrote on 1864: "Yosemite is the greatest glory of Nature… the union of the deepest sublimity with the deepest beauty" (The National Parks Film Project, 2009). He started acknowledging the value of this Land even before it was declared as Protected. Similar; John Muir, the promoter of the idea stated that "Wilderness is a necessity" for a spiritual connection. (The National Parks Film Project, 2009). In recent years, our relationship with Nature has changed. Modern ecological theory developed by Frederic Clements, Eugene Odum (1913-2002) Howard Odum (1924-2002), Lynn White (1967), William Cronon (1995), among others have influenced landscape architects understanding of natural processes and its relationship with human processes. As a consequence, professionals as Emma Marris in her book Rambunctious Garden (2011) started unfolding the new idea of wildness in the modern world. Marris supports novel ecosystems which are entirely new arrangements of plants and animals fostered by human design or human intervention. Instead of the conservationist idea that was promoted before, she proposes a nuanced idea of ecosystems and how humans affect these processes. Although there has been an ideological evolution regarding national parks, the parks have always provided an insight of sublime and beautiful landscapes, therefore it has changed the way people interact with the natural world. The National Park Service nowadays manage 84 million acres: 85.00 miles of perennial rivers and streams, 43.000 miles of shoreline, 27.000 historic structures, 68000 archeological sites. They are always trying to find new areas to protect. In this rapidly changing world, where environmental concerns and resources management are a matter of the utmost importance, generating a new radical idea about nature-human relationship is needed. World's contemporary issues are mostly related to a culture of waste and misuse of the earth resources which result from the lack of a connection between humans and natural environments. People have realized that even landscapes that look completely natural are manipulated. In that sense, going out to the "wilderness" is a valuable experience but it is not enough to change perspectives. Thoreau's had romantic idea about the wild. In his essay "Walking" (1862), he expressed the need to go to experience it out there. "I wish to speak a word for Nature, for absolute freedom and wildness, as contrasted with a freedom and culture merely civil—to regard man as an inhabitant, or a part and parcel of Nature, rather than a member of society". Contrary to this thought William Cronon says "If wildness can stop being (just) out there and start being (also) in here, if it can start being as humane as it is natural, then perhaps we can get on with the unending task of struggling to live rightly in the world—not just in the garden, not just in the wilderness, but in the home that encompasses them both." 1995. This is the moment to consider other types of landscapes (that are highly manipulated by and for humans) as sublime and beautiful places. In this sense, landscapes related to Energy regimes are worthy to be studied and reconsidered. More recently, people have started to show interest as is the example of Ken Ilgunas, who hiked the1,700-mile proposed Keystone Pipeline in 2014. He describes the richness of the culture and diversity of ecosystems that he encounters while walking this corridor.

Figure 1. Tourist at Glacier Point, Yosemite National Park, c. 1902



*"National Parks as the greatest glory of Nature… the union of the deepest sublimity with the deepest beauty"*

*Frederick Law Olmstead*

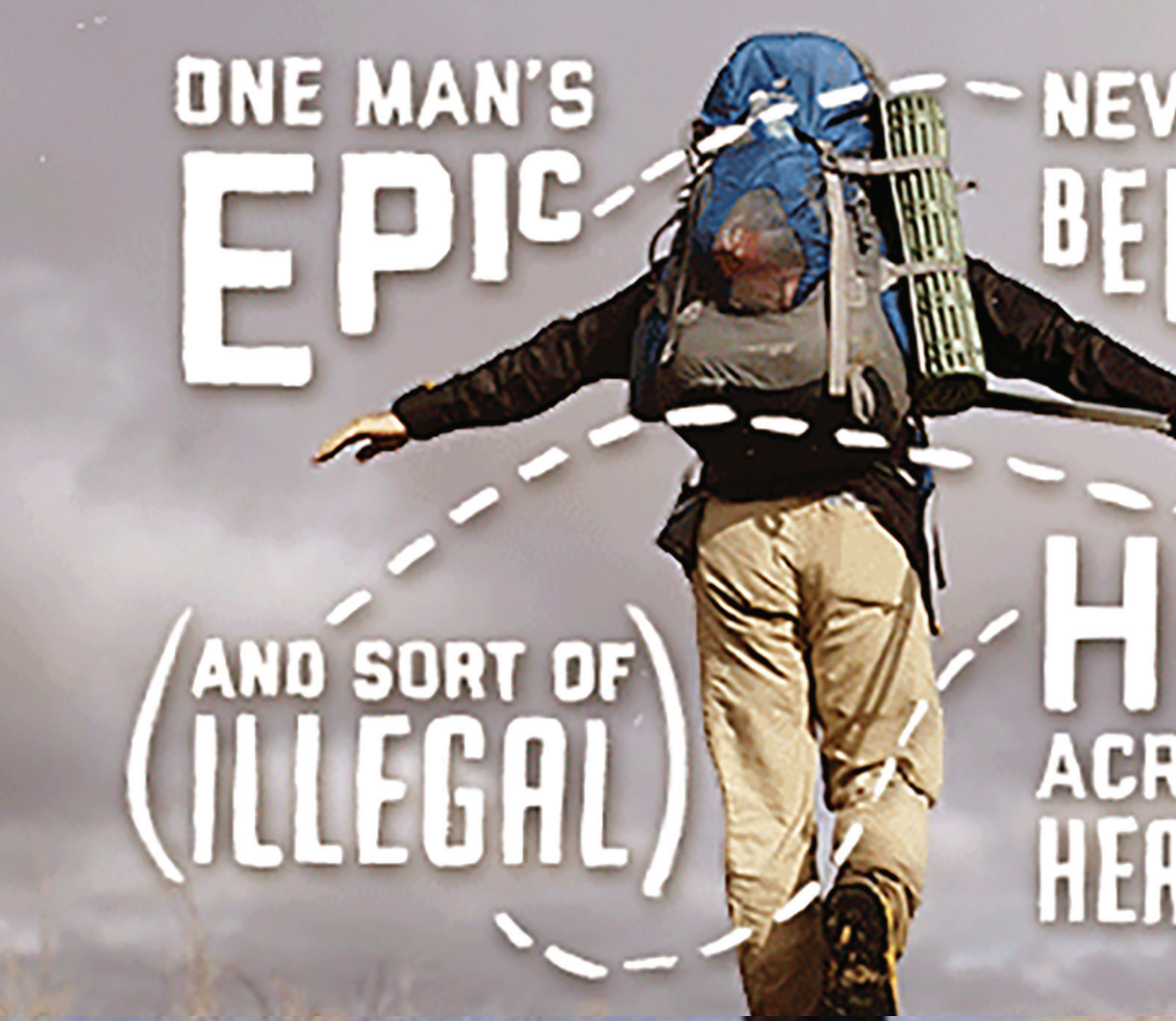



Figure 2: Ken Ilgunas. Walden on Wheels. 2013.

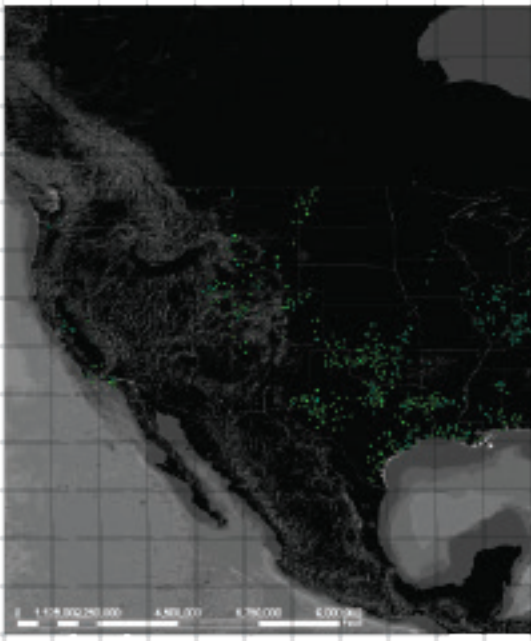

*"This is the moment to consider other types of landscapes (that are highly manipulated by and for humans) as sublime and beautiful places"*

*Gabriela Arevalo*

Figure 3.

Figure 4.

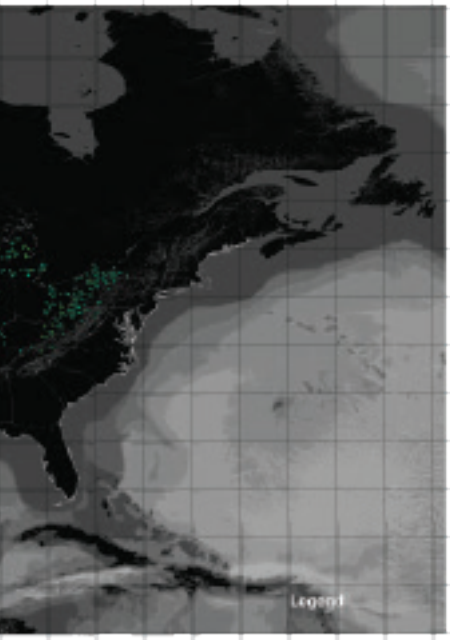
Figure 5.

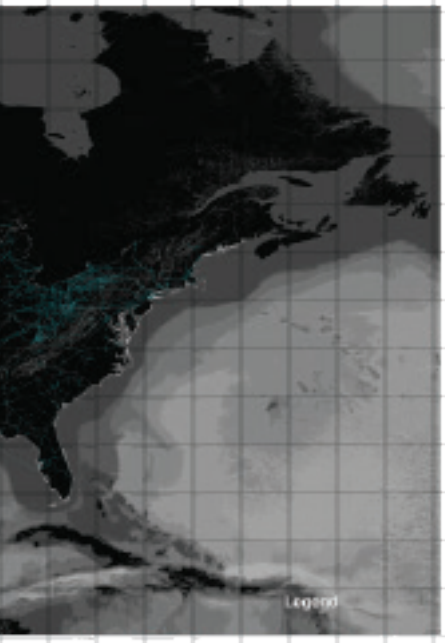


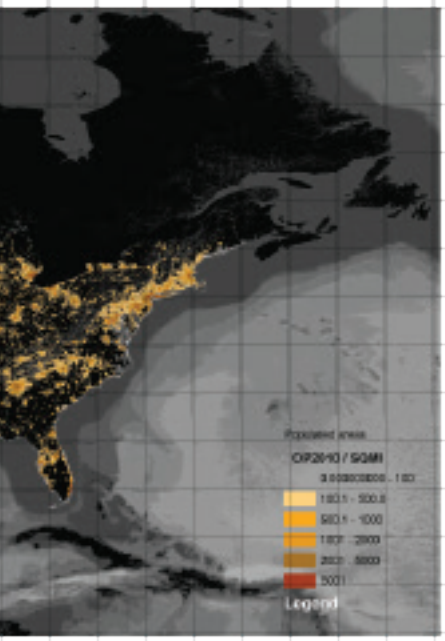
Natural Gas Deposit Areas

Natural Gas Pipeline Network

USA Most Populated areas







# [RATIONALE]
# Energy Regimes: Extraction, transmission and consumption landscapes

Extraction sustains our society; cities rely on energy but we are disconnected from the landscapes that are being exploited in order to yield that energy. How can we make visible landscapes of extraction, transmission and consumption when they are so far from each other but still connected? Contemporary cities need to create meaningful connections with this type of landscapes. According to the United Nations Conference on Trade and Development "Extractive industry can be defined as processes that involve different activities that lead to the extraction of raw materials from the earth (such as oil, metals, mineral and aggregates), processing and utilization by consumers." (United Nation, 2012). Recently, Landscape architecture practice has been interested in places of extraction due to the way this process has shaped the landscape physically, making evident that energy production consumes not only natural resources but also the territory itself. Projects like Keystone XL pipeline, in sum with the Kyoto Protocol and similar international treaties have raised awareness among politicians, general public, constructors, and designers, creating an opportunity to question if the practice understands clearly these kinds of spaces and the spatial framework of material exchange. But is is undeniable that we need to focus not only on extraction places but also on the network of infrastructure needed. As the world population increases, urban areas or consumption landscapes expand correspondingly but spatially removed from landscapes of extractions. As a result, a vast area of earth is being exploited, and the network to transport those resources is growing as well.


Meanwhile, our relationship to energy landscapes recedes ever further from daily view. Stephanie Carlisle and Nicholas Pevzner in the last issue of Scenario Journal state that "It is fashionable these days to take great interest in where our food and beer comes from, yet we actively ignore the sources of far more impactful (and necessary) materials. We prefer that hazardous raw materials come from somewhere far away." (Carlisle, Pevzner. 2015) The world is facing a time where reducing the Carbon emissions to the environment is imperative. In this note, "the United States, like other major industrialized economies, has recently committed to support a massive expansion of renewable energy as a way to meet its international carbon reduction goals" (Pevzner) Nevertheless it is evident that the mineral energy regime will continue to dominate the market. The USA government is investing in the development of other types of renewable energies regimes like solar and wind on vast stretches of landscape all across American West. (Bureau of Land Management).

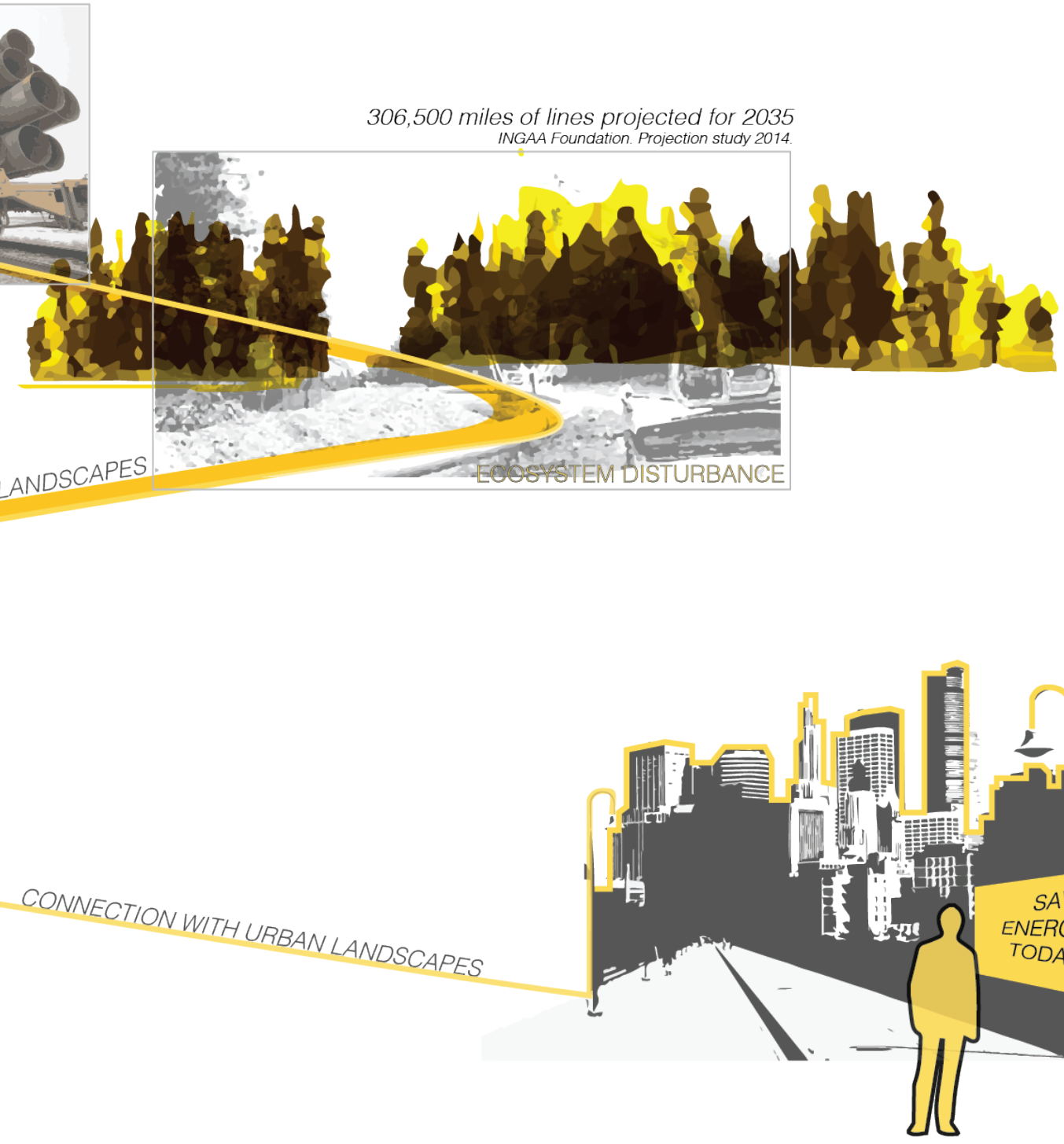



Diagram showing disconection in landscapes of extraction, transmission, and consumption of energy.

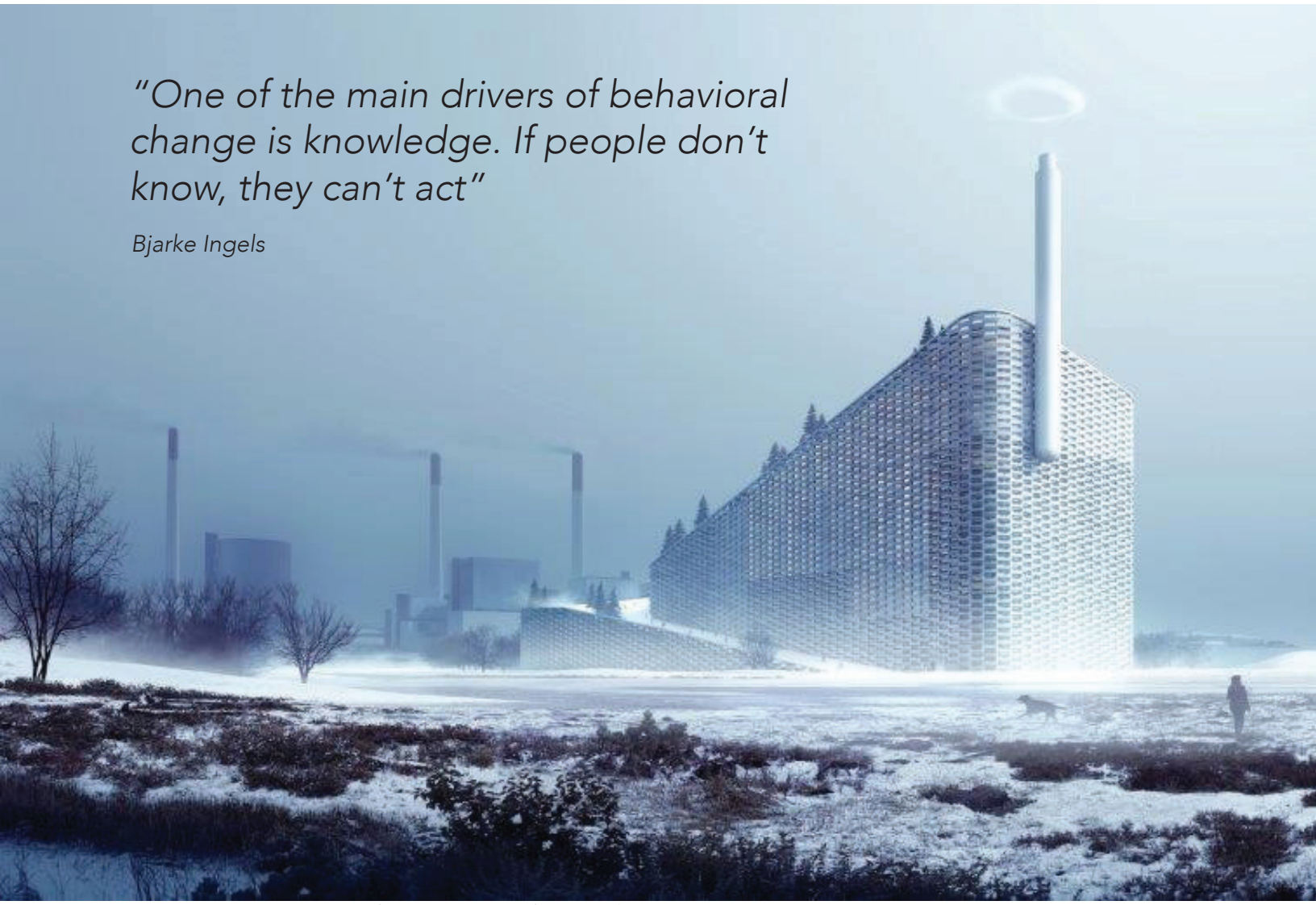
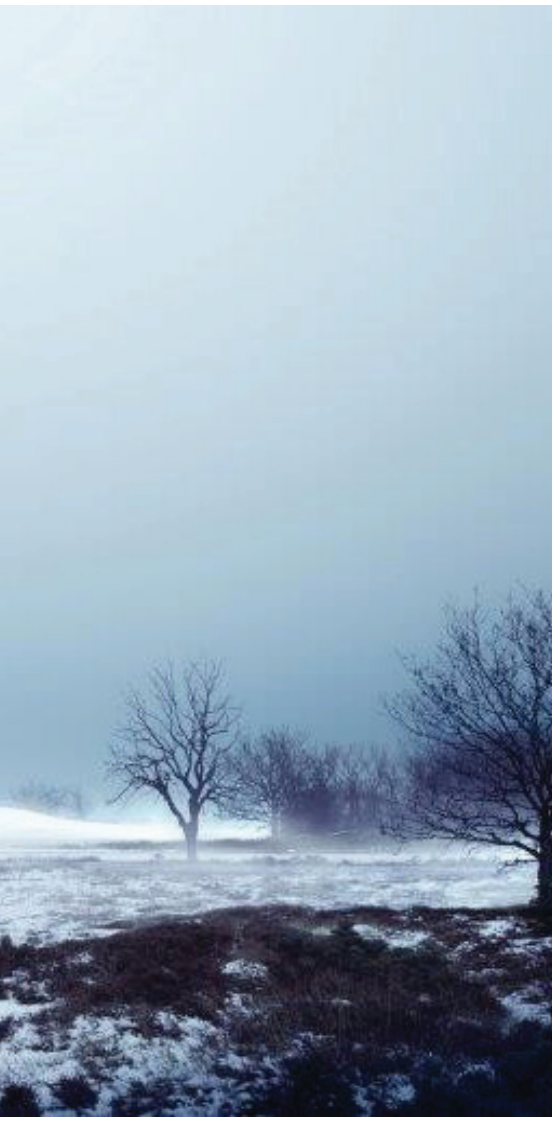



Figure 6. Dezzen Magazine. BIG Ingels Waste to Energy Plan. Copenhagen.



This shift is an opportunity for designers to rethink landscapes of energy regimes with the goal of generating a shift in the way humans interact with these places. Americans, in particular, are the biggest consumers of electricity and thus produce more harmful greenhouse gases that can accelerate global climate change (Revkin). This is the reason why creating value in places of extraction transmission and consumption can generate a change. Designers are already addressing this issues as is the example of Amager Bakke's waste-to-energy Plant in Copenhagen by Big Ingels Group. It serves not only as an energy infrastructure but also as an environmental learning tool.  It emits white smoke rings "to communicate to city-goers that it's not perfect, that the environment is still affected by its CO2 emissions" So citizens know that 5 smoke rings = one ton of CO2 release to the atmosphere. As Bjarke Ingels comments in his lecture for Going Viral: "One of the main drivers of behavioral change is knowledge. If people don't know, they can't act." (Dezeen Magazine)

Figure 7. Pipeline Material transportation.

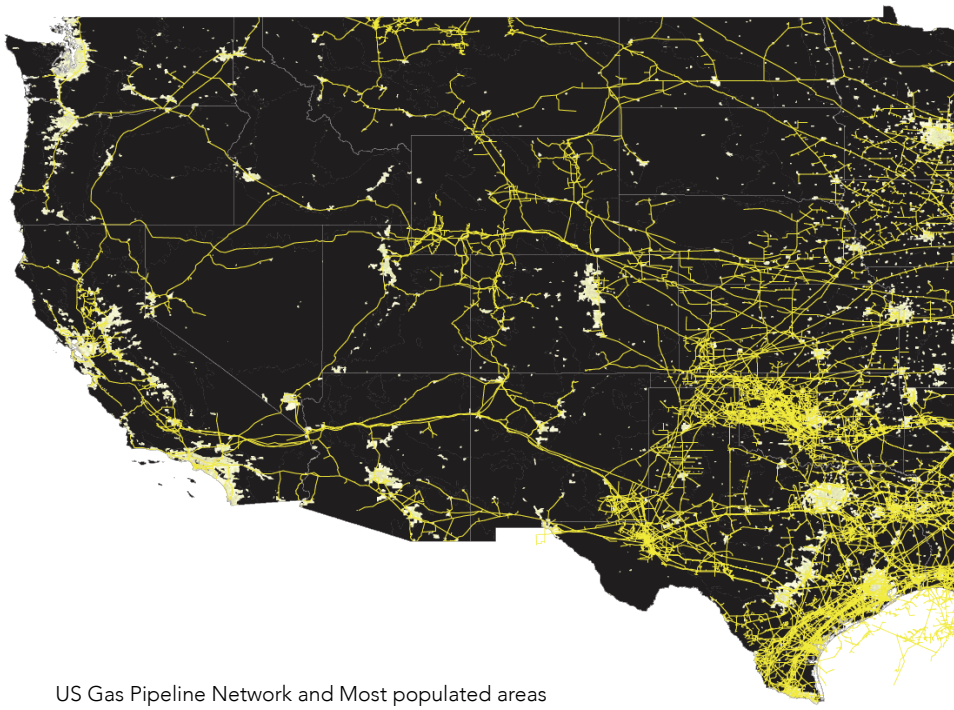
# Landscapes of transmission

*Natural gas consumption in the United States is projected to increase by an average of 1.2 percent per year through 2030*

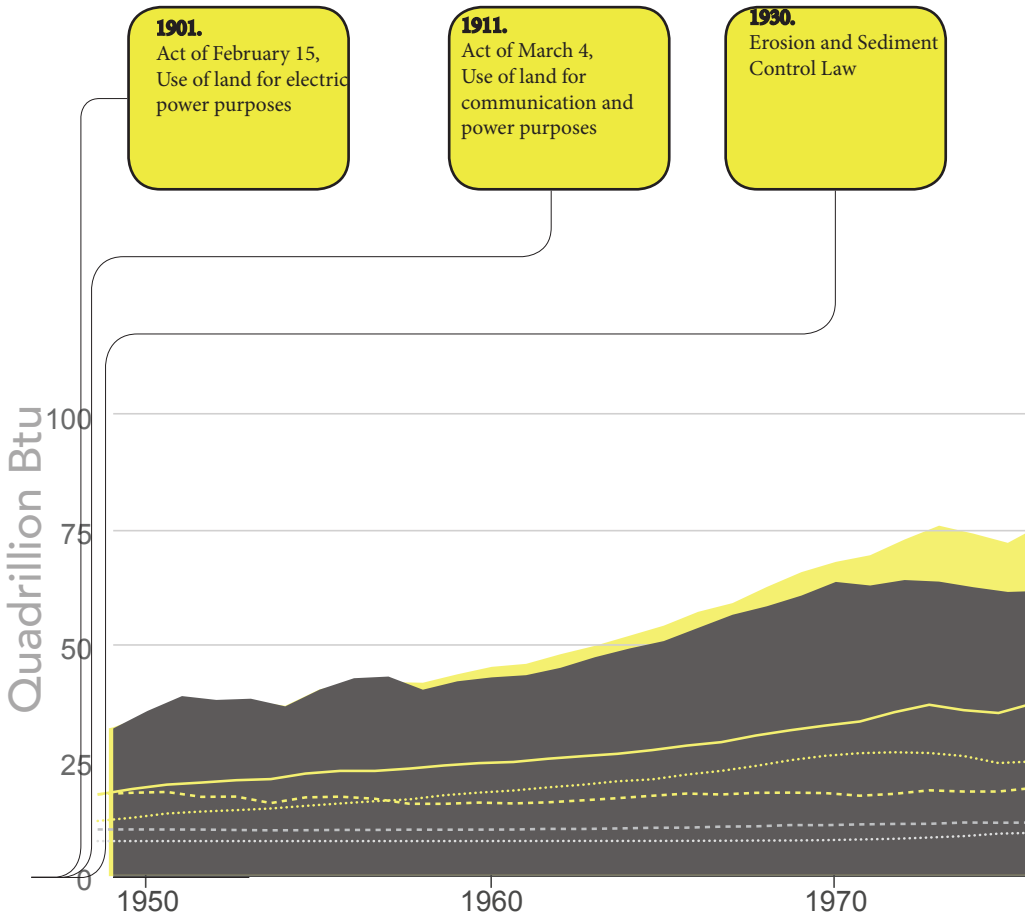
**28900 to 61600**
**miles of additional gas pipeline**

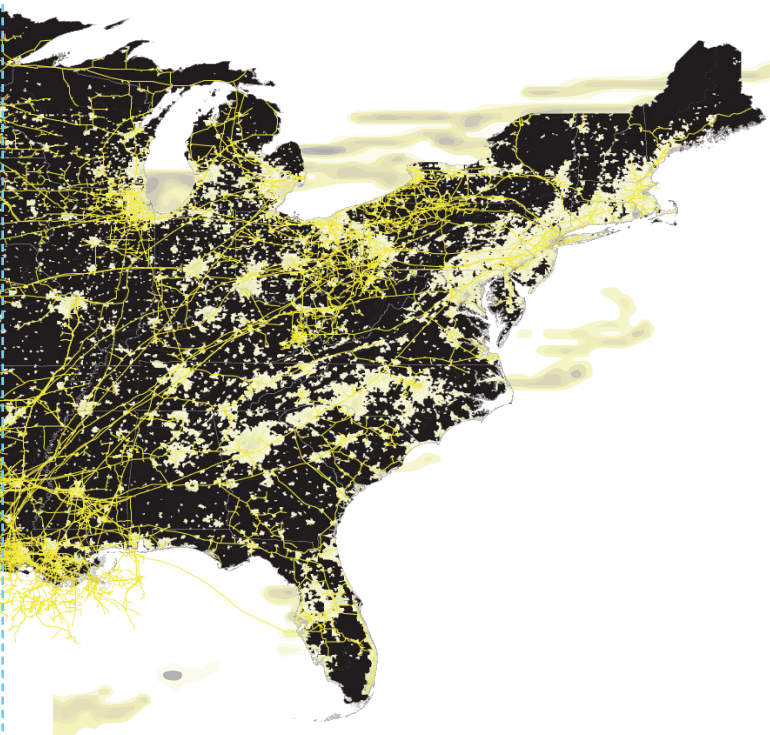
# [RATIONALE]

Considering utility corridors as part of the Park National Service, is an important and radical idea that can provide a great amount of land to the benefit of humans and other species. America's energy source is shifting from Coal to Natural Gas because it is a cleaner alternative; it has fewer impurities, is less chemically complex, and its combustion generally results in less pollution. (American Gas Association). The emission savings from replacing coal with gas by 2020 will be 150 million tons of CO2. (Battle group. EPA) In this context new natural gas supplies entering the interstate pipeline system will require additional pipeline capacity. "Natural gas consumption in the United States is projected to increase by an average of 1.2 percent per year through 2030, which is reflected by 28900 to 61600 miles of additional gas pipeline projected to be constructed in the same period. The southeastern United States is the first region with the largest increase in gas use." (INGAA Foundation, 2014). In this context, this landscape typology will increase rapidly and yet, landscape architecture has not developed a substantial impact on the use of it. There are a few unbuilt projects that have proposed the use of gas and oil pipelines as recreational trails. Scenario Journal: Extraction, explains how process of extraction of a range of materials and immaterial substances are affecting the shape of the landscape. It points out the importance of connecting landscapes of extraction and consumption, and describes pipelines as "dynamic networks of transportation". Pipelines are considered a physical connection between places of extraction and consumption which allow to engender a new ecological and social opportunity by revealing processes occurring on transmission landscapes that has not been yet explored in terms of our profession.



US Gas Pipeline Network and Most populated areas
This landscapes are highly connected.





## "One of the qualities of corridors is their permanence on the landscape"

William Curry, The Laurel Hill Study

**1973.** P.L. 93-153, Transportation of oil, natural gas, synthetic liquid, or gaseous fuels, and refined products

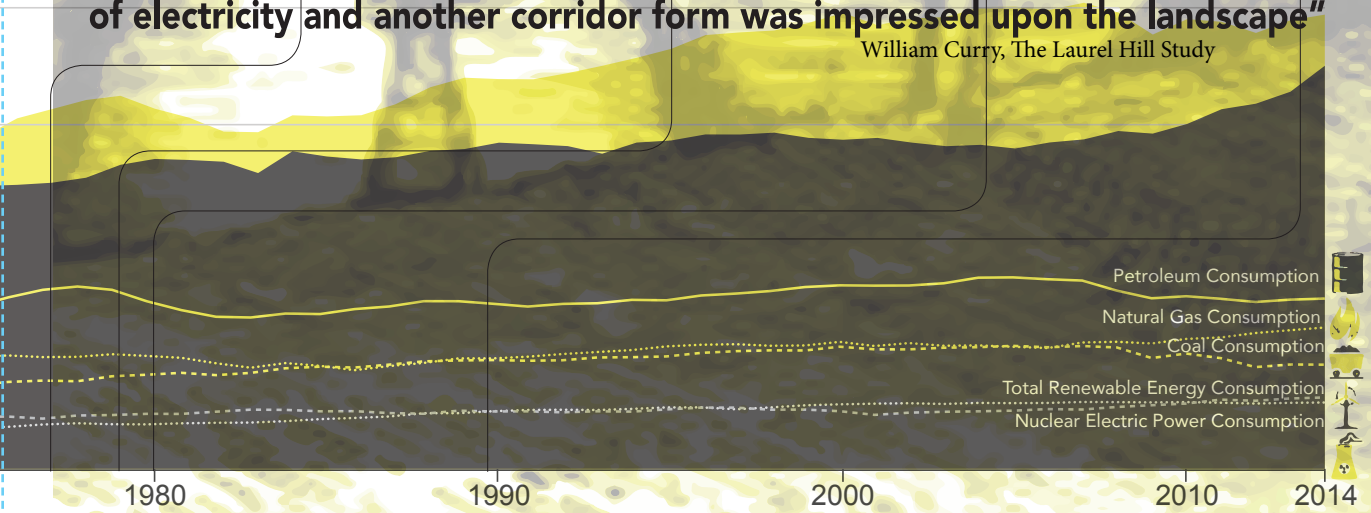
**1975.** Code of Alabama. Chapter 4, and chapter 14.

**1976.** The Federal Land Planning and Management act, and the National Forest Management Act.

**1986.** Western Regional Study

## "Growth in America's energy appetite justifies the economics of mine mouth generation of electricity and another corridor form was impressed upon the landscape"

William Curry, The Laurel Hill Study




y Energy Consumption

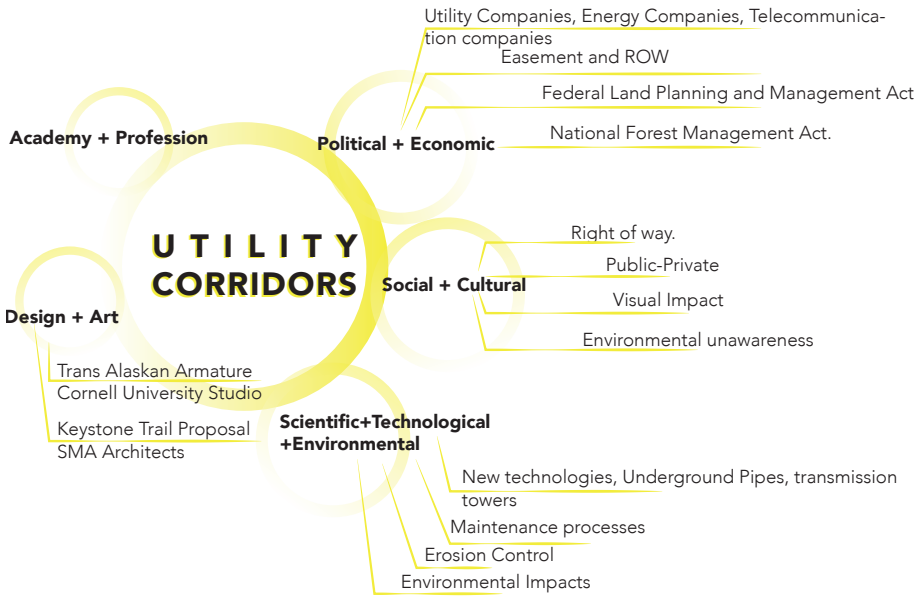
# PART 2 **[AIMS]**

The Gap in the discipline

# [AIMS]

## Hiking Utility corridors, a new radical idea

In an attempt to reexamine the use of utility corridors, this study explores the possibility of creating a regional hiking Armature for people that want to experience a new idea of nature and wilderness, and its relationship with energy infrastructure regimes. The trail is designed as an ecologically landscape that, when viewed and experienced holistically can mediate the disparity between postcard nature, real nature, and manipulated nature by creating spaces that reveal more nuanced understanding of wilderness and energy regimes infrastructure landscapes. The project claims to be a Landscape observatory of Energy Regimes and Wildlife. Benton MacKaye's utopian proposal "An Appalachian Trail: A Project in Regional Planning." (1921) seemed impossible at the time, but he generated enough support from several parties and now Americans can experience one of the most beautiful interstate hiking trails. It is an example of how these type of projects can be accomplished and managed. Pipelines, utility corridors, power lines, and similar energy infrastructure have the potential to become new ecological and recreational corridors, as well as an amenity for tourism, learning, and outdoor activities. Nowadays projects like the Keystone biking trail by SWA, or The Multimodal extraction/ transmission/tourism armature along the Trans-Alaska by Mike Smith (student of UPenn Studio, "Territories of Extraction," in spring 2014) show the curiosity of landscape architects and their aim to generate new thinking about utility corridors. However, this area of study needs to be further developed in our profession.




SWA Keystone KXL Pipeline Trail proposal: a cross-country bike path that would run along the same route as the pipeline, is an innovative utopian project that imagines a mix-use type of infrastructure. They claim "it's time to set a precedent for imagining infrastructure that folds into the reality of our everyday lives." (Baumgardner, 2013).

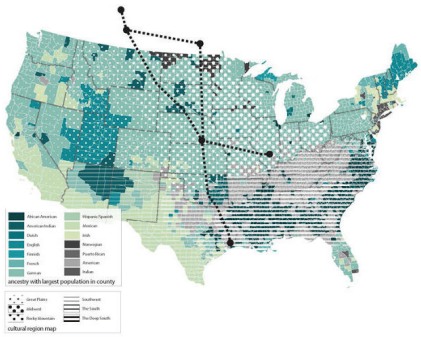


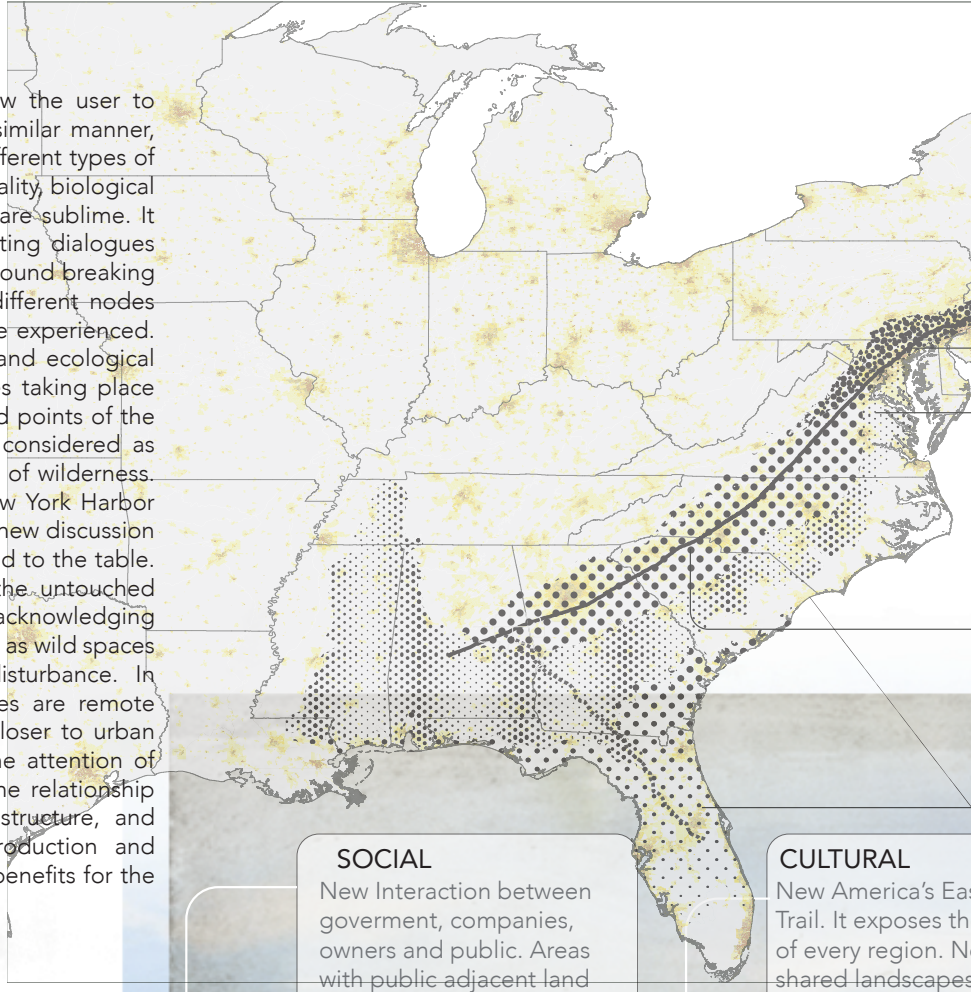
Figure 8. SWA Biking Armature

"cleared linear paths on the landscape as herbaceous openings for wildlife"

William Curry, The Laurel Hill Study

The Walking Guys
A young group of musicians walked all the way from Nashville to Atlanta to promote their music. They Used utility corridors as trails.

The Appalachian trail crosses 14 states that allow the user to experience several Ecoregions in the route. In a similar manner, as the utility corridor follows its route, it crosses different types of landscapes with specific characteristics. The materiality, biological identity, and ecological phenomena taking place are sublime. It is necessary to understand and recognize the exiting dialogues and interactions in order to create powerful and ground breaking experiences for the user. The pipeline provides different nodes with series of phenomena or moments that can be experienced. It is necessary to generate a phenomenological and ecological site inventory in order to determine the processes taking place and which of those should be amplified in selected points of the network. By interacting with the type of spaces considered as vague terrain, the user can experience a new idea of wilderness. Rob Holmes dredge's studies, and Kate Orff's New York Harbor proposals are examples of spaces that can bring a new discussion about designing and experiencing the natural world to the table. Society needs to move away from the idea of the untouched natural places as the Wilderness and should start acknowledging that even disturbed landscapes can be appreciated as wild spaces where nature takes over even after processes of disturbance. In comparison to the Appalachian trail where places are remote country areas outside cities, utility corridors are closer to urban populations. This is a benefit that can capture the attention of people. In this corridor, people can experience the relationship and interaction between nature, big scale infrastructure, and themselves as part of processes of energy production and consumption. Additionally, it can bring economic benefits for the surrounding communities.

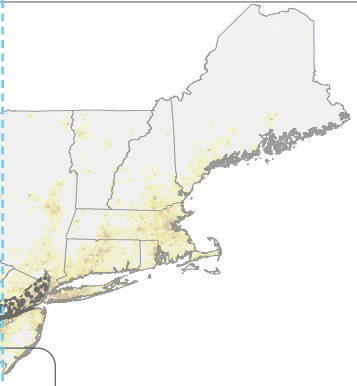


SOCIAL

New Interaction between goverment, companies, owners and public. Areas with public adjacent land uses have no boundaries.

CULTURAL

New America's Eas Trail. It exposes th of every region. N shared landscapes to native species



Northern Piedmont

Southeastern Plains

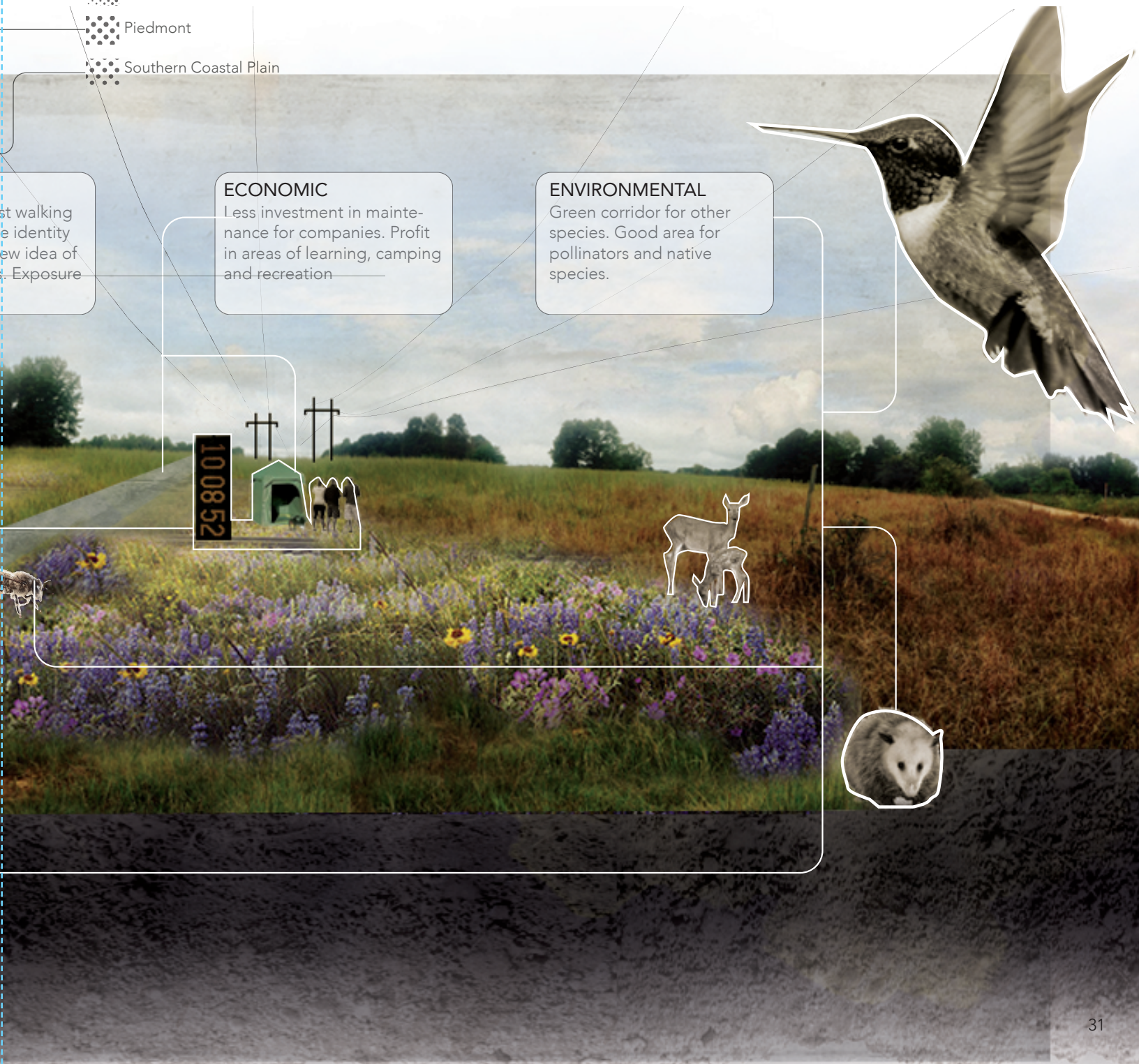
Piedmont

Southern Coastal Plain

st walking
e identity
ew idea of
. Exposure

ECONOMIC
Less investment in maintenance for companies. Profit in areas of learning, camping and recreation

ENVIRONMENTAL
Green corridor for other species. Good area for pollinators and native species.




Revelatory potential Of utility Corridors

# [AIMS]

## The Gap: Utility Corridors throught the lens of Revelatory design


Once the idea of a utility corridor has been determined, it is necessary to think about what kind of experience the visitor should have in order to generate an impact on interaction of people with natural resources and landscapes of energy regimes. In order to accomplished a ground breaking experience that will influence that change of perspective this thesis studies transmission landscapes through the lens of revelatory design with the purpose of making legible the local implication of a national energy infrastructure.

*Research question.*

*How can revelatory design make legible the local implication of a national energy infrastructure?*

#60

# LANDSCAPE JOURNAL

SPECIAL ISSUE: EXHIBIT CATALOG

Design, planning and management of the land

*Special Issue 1998*

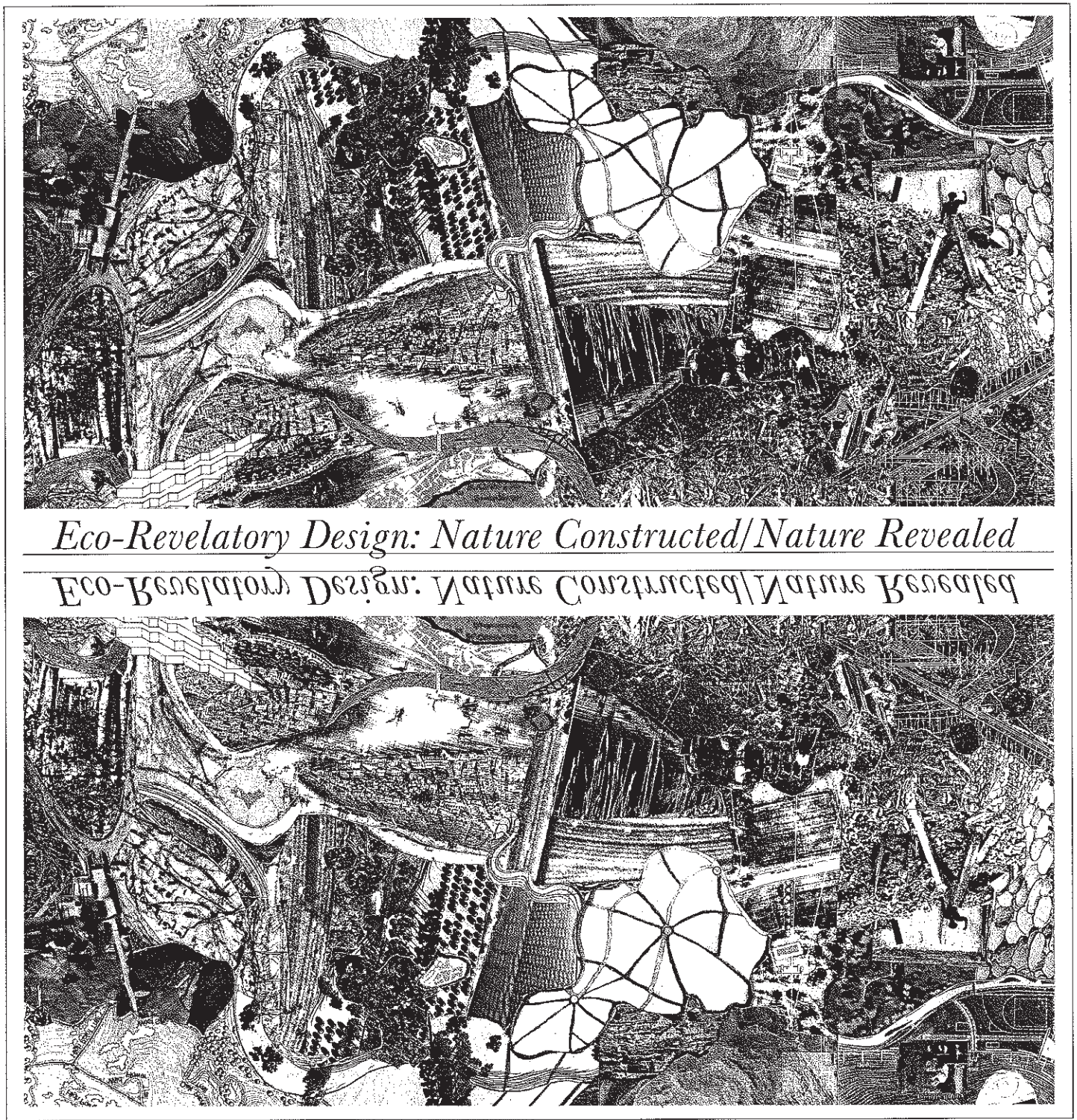





Figure 9. Eco-Revelatory Design Special Edition Cover. Landscape Journal.

# [AIMS]

## The Gap: Utility Corridors trought the lens of Revelatory design

In 1998, a group of professionals and scholars wanted to bring attention to their concern that ecological processes were separated from aesthetic and learning values by publishing a Landscape Journal and an exhibition called Eco-Revelatory Design: Nature Constructed/Nature Revealed. Eco revelatory design is defined as "a design strategy that attempts to enhance site ecosystems as well as engage users by revealing ecological and cultural phenomena, processes and relationships affecting a site". "The intention of ERD is to "connect people with the natural environment". It is a dynamic balance between natural environment and society, intended to reveal and interpret (resolve and educate the relationship between user and the designed area) and finally to provide awareness on ecological understanding. Consequently, Revelatory design is the tool to generate a more nuance understanding of this type of landscape because it can provide "moments of extreme clarity and insight with the potential to transform our consciousness and guide future actions." (Brown, 1998)

After the exhibit there were some critics in terms of the capacities of the strategy to reveal different phenomena. Brenda Brown mentions that "while water is central to many projects, only a few begin to address the complexities of its relation to geology, landforms, soil, and plants; few give much detailed attention to smaller scale intricacies and relations between plant, animal, and human life. [Also] while kinesthetic as well as visual experience is integral to many of these landscapes, fragrance and sound remain ignored or taken for granted" (Brown).


Figure 10. Urban/Transition Design: Next Generation Infrastructure. Ken McCow Students Work.

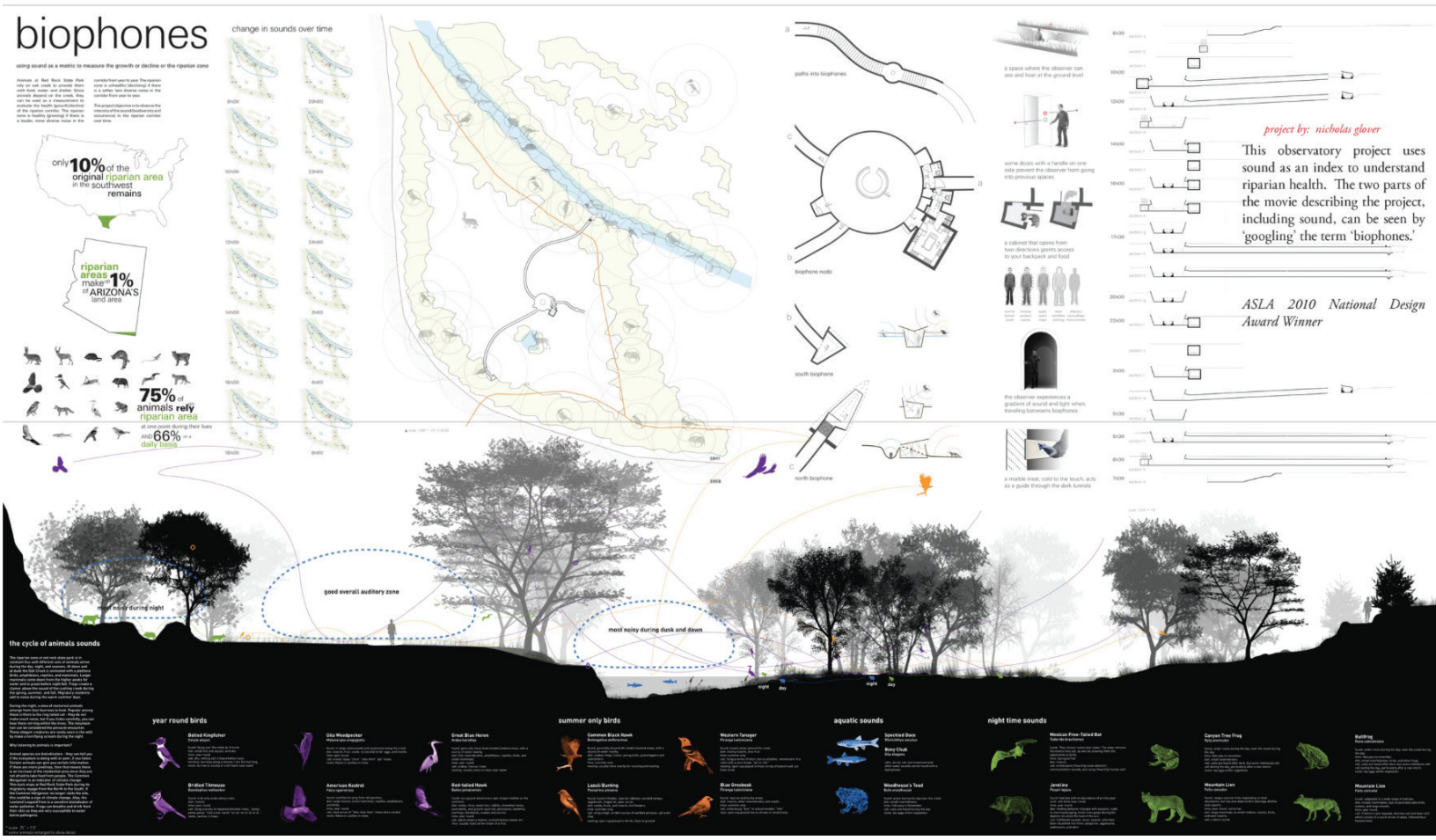



Figure 11. Biophones By Nicholas Covler

In recent years Ken McCown from the University of Tennessee and his students work have tackled these critics and have explored how to reveal geology, sedimentation, water phenomena, habitat disturbance processes. They explore ecological revelation in a deeper and successful way by the use of phenomenology to reveal ecological messages in several scales. They have used design as a device to change the perspective and relationship of people and nature by layering cultural understanding into environmental processes. Valerie Friedman in her thesis River and Ridge: Eco-Revelatory Design at Seven Islands Wildlife Refuge" (2012) focuses upon revealing the story of the geomorphology, and specifically the sedimentary rock cycle utilizing phenomenology as the tool. She states that "By revealing the environmental processes evident in everyday landscapes, landscape architects can play a key role in the development of ecological education and appreciation. The objective of is to help restore a holistic view of people's relationship within broader environmental systems. Biophones, a project by Nicholas Glover from Arizona State University, that was awarded at the 2010 ASLA Student Award is a great example for this investigation. It serves "as an environmental measuring device and also trains the human ear to notice the subtle nuances in our soundscapes. It connects people to the natural habitat through sound as animal calls become an indicator of environmental health. Biophones trains people to be advocates of natural soundscape awareness and preservation by teaching observers how to listen" (Glover) These types of projects are beneficial for our practice and have inspired a base framework for this thesis exploration.

The propose seeks to evaluate the potential of revelatory design to reveal many processes are imperceptible. It aims to explore how revelatory design can convey several messages related to energy regimes in a macro scale as well as in a local scale. Most of the phenomena related to this processes are intangible, and as Thayer points out in his critic of ERD: many other ecological phenomena are either too large, too small, too extensive, too complex, too fast, or too slow to be revealed by direct perceptual means" (Thayer, 1998). The complexity increases when processes related to big scale systems like energy regimes should be revealed as well. The objective is to create a deep embodiment experience for the user by revealing natural processes and to generate an understanding of energy regimes. Pavilions in specific points of the trail work as devices to reveal and document processes of disturbance in juxtaposition with information about energy regimes infrastructure processes. Early iterations have focus on understanding tools to reveal more tangible processes such as habitat disturbance on the local scale. Nevertheless, some of the latest design exploration have focused on how to reveal intangible processes that still shape the local landscapes.

# PART 3 **[THE SITE]**

Sabal trail. Southern revelatory Armature

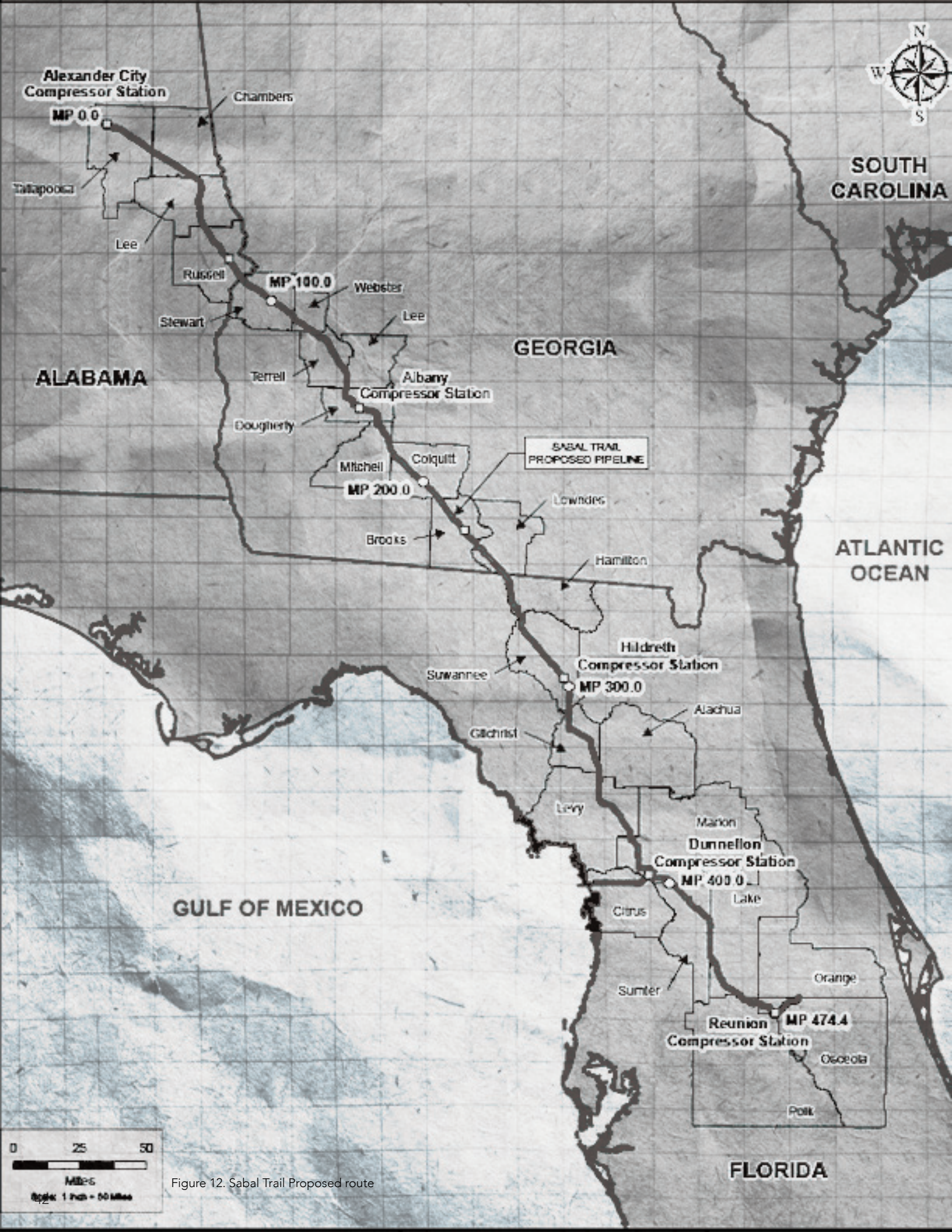



Figure 12. Sabal Trail Proposed route

# Sabal Trail. The local opportunity

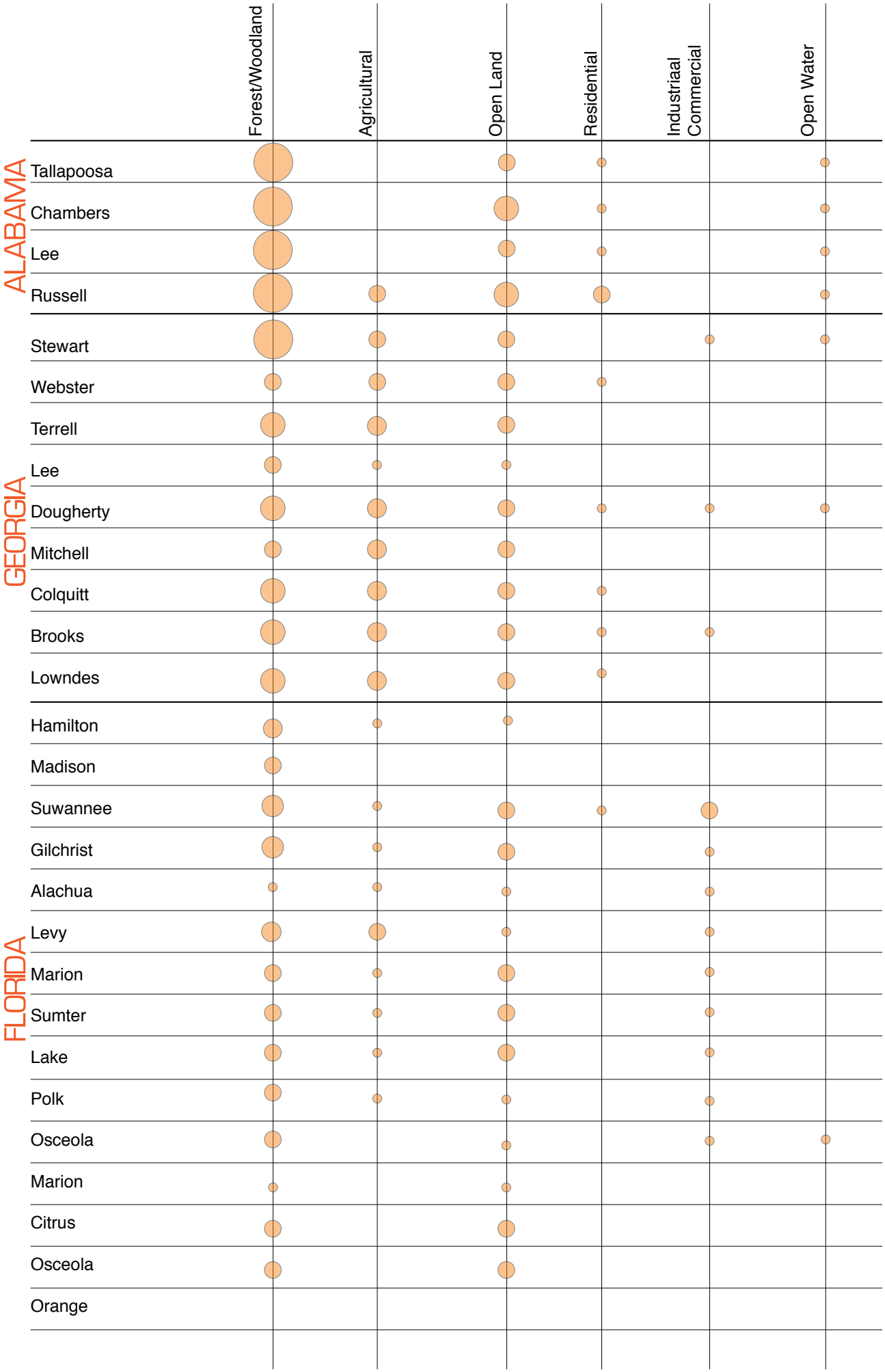
In the state of Alabama, the extraction industry has an important impact. The Sabal Trail is a 515-mile proposed Interstate underground pipeline which crosses different ecosystems of various land-uses and ecological conditions. (Spectra Energy). This local example is an opportunity to test the ideas. This corridor is an interstate natural Gas Pipeline along Alabama, Georgia and Florida that will satisfy the increasing needs of energy in Florida.

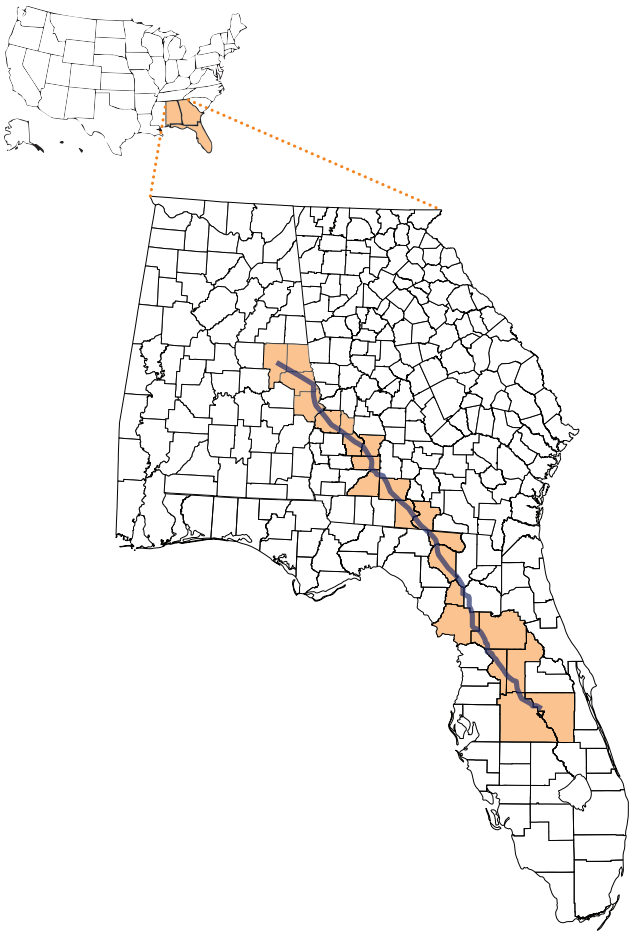
The Project includes construction of approximately 474.4 miles of new 36-inch diameter natural gas transmission pipeline (the "Mainline Route"), approximately 13.1 miles of new 36-inch diameter natural gas pipeline (the "Hunters Creek Line"), and approximately 21.4 miles of new 24-inch diameter natural gas pipeline (the "Citrus County Line").

In regards to the aboveground facilities, five new compressor stations are proposed to be constructed along the Mainline Route. (Alexander City AL, Hildreth, Reunion, Dunnellon, and Albany). The projects in total needs 3,063,81 acres of land to operate. In relation with other National Park, if we consider the acres, it compares to Yellowstone National Park (3,468 acres), It is around twice the size of Yosemite (1,190 acres), and it is relatively small in comparison to the Appalachian Trail (250,000 acres)

The Existing Land Uses in the Project Area are classified into the following six classifications based on predominant land uses: Open Land: Utility right-of-ways ("ROWs"), open fields, vacant land, herbaceous and scrub-shrub uplands, non-forested lands, emergent wetland, scrub-shrub wetland, golf courses, and municipal land; Agricultural: active hayfields, cultivated land, and specialty crops; Forest/Woodland: upland and wetland forest and pine plantation; Industrial/Commercial: manufacturing or industrial plants, paved areas, landfills, mines, quarries electric power or natural gas utility facilities; developed areas, roads, railroads and railroad yards, and commercial or retail facilities; Residential: existing developed residential areas and planned residential developments, and Open Water: water crossings greater than 100 feet wide and streams visible on aerial photography but less than 100 feet in width.

The Sabal trail project has presented a Resource Report of Fish, Wildlife, and Vegetation. In this document they provide a detail study of all the species that can potentially be affected. Understanding this report is imperative for the design strategies because they will determine the ecological value of the corridor. In Alabama the following USEPA Level IV Ecoregions are crossed: Southern Inner Piedmont, Southern Outer Piedmont, Flatwoods/Blackland Prairie Margins, Southern Hilly Gulf Coastal Plain, Fall Line Hills, and Southeastern Floodplains and Low Terraces (USEPA, 2013). The upland forest to be encounter presents species such as: red maple, farkleberry (Vaccinium arboreum), sweetgum, muscadine (Vitis rotundifolia), greenbrier (Smilax bonanox), loblolly pine, juniper (Juniperus virginiana), winged elm (Ulmus alata), and Christmas fern (Polystichum acrostichoides). The project also deals with Unique, Sensitive, or Protected Vegetation, as well as endanger and threatened animal species. One of the main characteristic of the Sabal trail is that it occupies mostly existing corridors in order to reduce impacts on wildlife.


Forest/Woodland
Agricultural
Open Land
Residential
Industriaal Commercial
Open Water
ALABAMA
Tallapoosa
Chambers
Lee
Russell
GEORGIA
Stewart
Webster
Terrell
Lee
Dougherty
Mitchell
Colquitt
Brooks
Lowndes
FLORIDA
Hamilton
Madison
Suwannee
Gilchrist
Alachua
Levy
Marion
Sumter
Lake
Polk
Osceola
Marion
Citrus
Osceola
Orange



Sabal Trail Proposed route

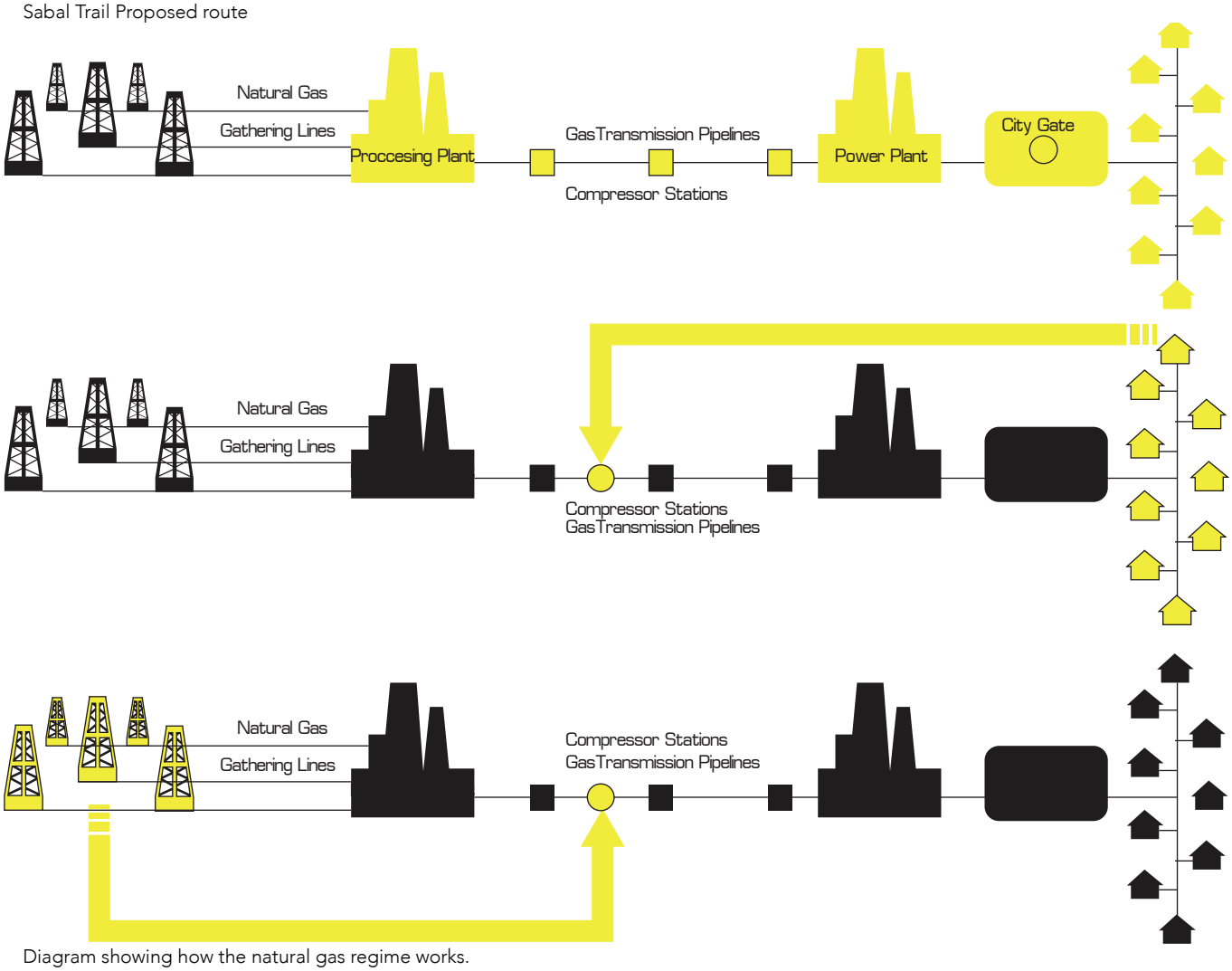
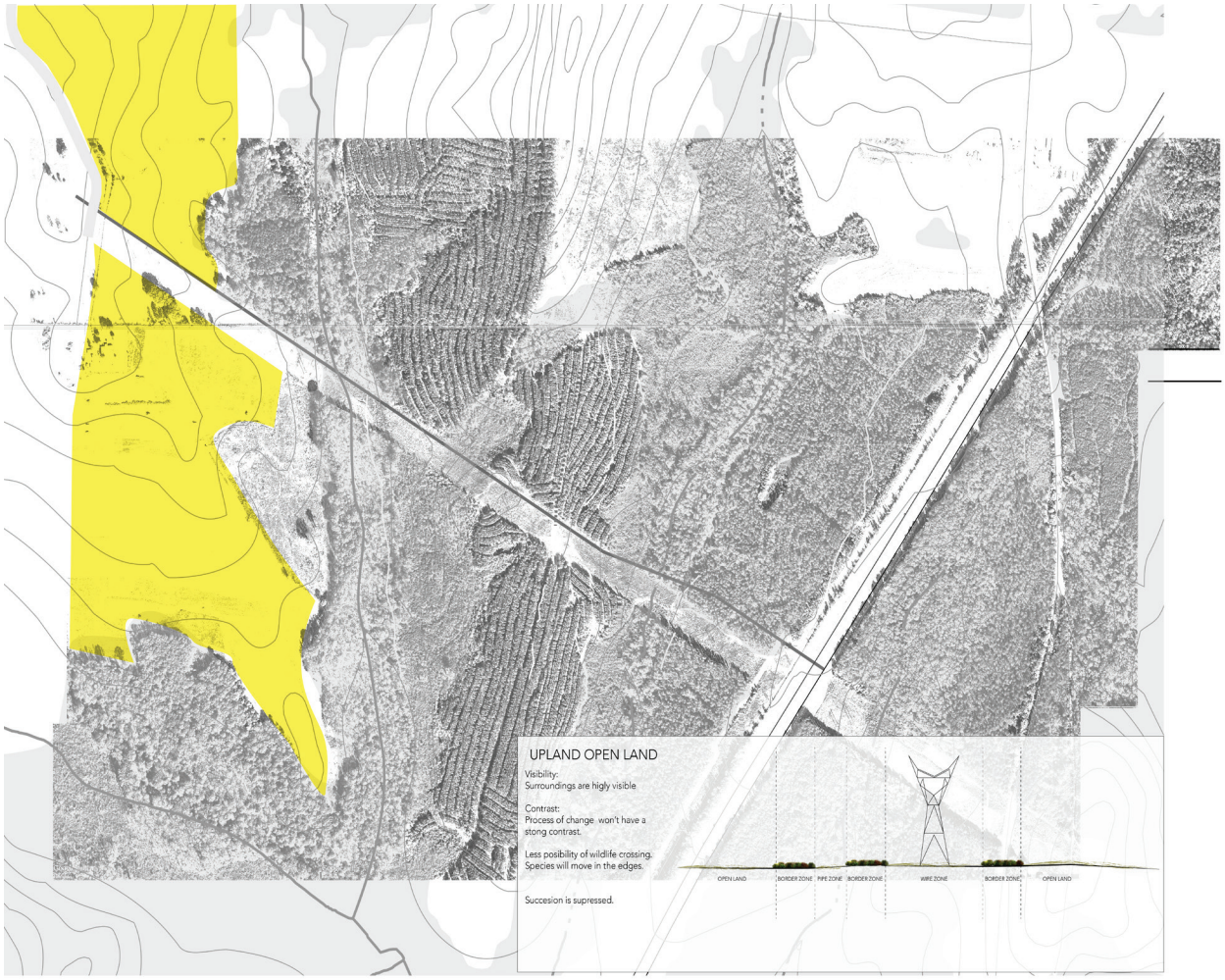
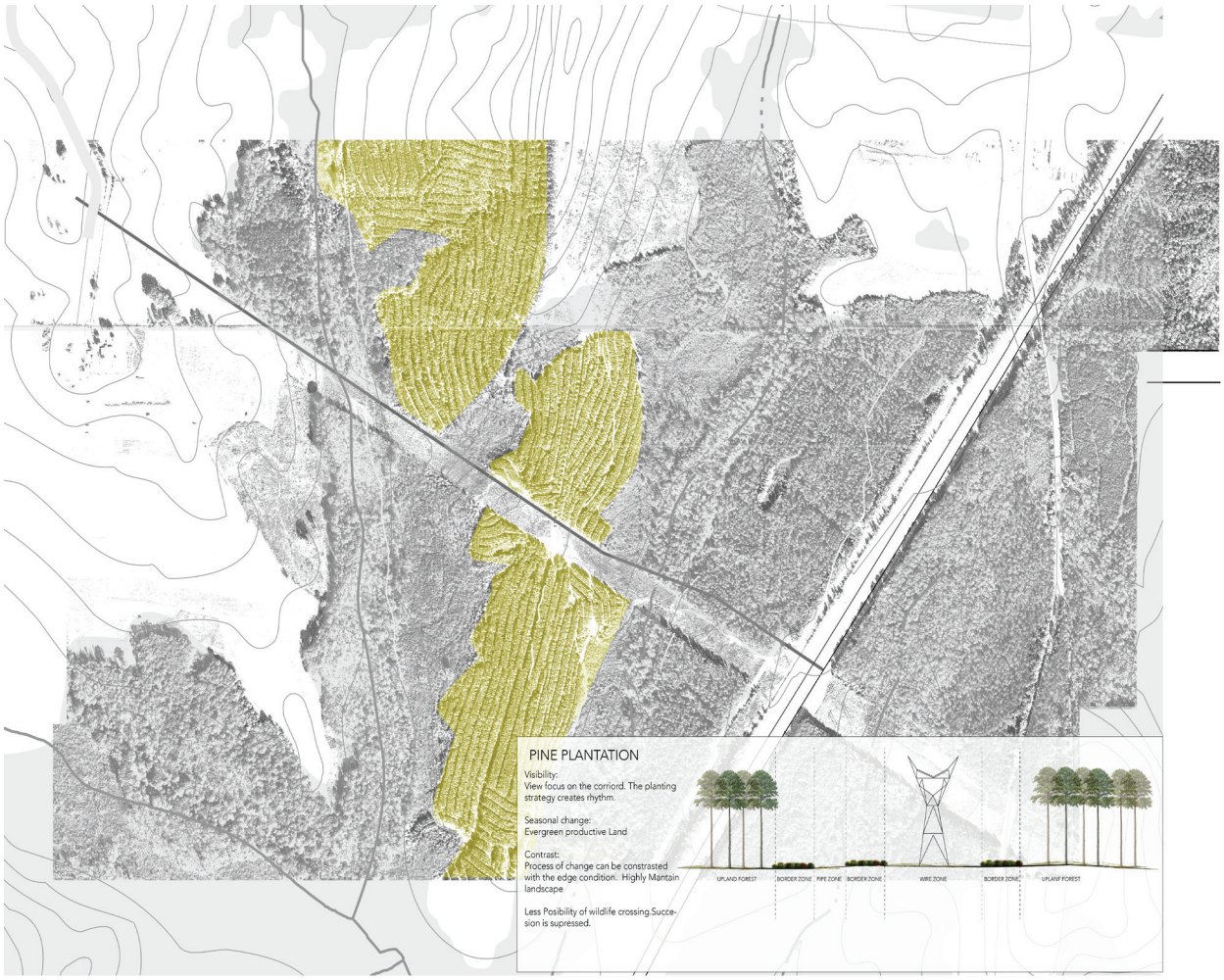
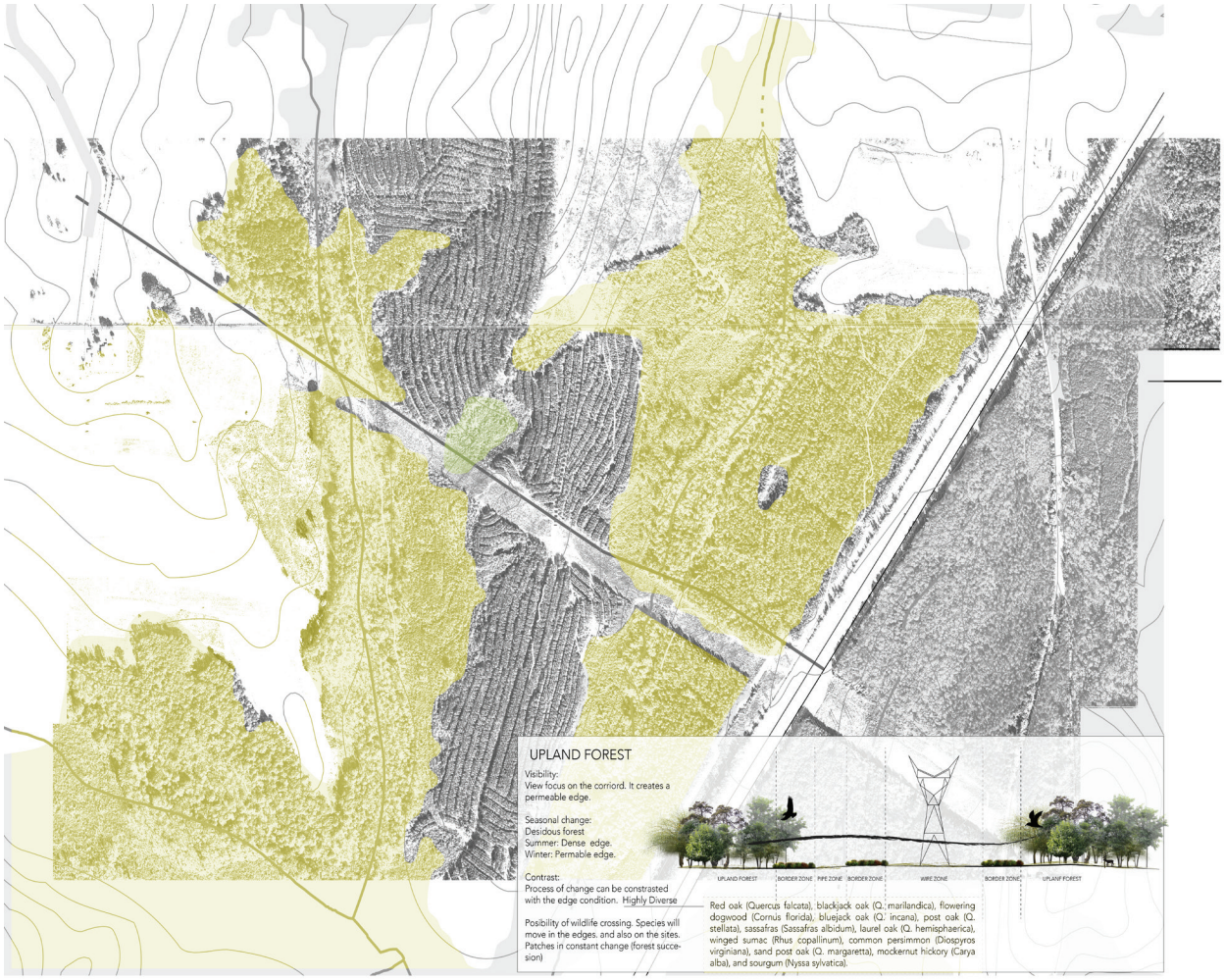
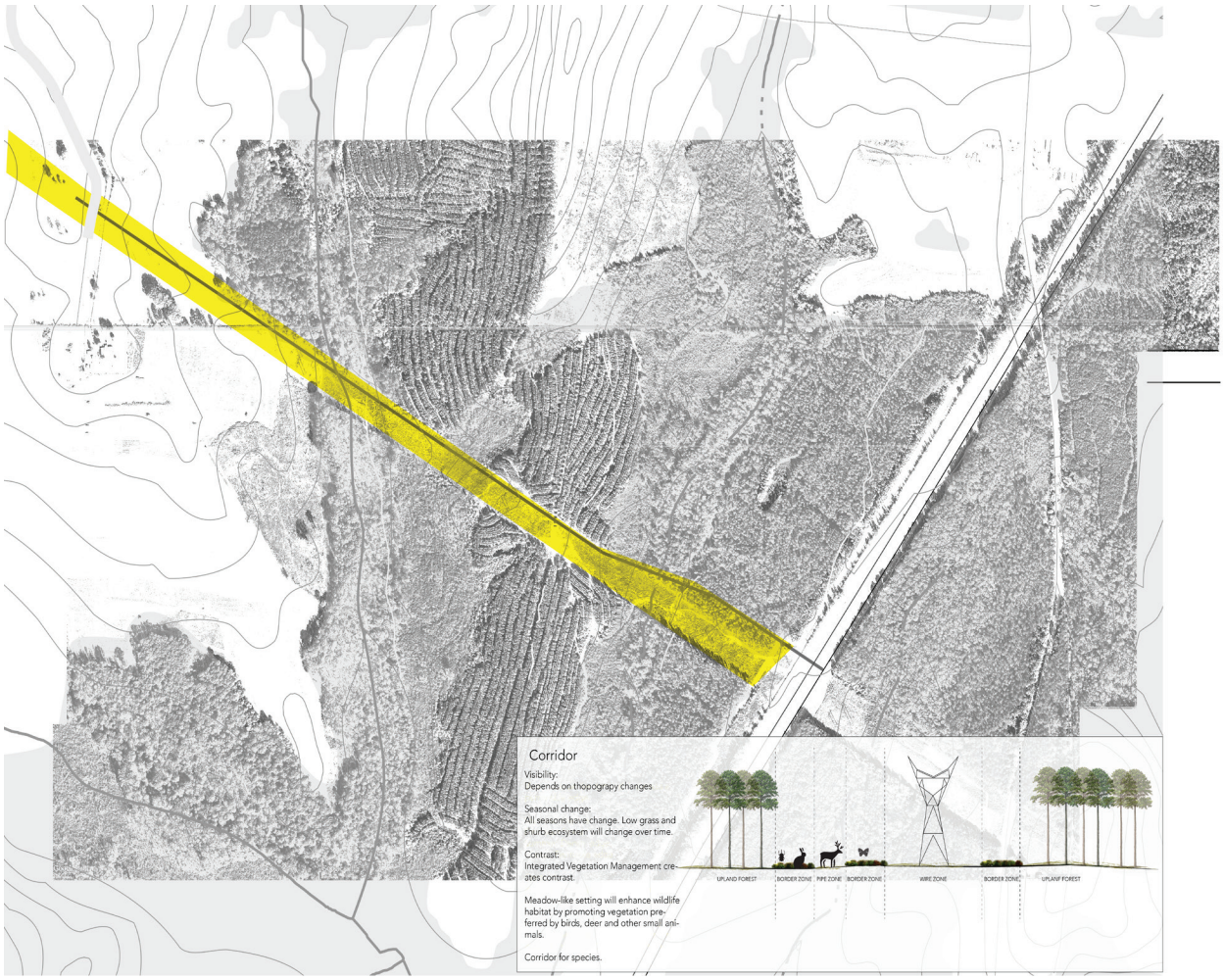



Diagram showing how the natural gas regime works.


UPLAND OPEN LAND
Visibility:
Surroundings are higly visible.
Contrast:
Process of change won't have a stong contrast.
Less posibility of wildlife crossing.
Species will move in the edges.
Succesion is supressed.
OPEN LAND
BORDER ZONE
PIPE ZONE
BORDER ZONE
WIRE ZONE
BORDER ZONE
OPEN LAND


PINE PLANTATION
Visibility:
View focus on the corriord. The planting strategy creates rhythm.
Seasonal change:
Evergreen productive Land
Contrast:
Process of change can be constrasted with the edge condition. Highly Maintain landscape
Less Posibility of wildlife crossing.Succesion is supressed.
UPLAND FOREST
BORDER ZONE
PIPE ZONE
BORDER ZONE
WIRE ZONE
BORDER ZONE
UPLAND FOREST




Existing land uses and its characteristsics.

# PART 4 **[THE TRAIL]**

Crafting a clear message. Selecting the right nodes

# Crafting a clear message

Revelatory design is successful in relation to the level of clarity of the message to be revealed. For this exploration and due to the complexity of the topic, three scales with different messages are defined. This landscape should perform in a way that reveals:

1. Energy Regimes in USA: Invisible process that is shaping this type of landscapes.

2. Energy Regimes in a Regional Scale: Energy Infrastructure and ecological indicator according to the Region

3.On Site phenomena: Tangible characteristics define by ecological processes occurring on the local scale.

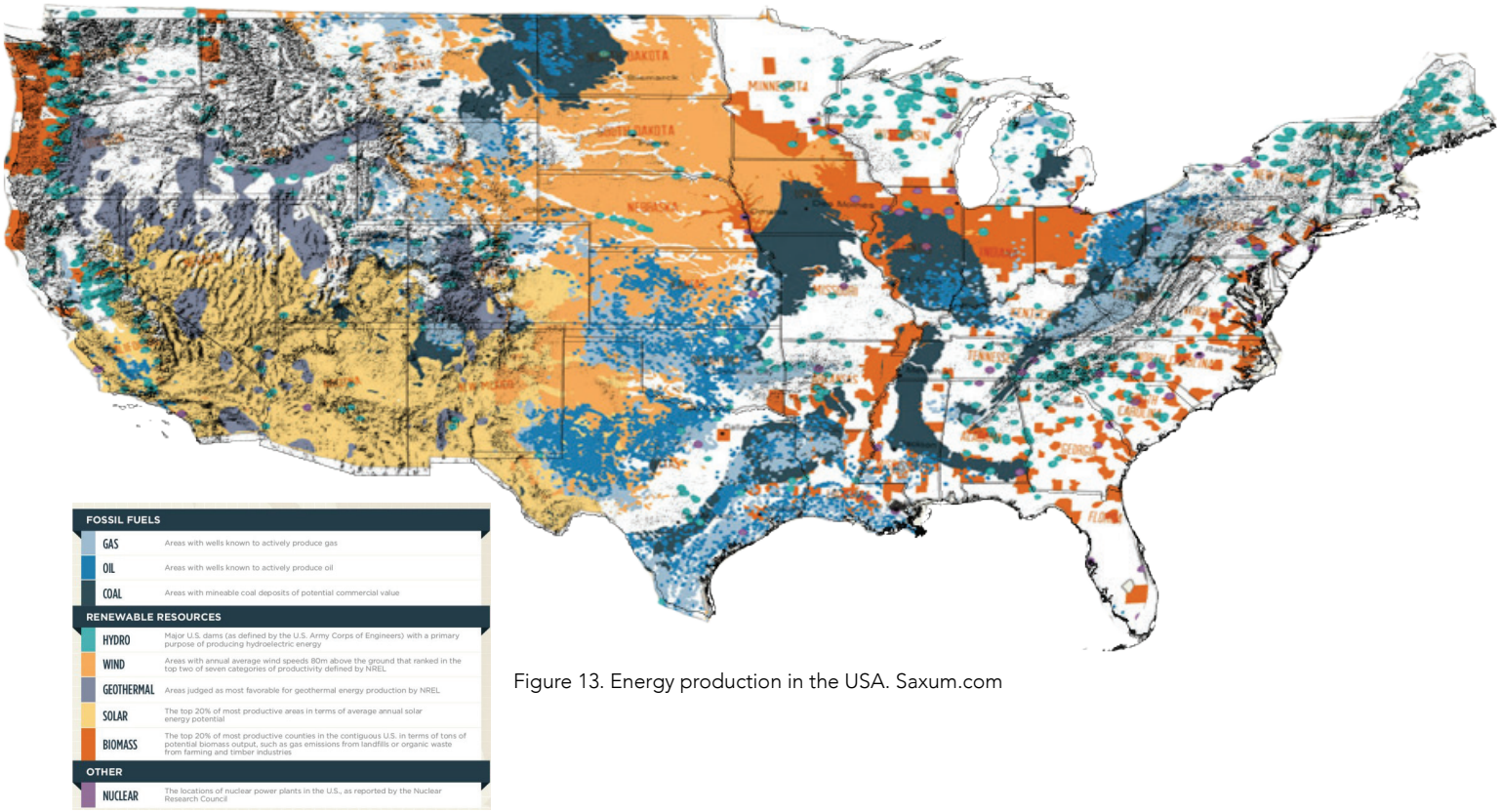
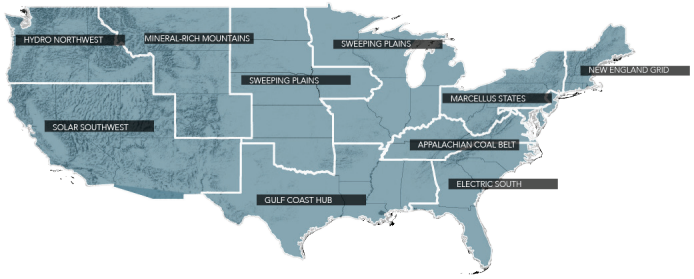
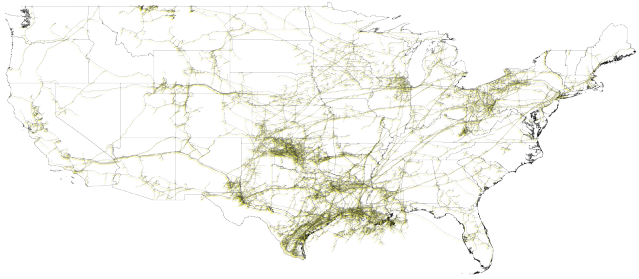


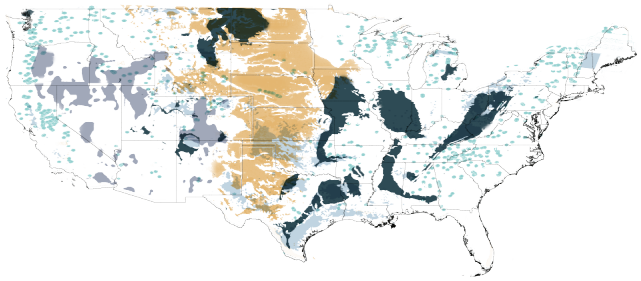

Figure 13. Energy production in the USA. Saxum.com



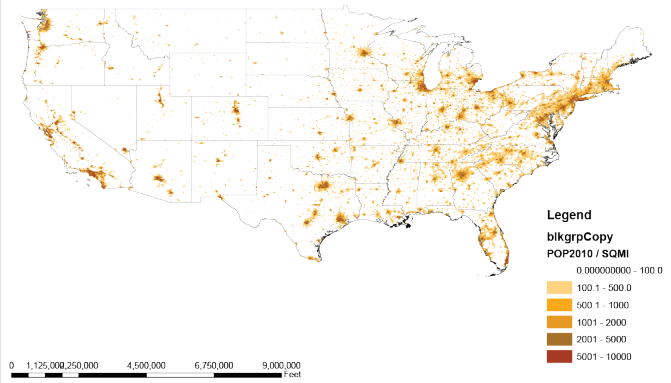

USA Energy Regions.



USA Natural Gas Pipelines



Energies of the future map.




USA Most populated areas

# Understanding USA Energy Regimes

Historically, energy production has been shifting from wood, to coal, to petroleum, to natural gas as a result of the increasing consumptions rates of the Country. It is a point on time where the State is trying to develop more sustainable types of energy such as solar and wind power as a strategy to protect the environment. Despite the fact, this natural gas is better than coal, it cannot be denied that other energy regimes are better to reduce carbon emission. Pevzner points out that "Compared to coal and oil extraction, the impact of renewables on the landscape are certainly less extreme, but still significant: compared to coal, the newer technologies of solar and wind have decreased both the relative consumption of the landscape per kilowatt, as well as the water-intensiveness of electricity generation." (2015). Barack Obama´s administration established the development of renewable energy on public land as one of the highest priorities for the Department of the Interior (U.S. Department of the Interior, Secretarial Order 3285). Wind and solar facilities are planned to be developed in the following years. Overlaying different energy regimes infrastructure is a potential to create rich landscapes with diverse uses and with different meanings.

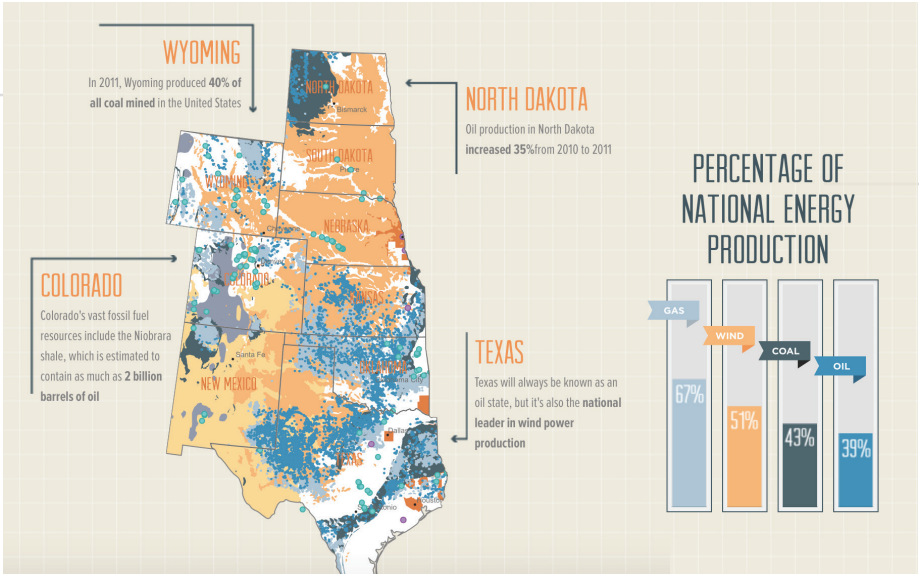
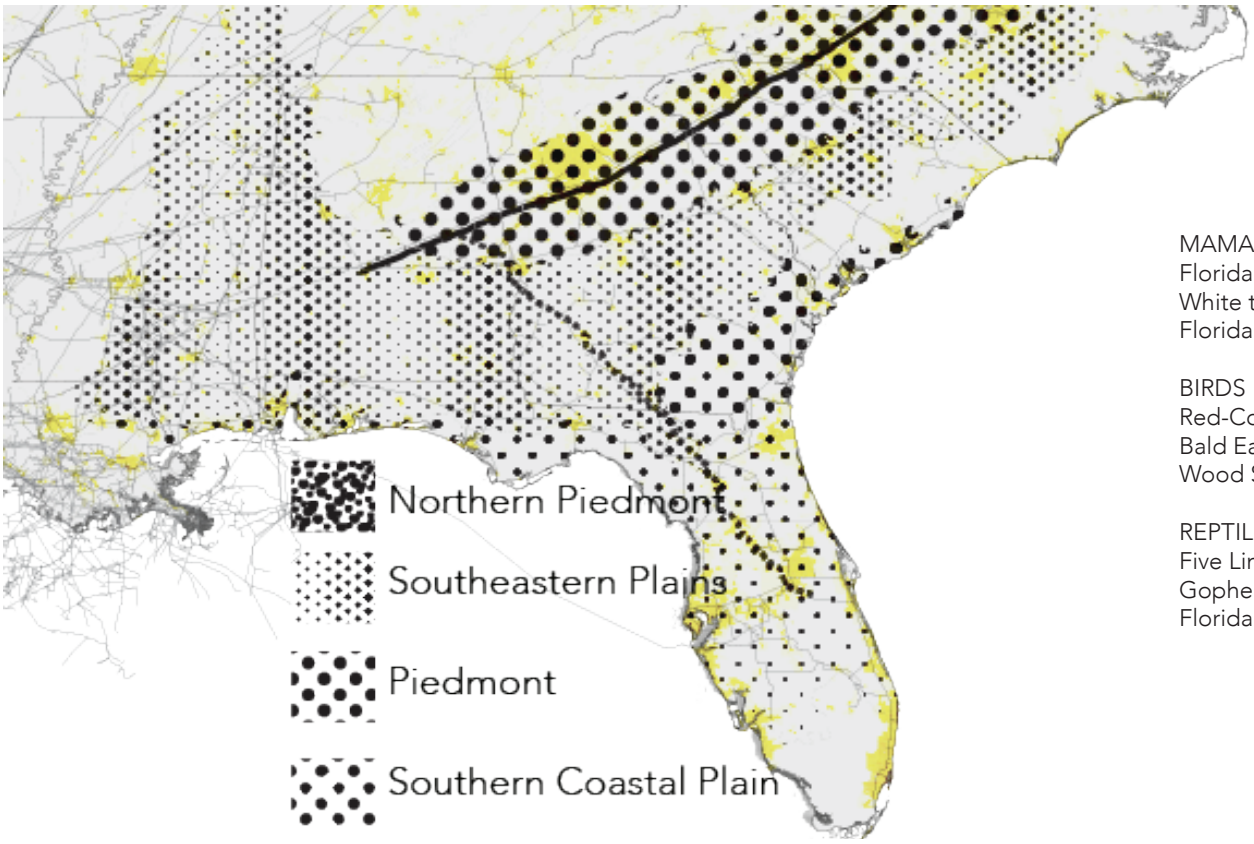



Figure 14. America's Hot Spot. Saxum.com

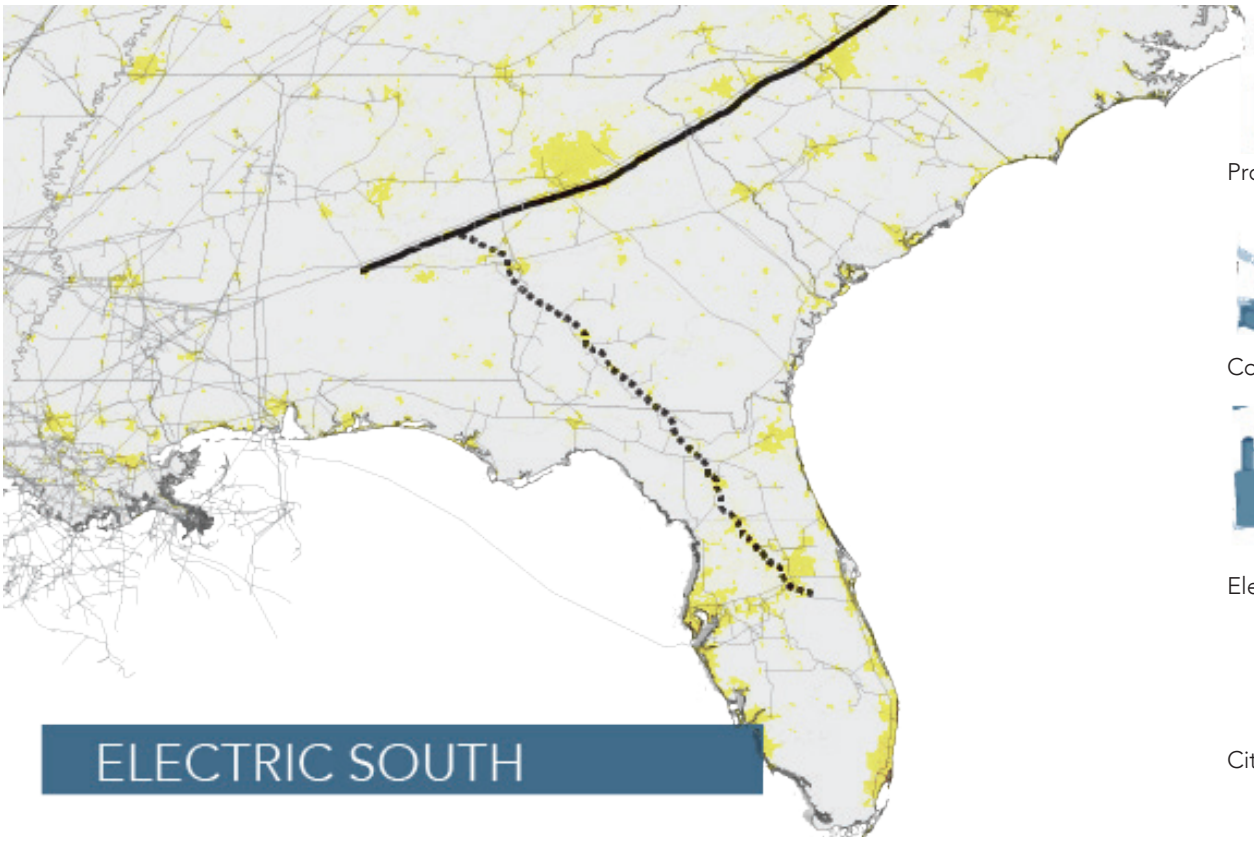
Saxum, an integrated marketing communication agency has developed an interactive study and map that explains the complex process of energy regimes in the U.S. They explain the project: The U.S. is one of the world's largest consumers of energy and recently it has enjoyed a renaissance as a major energy producer. The U.S. energy landscape comprises 13 regional constellations of energy markets and infrastructure. These regions are distinguished by geographic linkages, geological features, infrastructure networks, energy resources and energy consumption trends. This study reveals a very interesting reality. America's Energy Hot spot. The states of North and South Dakota, Wyoming, Nebraska, Kansas, Colorado, Oklahoma, New Mexico and Texas are very rich in terms of resources as oil, natural gas and coal, but also they have the greatest potential to develop wind and solar energy. These states represent 46% of the National Total energy production (67% of Natural Gas, 51% Wind, 43% Coal and 39% Gas.). But they represent only the 14% of the population. The major consumers are cities in the west and east coast. Therefore, transportation landscapes for this types of energy will be a constant need in following years. America's Hot Spot is the message to be revealed about this scale.




MAMALS.
Florida Mouse
White tale Deer
Florida Bonneted Bat

BIRDS
Red-Cockaded Woodpecker.
Bald Eagle
Wood Stork

REPTILES
Five Lined Skinck
Gopher Tortoise
Florida Pine Snake





Processing Plant


Compressor Station


Electric Generation Station


City Gate

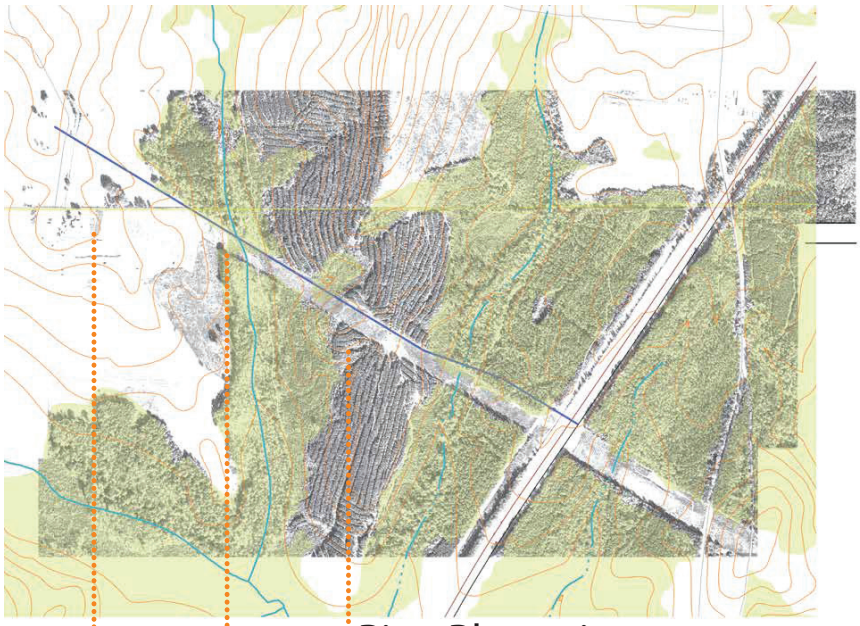
# [THE SITE]
## Understanding the Region



The regional context is the bridge between big scale processes of Energy regimes and its implication on the local scale. The Regional factor determine both, the energy infrastructure typologies to be encountered as well as the indicator species. As mentioned before the Level IV Ecoregions crossed are: Southern Inner Piedmont, Southern Outer Piedmont, Flatwoods/Blackland Prairie Margins, Southern Hilly Gulf Coastal Plain, Fall Line Hills, and Southeastern Floodplains and Low Terraces (USEPA, 2013). This provides a list of common land uses and wildlife species to be present. On the same way, the infrastructure of the region is determined by the Energy Regions. In the case of the Sabal trail the Regional Infrastructure relates to Natural gas. These elements vary on scale from Processing Plants, Compressor Stations, Electric Generation Station, City gates, Valves. Revealing Natural Gas infrastructure with data about energy production versus consumption rates of the specific case is the message to be revealed about this scale.

# BIOLOGICAL IDENTITY

POTEN



## Pine Plantation

## Upland Native Forest


## Agricultural

Some found in HALAWAKEE creek (Sabal Enviromental report)

Little Amphianthus

Canby's Dropwort

Relict Trillium

This species may be found on the ground or in trees and is often common in dry, wooded habitats where there are an abundance of fallen trees and stumps to hide in. Southeastern five-lined skinks prefer drier habitats that the similar five-lined skink, and are particularly common in dry pine forests and in coastal areas.(Savannah River Ecology Laboratory)

Black bears are typically opportunistic omnivores and approximately 80% of the diet is plant materials (Maehr and DeFazio 1985). They eat a wide variety of food including berries, grasses and seeds, and nuts and acorns.(Sabal Enviromental report)

## NTIAL FLORA AND FAUNA

Sculptured Pigtoe. Historic

MUSELS
Elliptio pullata,
Villosa lienosa, and
Villosa vibex

BALD EEAGLE

WOOD STORK

Eastern Coachwhip SNAKE
Eastern Kingsnake

Alligator Snapping Turtle

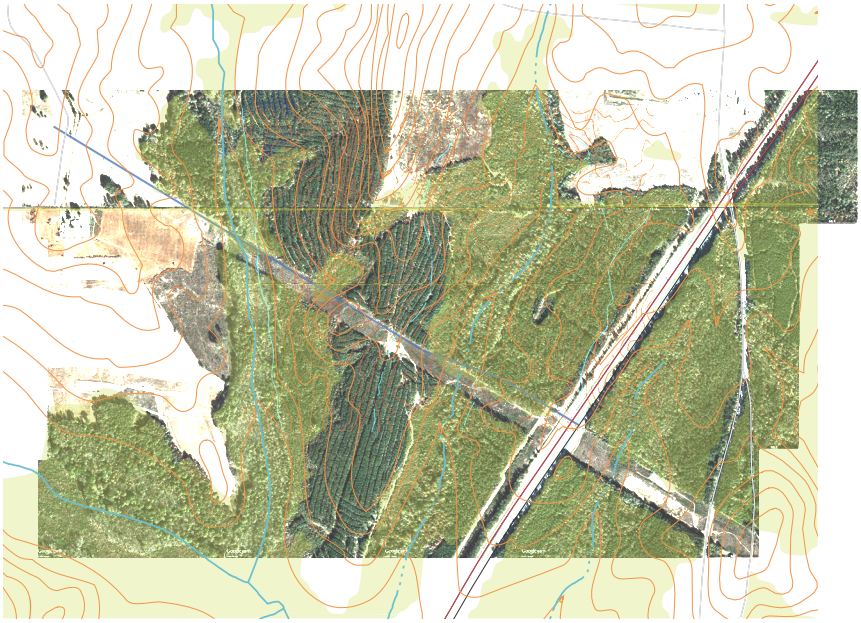
Southeastern Five-lined Skink

Seal Salamander

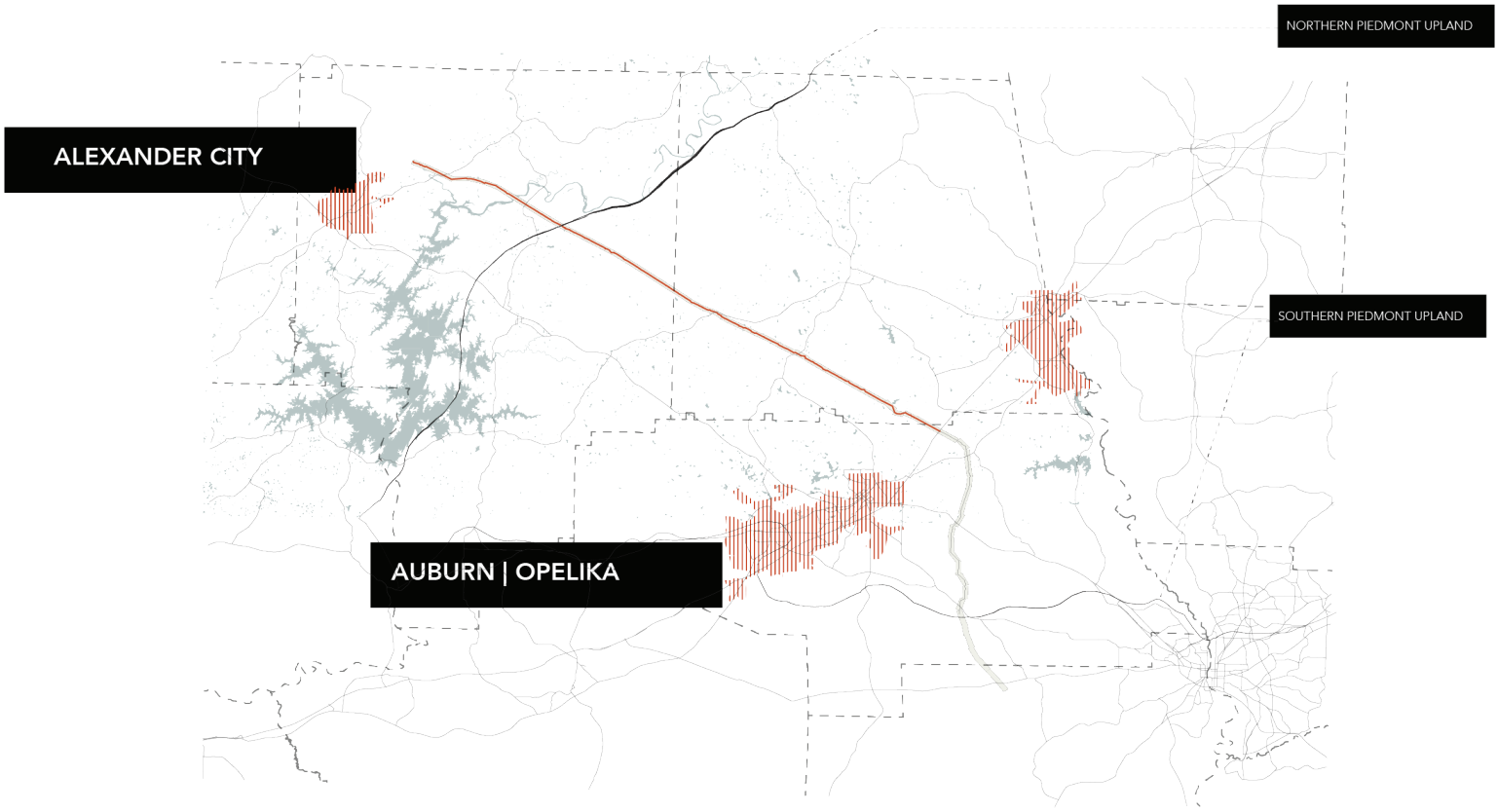
Florida Black Bear

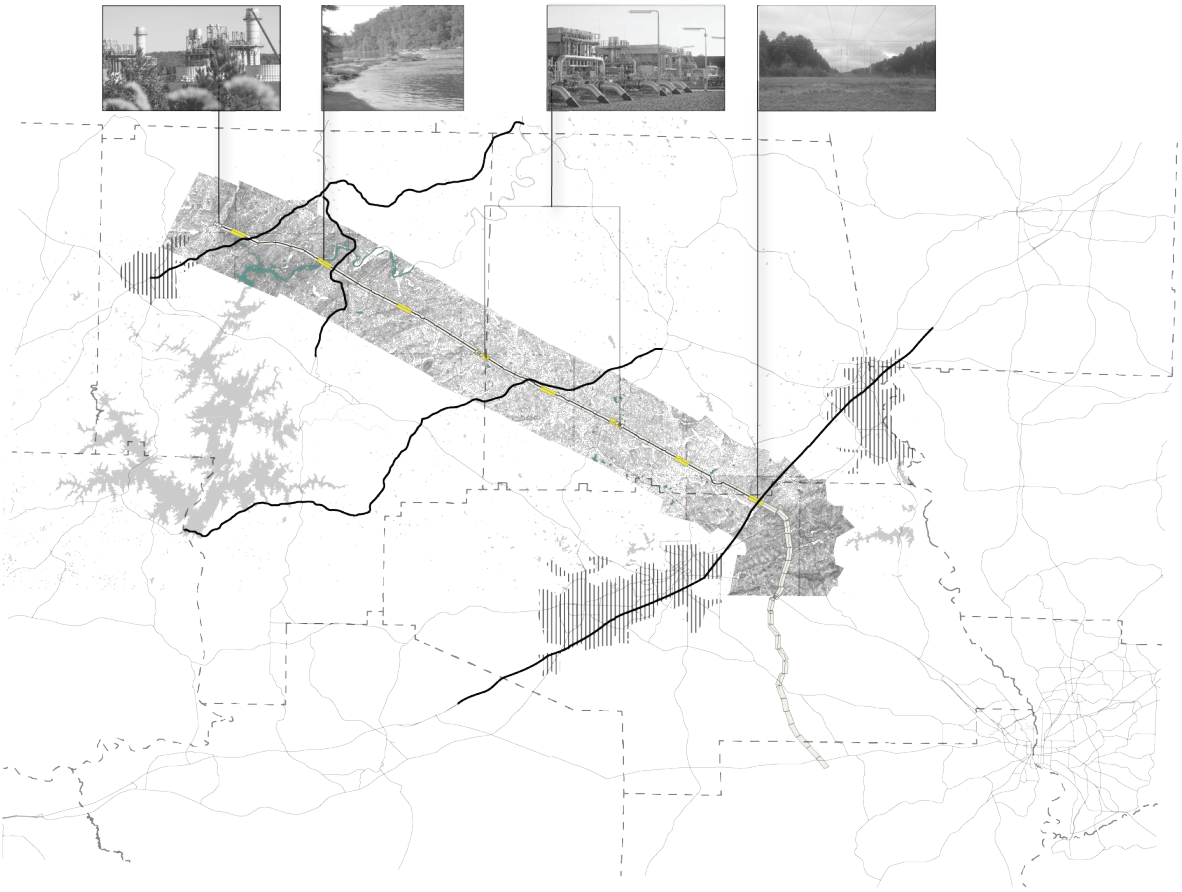






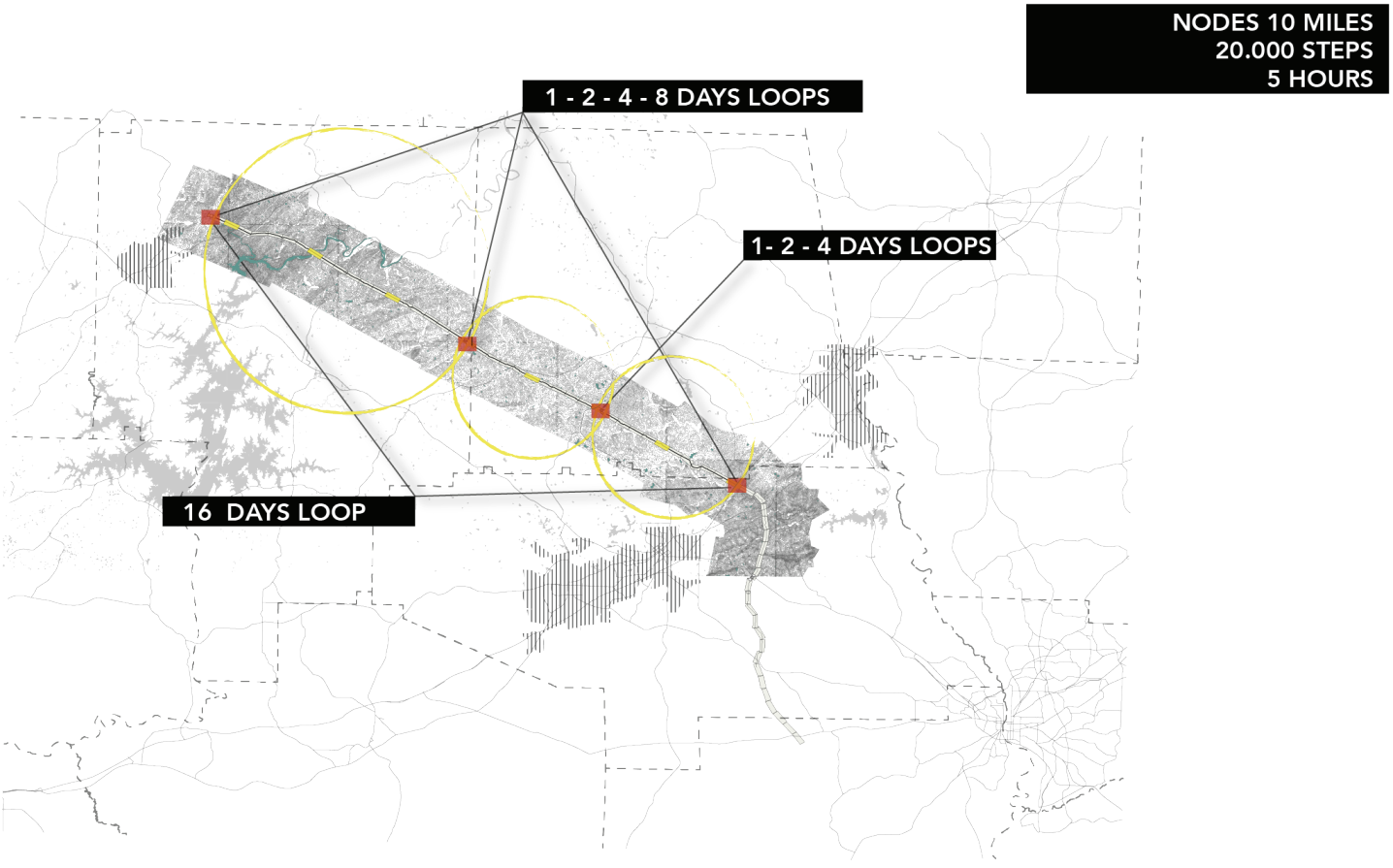
Every site along the way presents a specific phenomenon. Every node presents specific characteristics in terms of soil, hydrology, surrounding land uses; therefore, a phenomenological and biological site inventory is crucial. It will determine what indicator species or physical phenomena are more tangible to be revealed. The materiality, colors, sound, textures, movement, and other factors of this intimate scale will create moments of extremely clarity for the user. If people interact with these invisible processes that provide a physical experience, they will understand the impacts of energy regimes on the landscape. Indicator species counts are the message to be revealed at this scale.

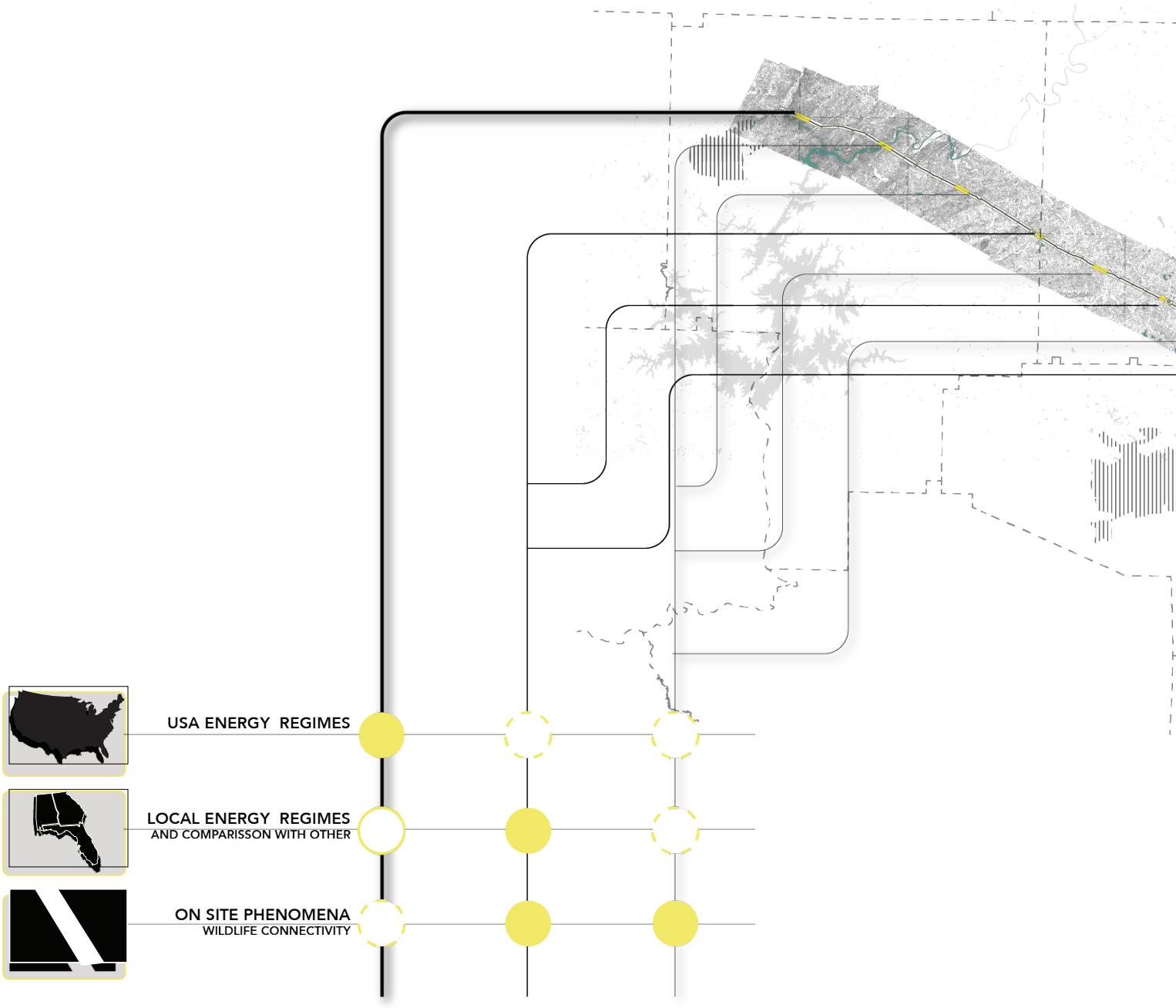

NORTHERN PIEDMONT UPLAND
ALEXANDER CITY
SOUTHERN PIEDMONT UPLAND
AUBURN | OPELIKA



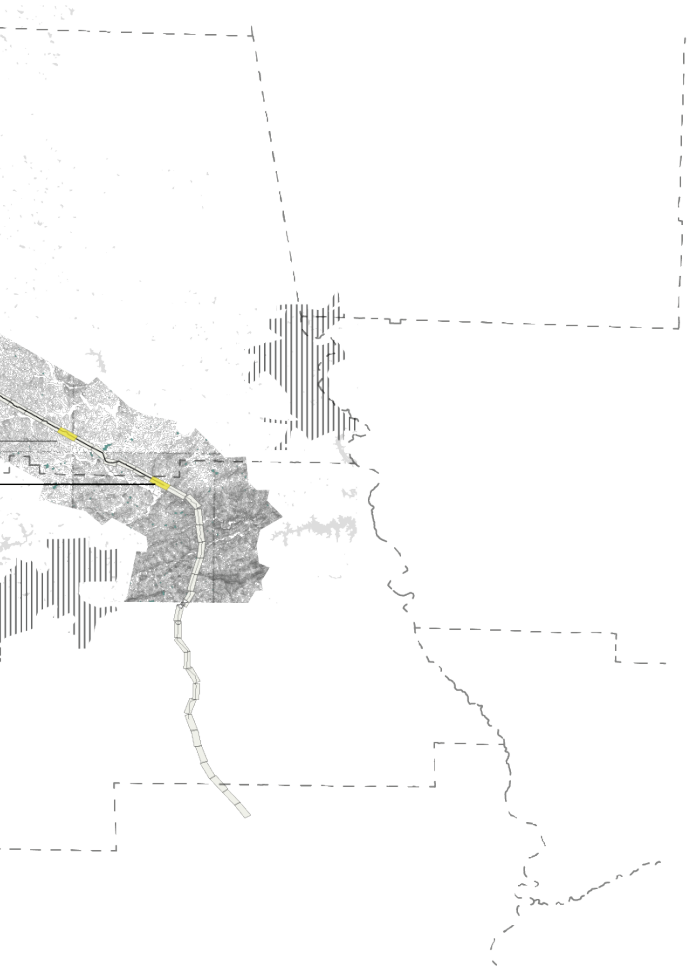
# [THE SITE]
## Node Selection

The first phase of the Trail is planned to start in Alexander City, AL. At the start point of the Sabal Trail Pipeline until the node located 15 minutes away from the Auburn-Opelika Area. This is an 80 miles transect approximately. The nodes are selected under three different criteria. The first relates to functional aspects: An average hiker can walk around 8-10 miles daily, therefore a camping node is located every 10 miles. The second is applied in terms to the natural gas infrastructure presence; the nodes that encounter natural gas compressor station or valves along the way are selected as well. The third relates to ecological factors; nodes with interesting conditions such as river crossing are also selected. Similar to the Appalachian trail, the Sabal trail offers a one-day hiking option, multiple day hiking options and a thru-hiking option. Every node offers one-day visit, 2, 4, 8, and 16 days' loops. Walking the whole transect from Auburn to Alex City and back should take 16 days total. This landscape will be better understood in terms of how much of it is actually experienced. One day visitors will have a different outcome that thru-hikers who experienced it holistically.




USA ENERGY REGIMES
LOCAL ENERGY REGIMES
AND COMPARISSON WITH OTHER
ON SITE PHENOMENA
WILDLIFE CONNECTIVITY

# [THE SITE]
## Nodes Typologies

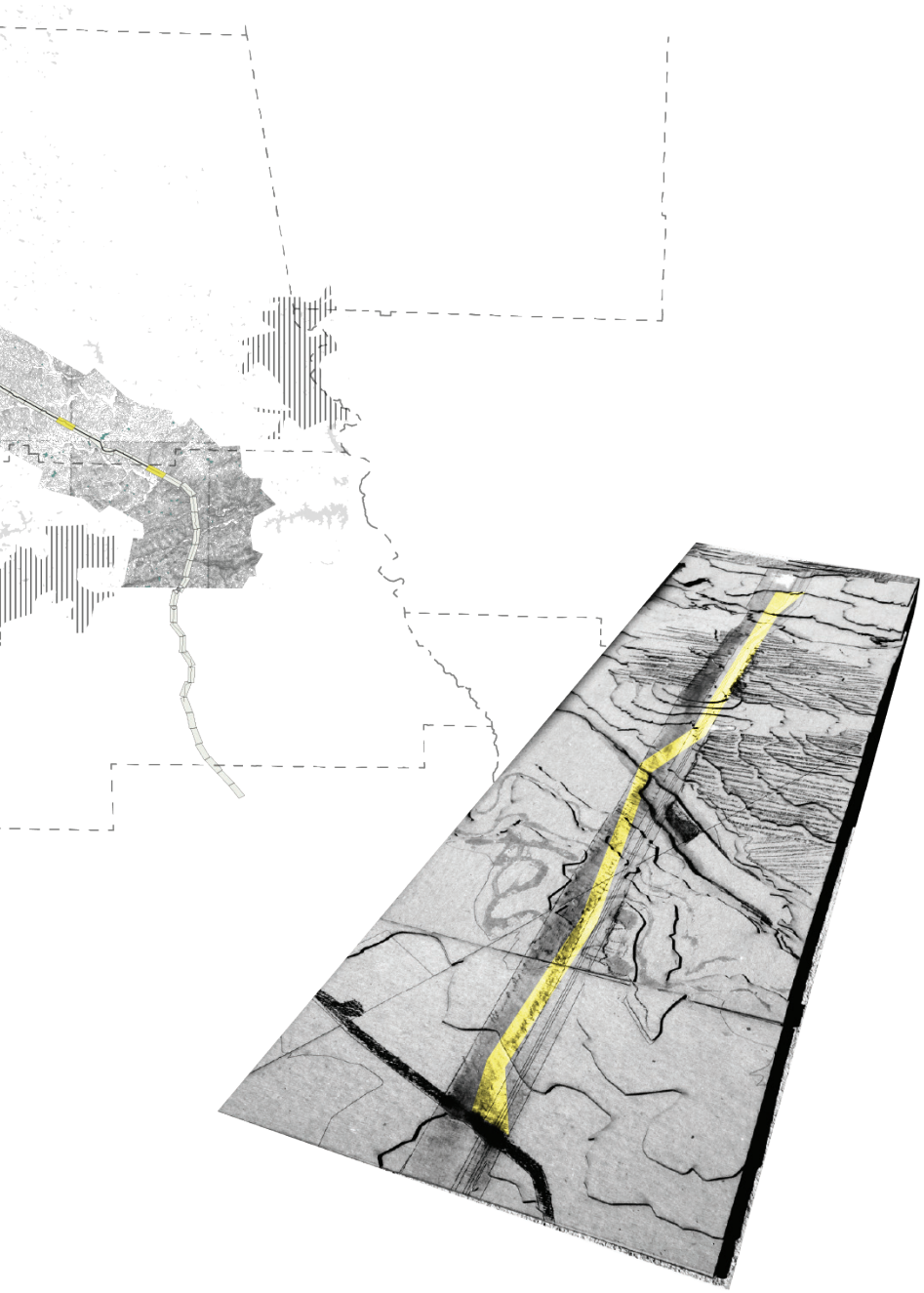


Every node on the network can provide a piece of information about the three scales that add upon the message but, due to the on site characteristics of every node, they have the potential to reveal certain aspect on a deeper on shallower way. There are three different types of nodes along the way and each one has a specific design resolution.

USA ENERGY REGIMES

LOCAL ENERGY REGIMES
AND COMPARISSON WITH OTHER

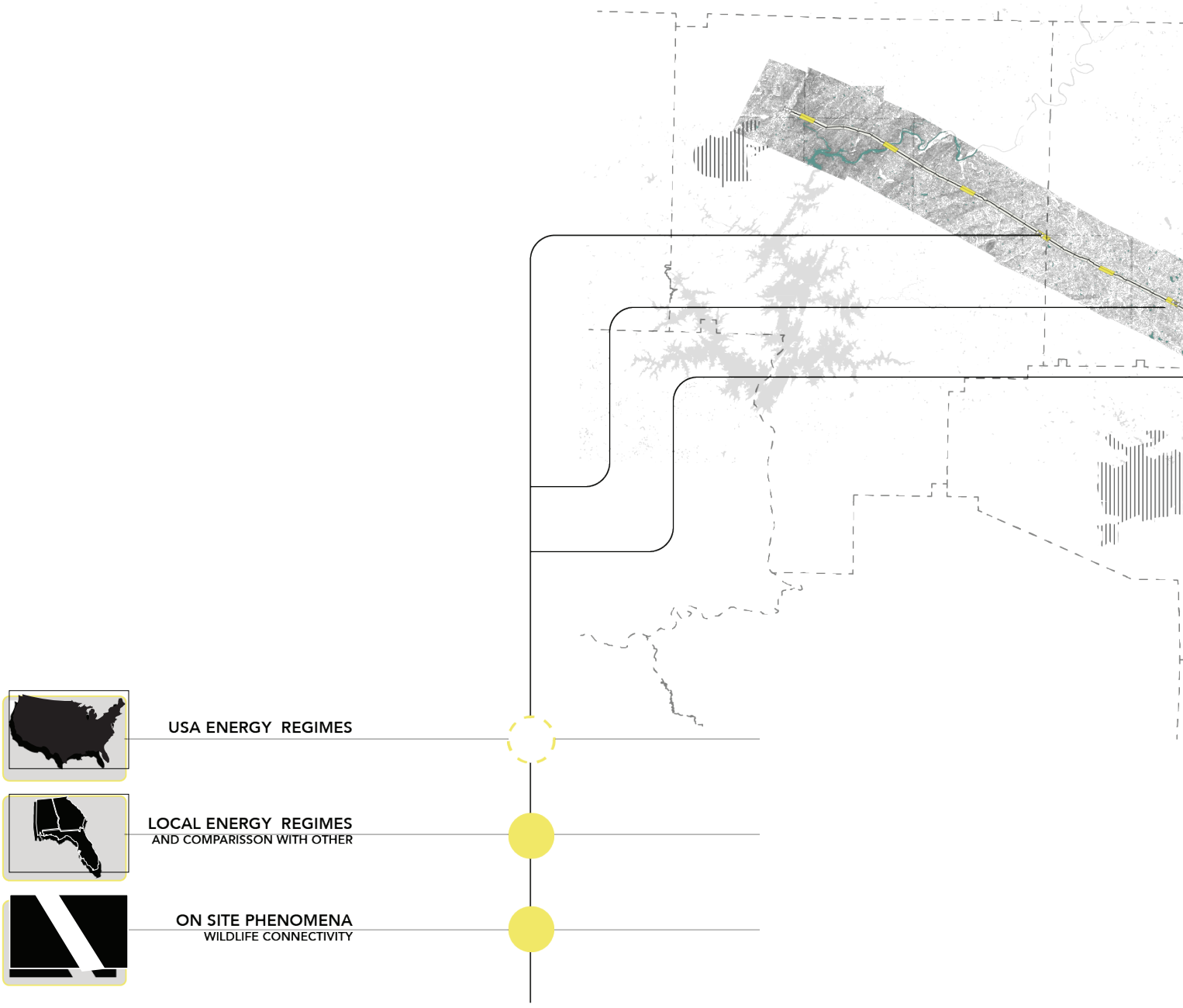
ON SITE PHENOMENA
WILDLIFE CONNECTIVITY

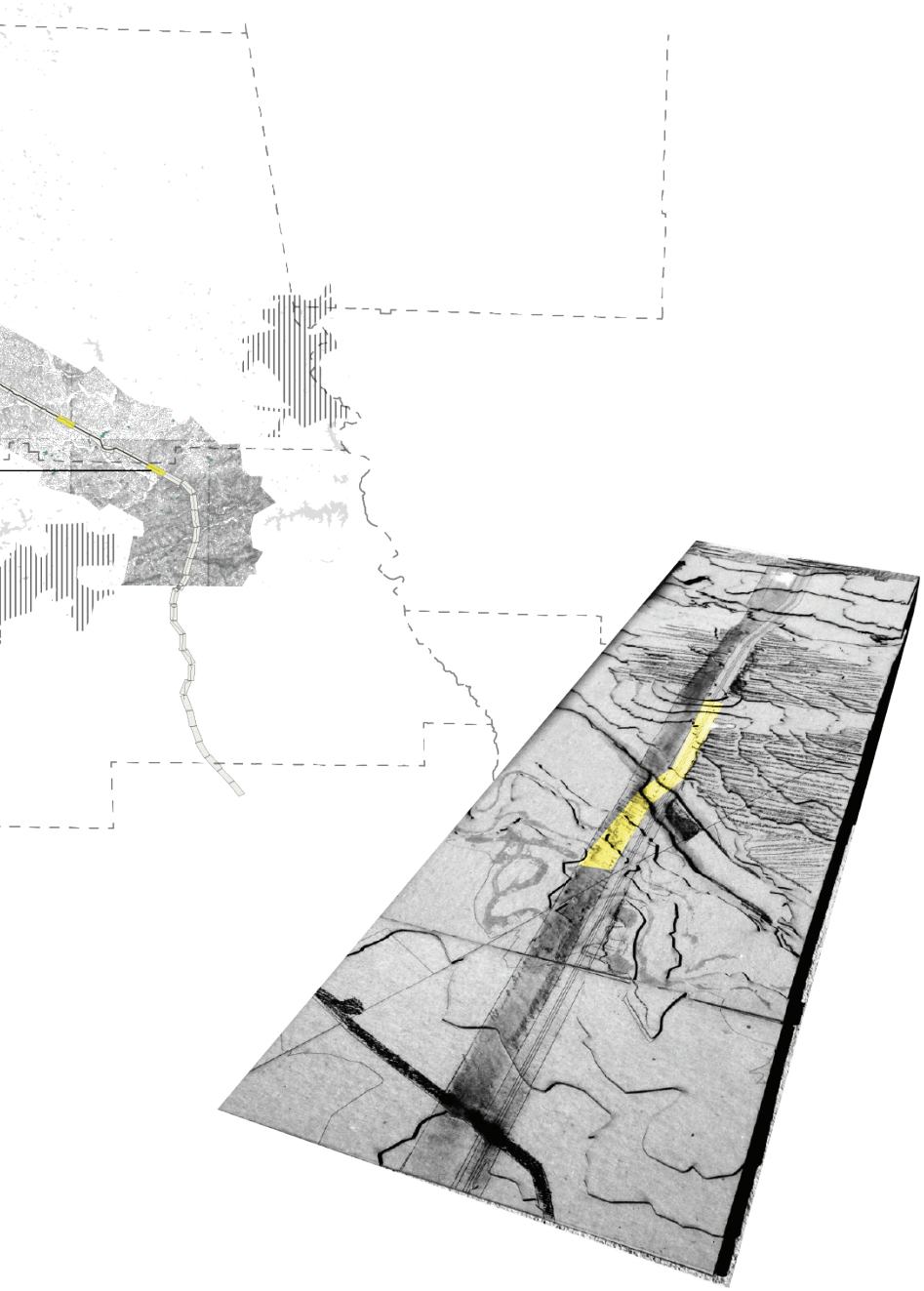


Typology 1. Big scale infrastructure.

These nodes are characterized for the presence of big scale infrastructure such as Electricity Generation stations. Strong sound and big scale power lines the main attraction of the sites. Because of the proximity to the process of energy creation from gas to electricity, revealing the USA energy regime context is appropriate. The same happens with the Regional scale. The presence of Natural Gas infrastructure provides the opportunity for the visitor to learn about the context of Alabama in relationship to the region. Due to the high levels of noise pollution and disturbance due to the plant, less species will be found near the area. To show the on Site phenomena is not relevant at this moment but it can still happen if there is a specific phenomenon that shows itself.

Execution: The intervention in typology 1 is bold. A continuous line of a different material is drawn across the landscape. This path will take the users to a pause point at specific areas where something is worth revealing. The graphic shows how design should approach this node.


USA ENERGY REGIMES
LOCAL ENERGY REGIMES
AND COMPARISSON WITH OTHER
ON SITE PHENOMENA
WILDLIFE CONNECTIVITY



Typology 2. Medium scale infrastructure + Site phenomena.

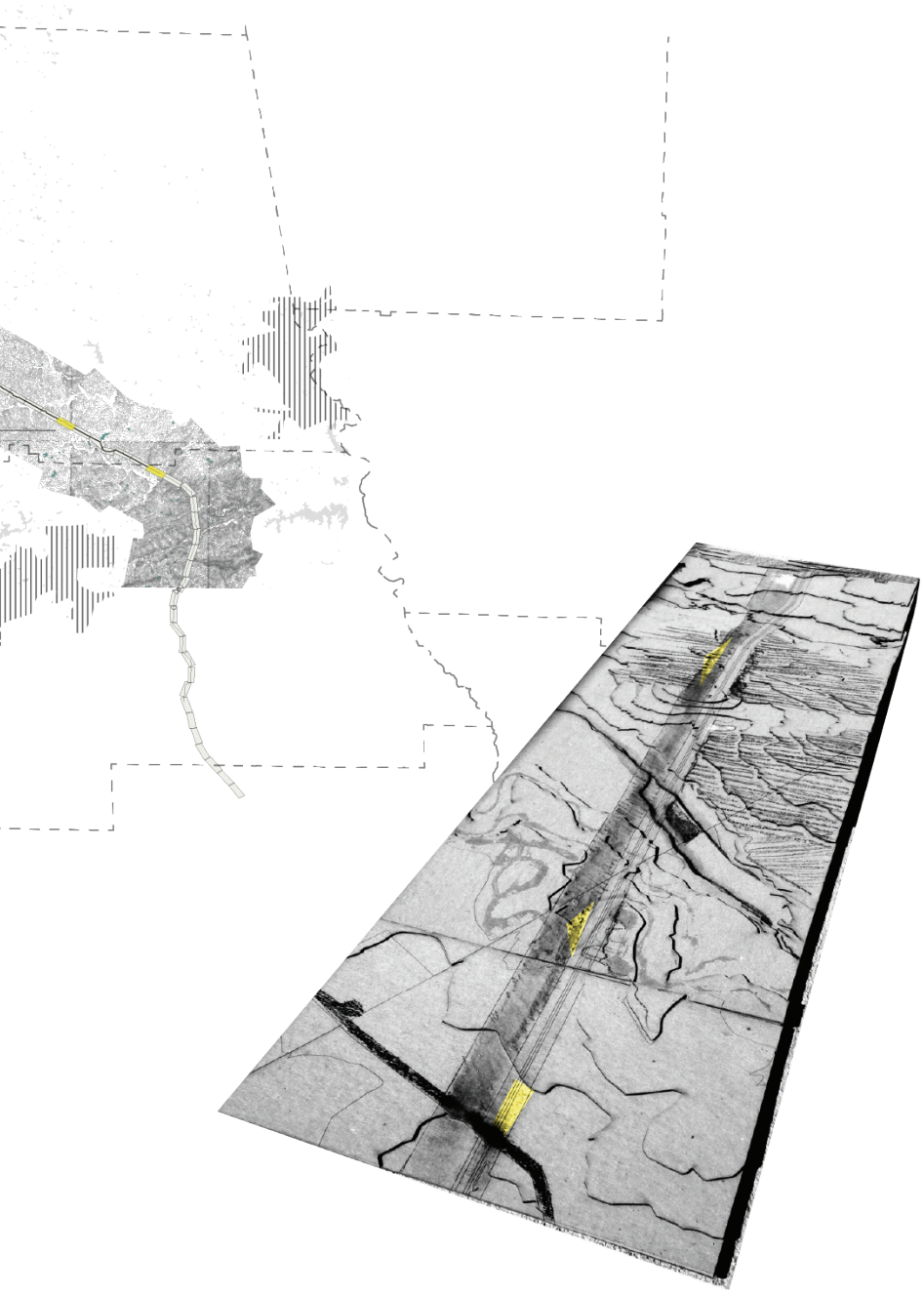
These nodes are characterized by smaller scale infrastructure such us valves and a strong presence of site phenomena given by ecological conditions. The presence of infrastructural elements allows to reveal the Regional Scale message, and the richness of the ecological factor allows to reveal the local implications. In this areas the visitor can experience both scales of information.

Execution: The intervention in typology 1 is modest. A different material delineates the areas where any of these phenomena take place. The graphic shows how design should approach this node.

USA ENERGY REGIMES

LOCAL ENERGY REGIMES
AND COMPARISSON WITH OTHER

ON SITE PHENOMENA
WILDLIFE CONNECTIVITY

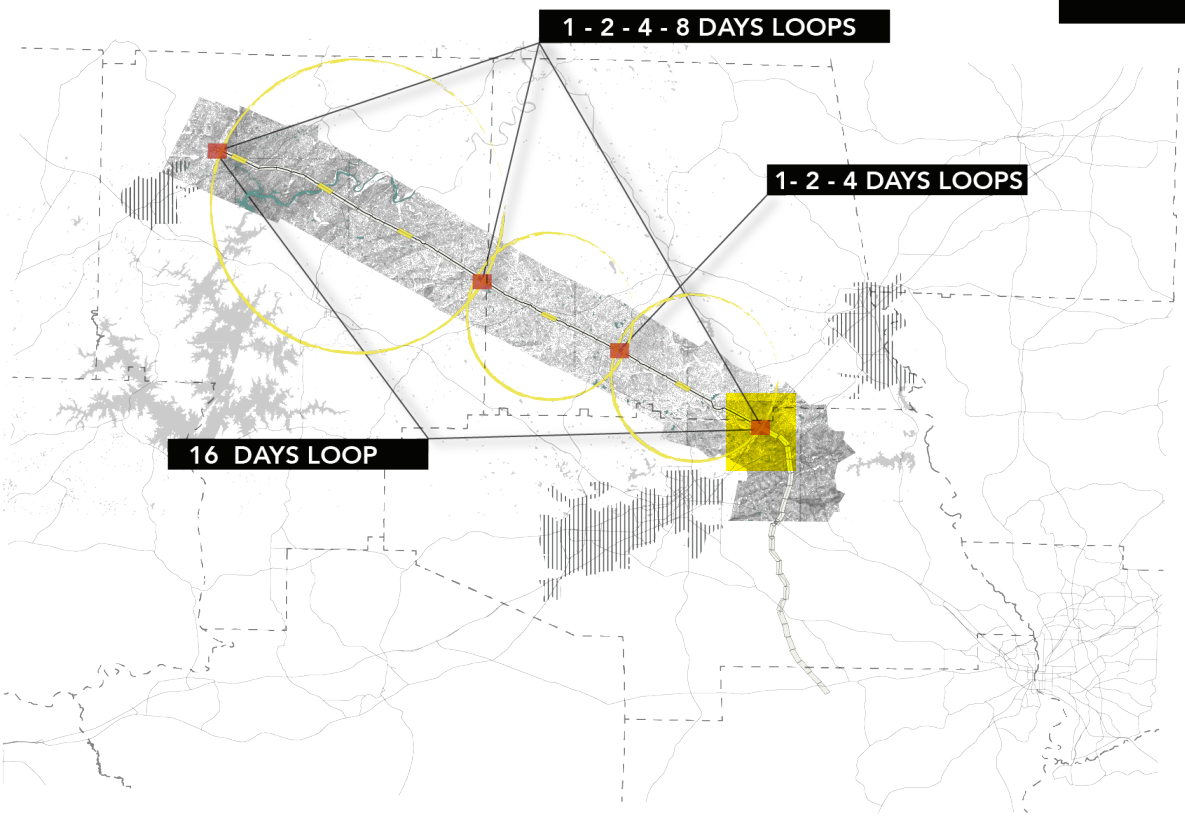


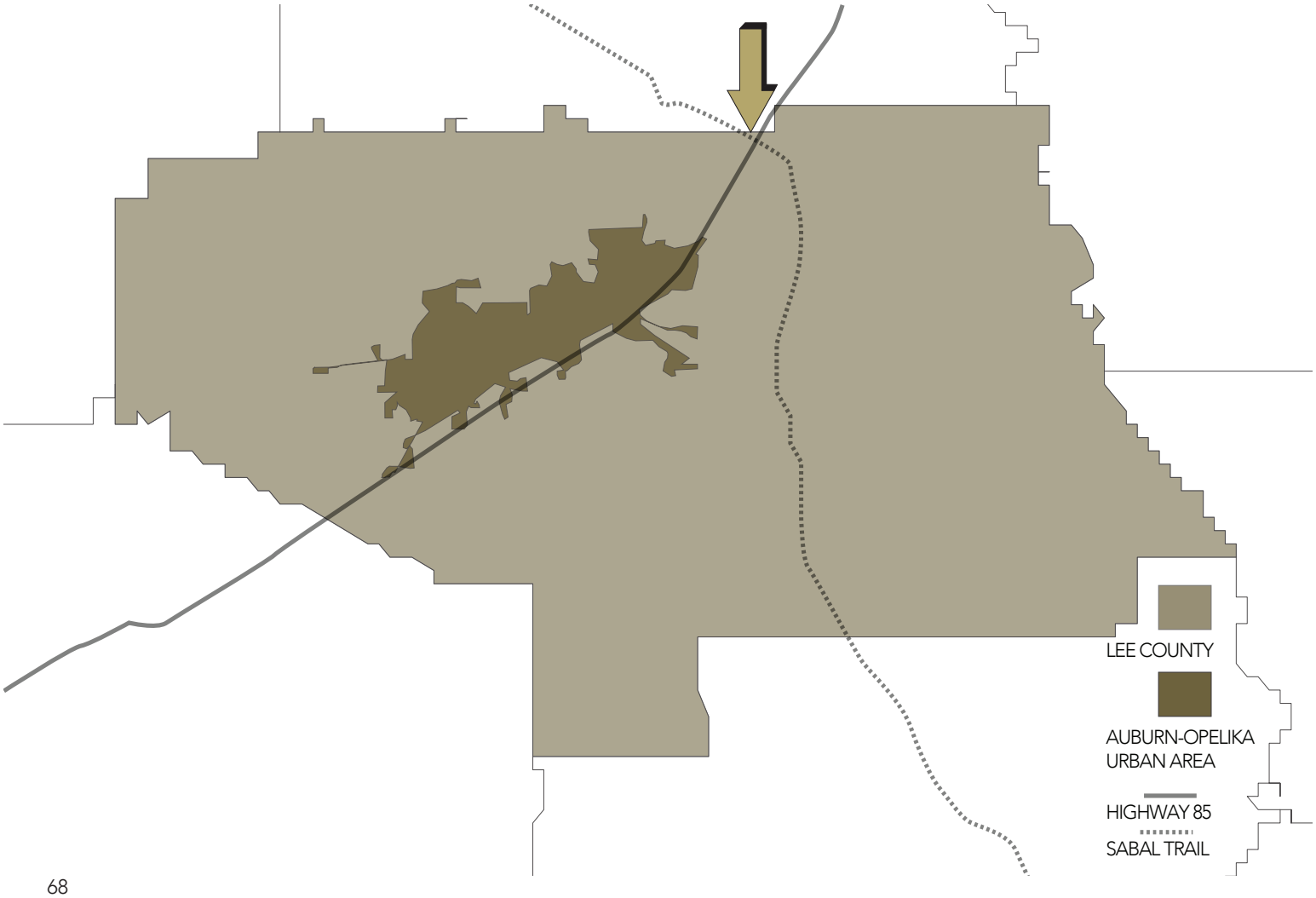
Typology 3. Highly sensorial site phenomena.

These nodes are characterized by phenomena given by the ecological conditions of the site. Sensorial elements are highly important: textures, colors, sounds, species presence. These processes can be experienced through all the senses. The visitor should be able to have an experience that connects him/her to the site in a deep manner.

Execution: The intervention in typology 3 is punctual. A different path material delineates only pavilion areas where phenomena is revealed. The camping areas are camouflaged to reduce the disturbance for wildlife. It also promotes the interaction between human beings and species present in the corridor.

NODES 10 MILES
20.000 STEPS
5 HOURS



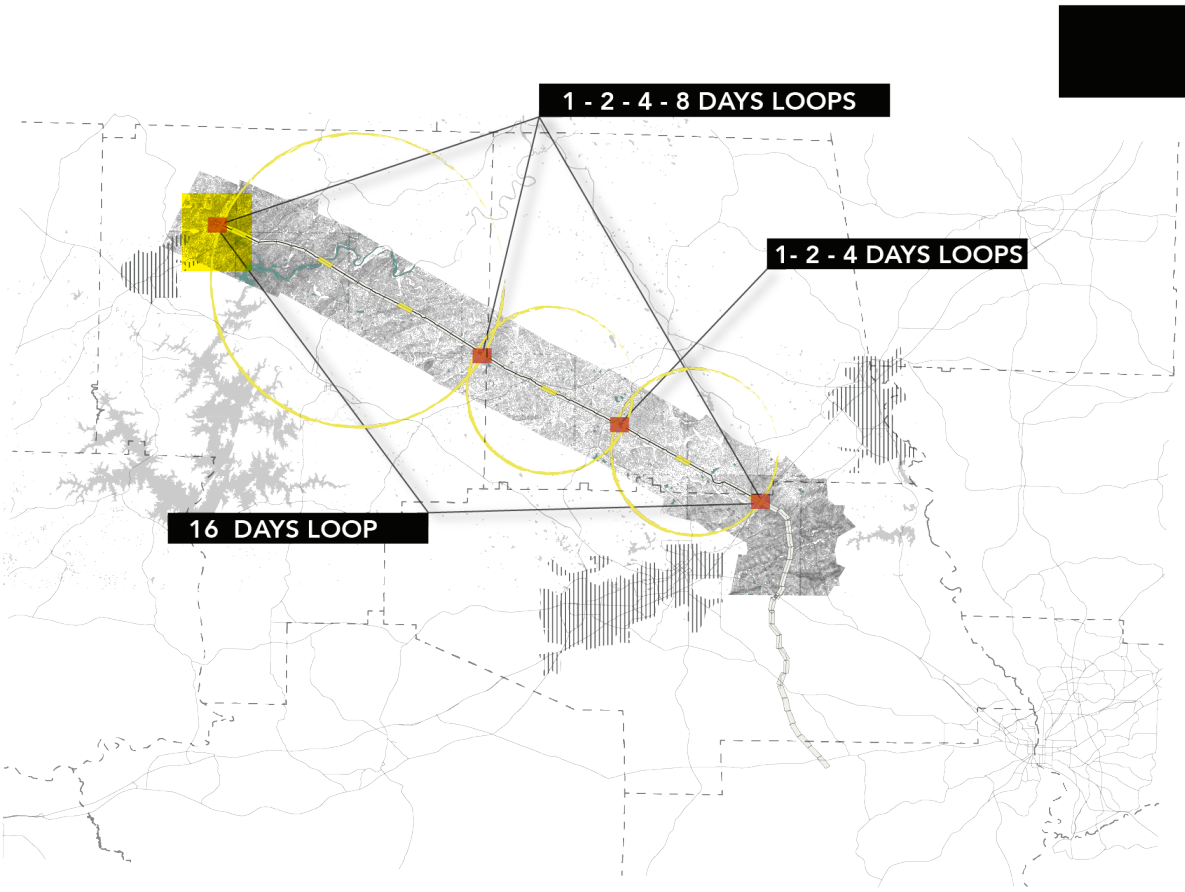



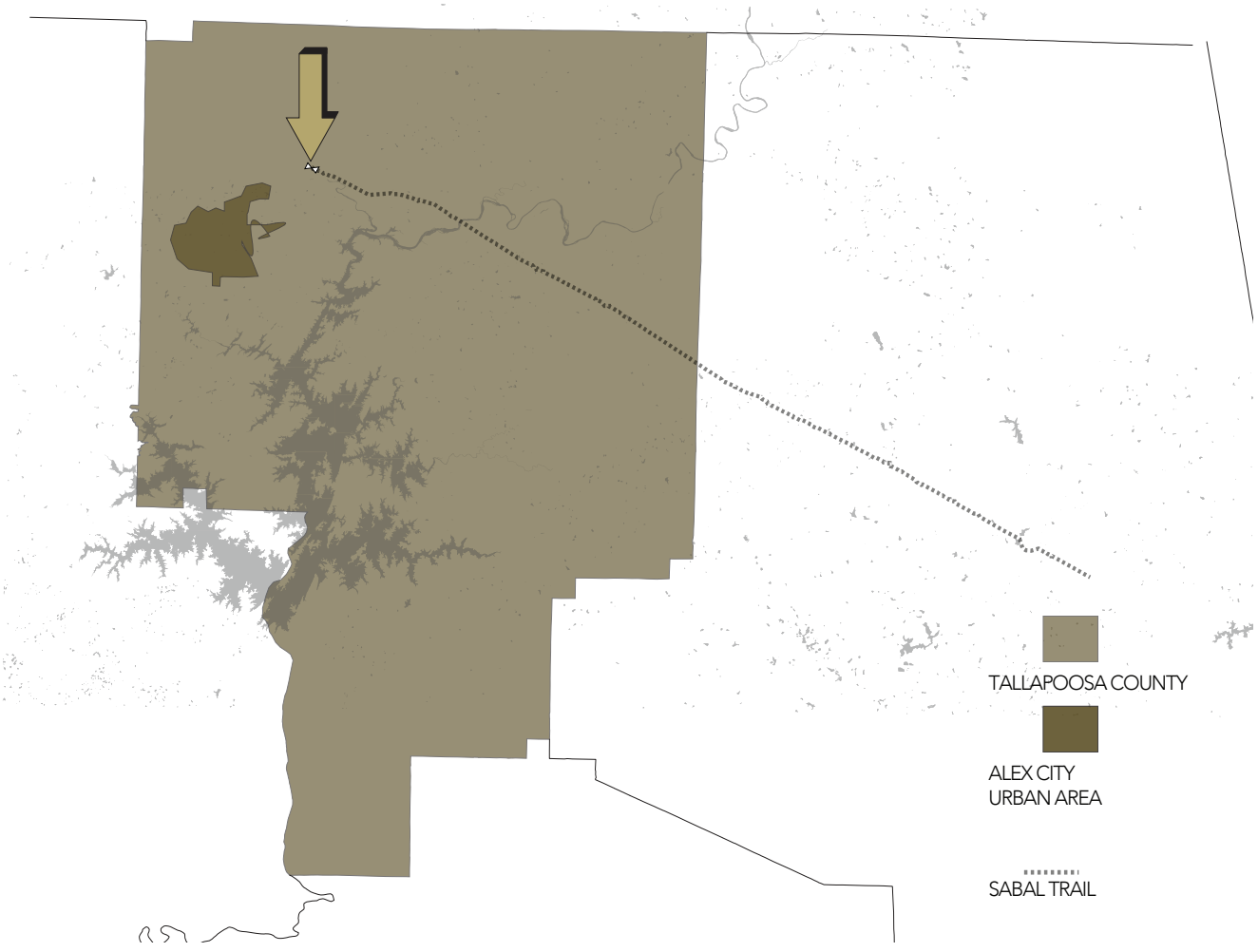
# [THE SITE]
## Tested Nodes




During this year long investigation two different nodes within the network were the scenario for several iterations. The first half of the process was developed in the last node of the network.

This place is located on an existing utility corridor. It is located 5 minutes away from Tiger Town in Opelika. It is the border between Chambers and Lee county. It is crossed by Highway 85. After the first visit to the site several sensorial phenomena were identified. Sound of crickets and insects were prominent, birds signing in the distance, exposed soil with a beautiful red color contrasting with the green grass, tall grasses slowly moving and whispering with the wind. The site has most of the adjacent land-uses present in the corridor: upland forest, pine plantation and open grassland. Any Natural Gas Infrastructure element is found.


NODES 10 MILES
20.000 STEPS
5 HOURS
1 - 2 - 4 - 8 DAYS LOOPS
1- 2 - 4 DAYS LOOPS
16 DAYS LOOP


TALLAPOOSA COUNTY
ALEX CITY
URBAN AREA
SABAL TRAIL

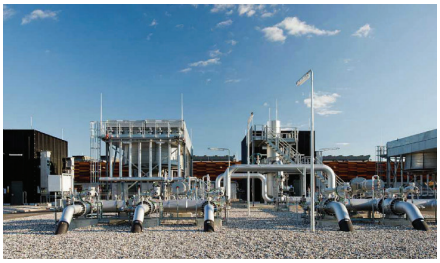



Figure 15. Hilabee Power Plant view. Alex city.

Figure 16. Hilabee Power Plant view. Alex city.

The second half of the investigation focused on the first node of the network. It is located 15 minutes away from Alexander City in Tallapoosa County.

This node has a strong presence of big scale natural Gas infrastructure. Hillabee Generating Station is a three unit, 722 megawatt (MW) combined cycle natural gas power plant located on this node. Big electric posts are shocking in scale. The land in now owned by the Sabal trail and will also accommodate the Hillabee compressor station for the natural gas transportation infrastructure. It is the start point of the 515-mile pipeline. This place is characterized by the high level of noise pollution due to the transformers in the plant. Additionally, the cooler system in the pant is always generating a white smoke that has a have a constant presence in the site

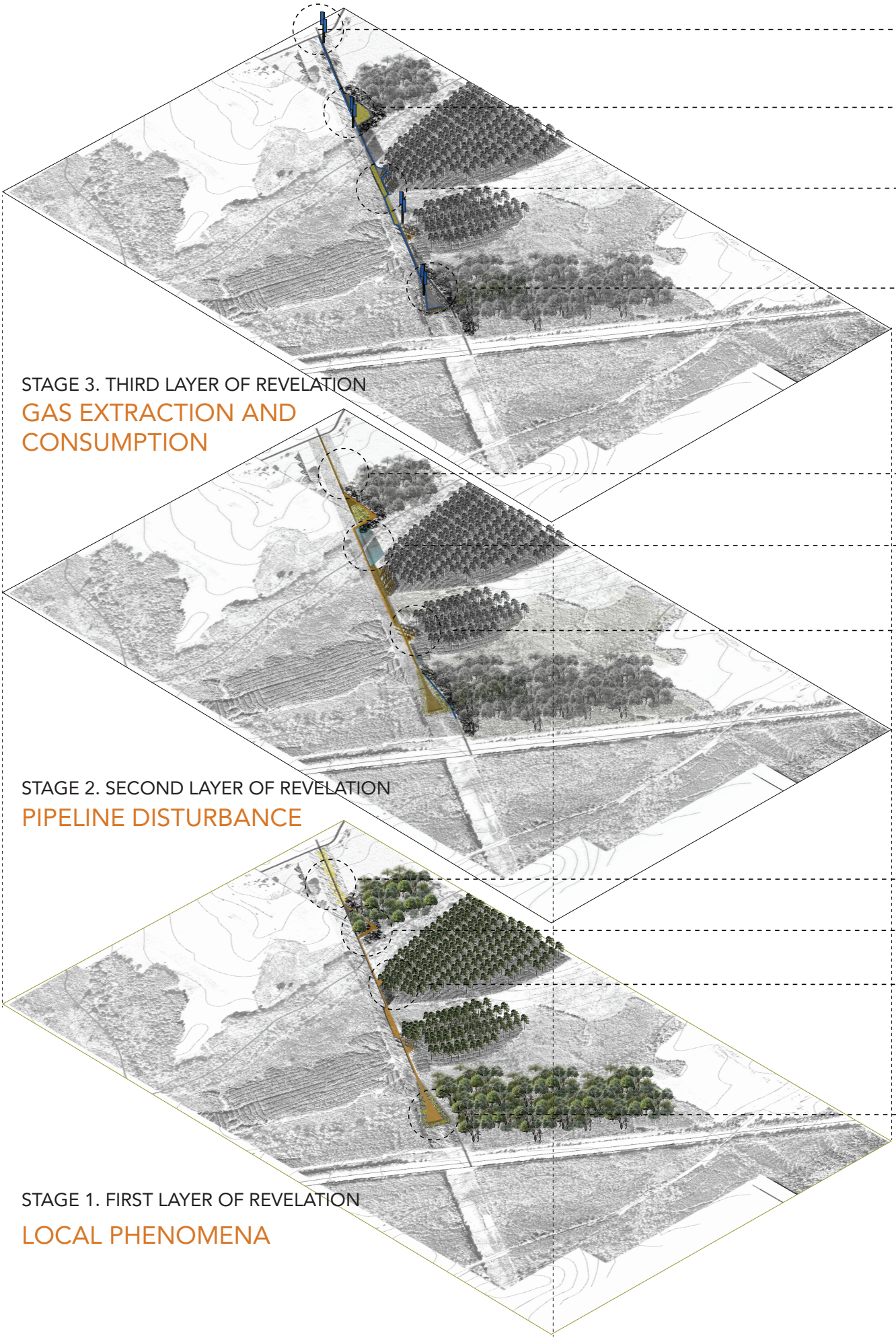
# PART 5 **[DESIGN ITERATIONS]**

Developing Revelatory schemes


OF THESIS
FRACKING

# [DESIGN ITERATION]
## Overview

The aim for this investigation is to test how can revelatory design make legible the local implications of a National Energy Infrastructure Regime. Once the messages have been determined in several scales, a diverse set of revelatory design strategies were tested in the selected nodes. The iterations are evaluated in terms of how clear they convey the messages. During the process, every design test endeavors to deeply understand the relationship between intangible processes related to energy regimes and on-site phenomena. Several schemes were successful showing the tangible phenomena, but revealing processes related to the bigger scale was a challenge. The projects are classified by the main objective instead of a chronological order. Every iteration is explained in terms of the goals to be achieve and the discoveries they generated.



STAGE 3. THIRD LAYER OF REVELATION

## GAS EXTRACTION AND CONSUMPTION

STAGE 2. SECOND LAYER OF REVELATION

## PIPELINE DISTURBANCE

STAGE 1. FIRST LAYER OF REVELATION

## LOCAL PHENOMENA

Revealing processes related with gas extraction.
Technology

Revealing processes related with gas consumption.
Research

Revealing processes related with gas consumption.
Research

Revealing processes related with gas extraction.
Technology

ABSTRACTION ANS SIMULATION AND CHANGING PERSPECTIVES.
cONCRETE MOMENTS OF rEGENERATIVE, NON HUMAN AND HUMEN, VISIBLE AND INVISIBLE ECOSYSTEMS.
pROVIDING vISIBILITY, RESEARCH AND HUMAN EXPERIENCE

Revealing disturbed soils and erosion process

Revealing constructured ecosystem for Mussells

Revealing constructured ecosystem for skinks

EXPOSING INFRASTUCTURE AND CHANGING PERSPECTIVES.
CONCRETE MOMENTS OF REGENERATIVE, NON HUMAN, VISIBLE ECOSYSTEMS

Revealing tall grass and relationship to wind and sounds

Revealing moments related to the surrounding matrix
Native Forest

Revealing moments related to the surrounding matrix
Pine Forest

Revealing moments related to the surrounding matrix
Tall grass amphitheather

SIGNIFYING FEATURES.
cONCRETE MOMENTS OF NON HUMAN, VISIBLE ECOSYSTEMS

# [DESIGN ITERATION]

## Scheme 1. Datum of land-uses

Scheme 1 acknowledges the existing surrounding ecosystems and sees it as an opportunity to reveal its changes over time. The path takes the users to walk along the open corridor amplifying sensorial experiences and it takes the hiker inside some of the adjacent pine forest and upland forest. The landscape performs as a Learning Field where people can understand complex systems, processes, and ecological phenomena occurring at multiple scales.
The revelatory strategy consisted only in providing pause spaces along the path where people would experience natural phenomena.

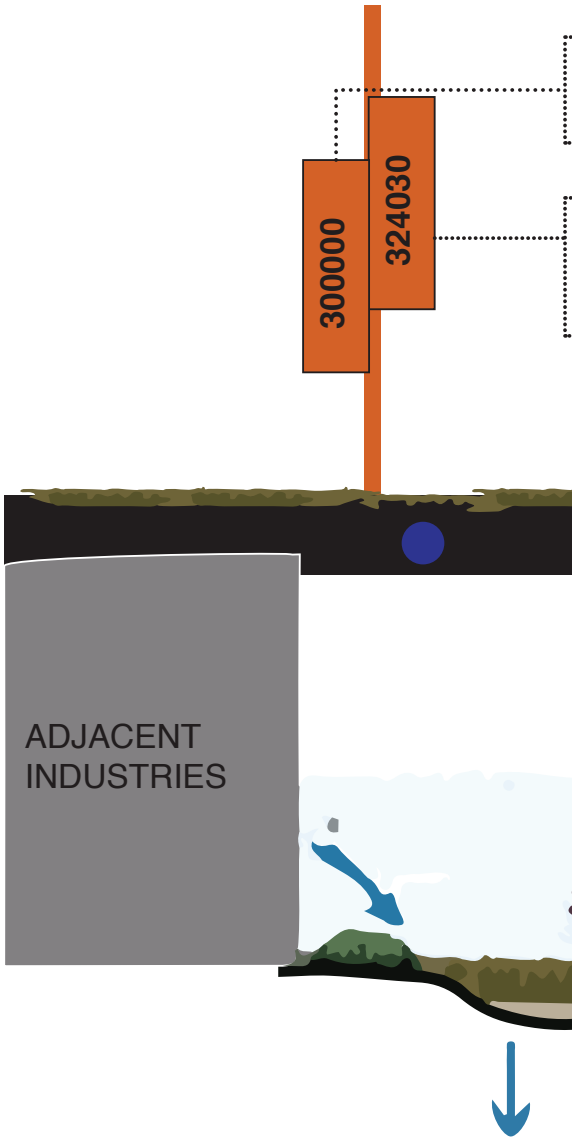
### Discoveries

Some of the constrains of these scheme is the lack of clarity in the message. The user may be confused by showing several aspects of the disturbance such as soil erosion or mussel ecosystems disturbance. In that case, it is better to select one aspect and reveal it with clarity.




This strategy seeks to reveal processes of pipeline construction and volume of gas crossing specific points. By revealing real data regarding the volume of gas, a connection between the landscape and a further scale of phenomena is created. Big LED screens will show those values.
When the user visits this place they will learn about the amount of resources flowing underneath their feet.





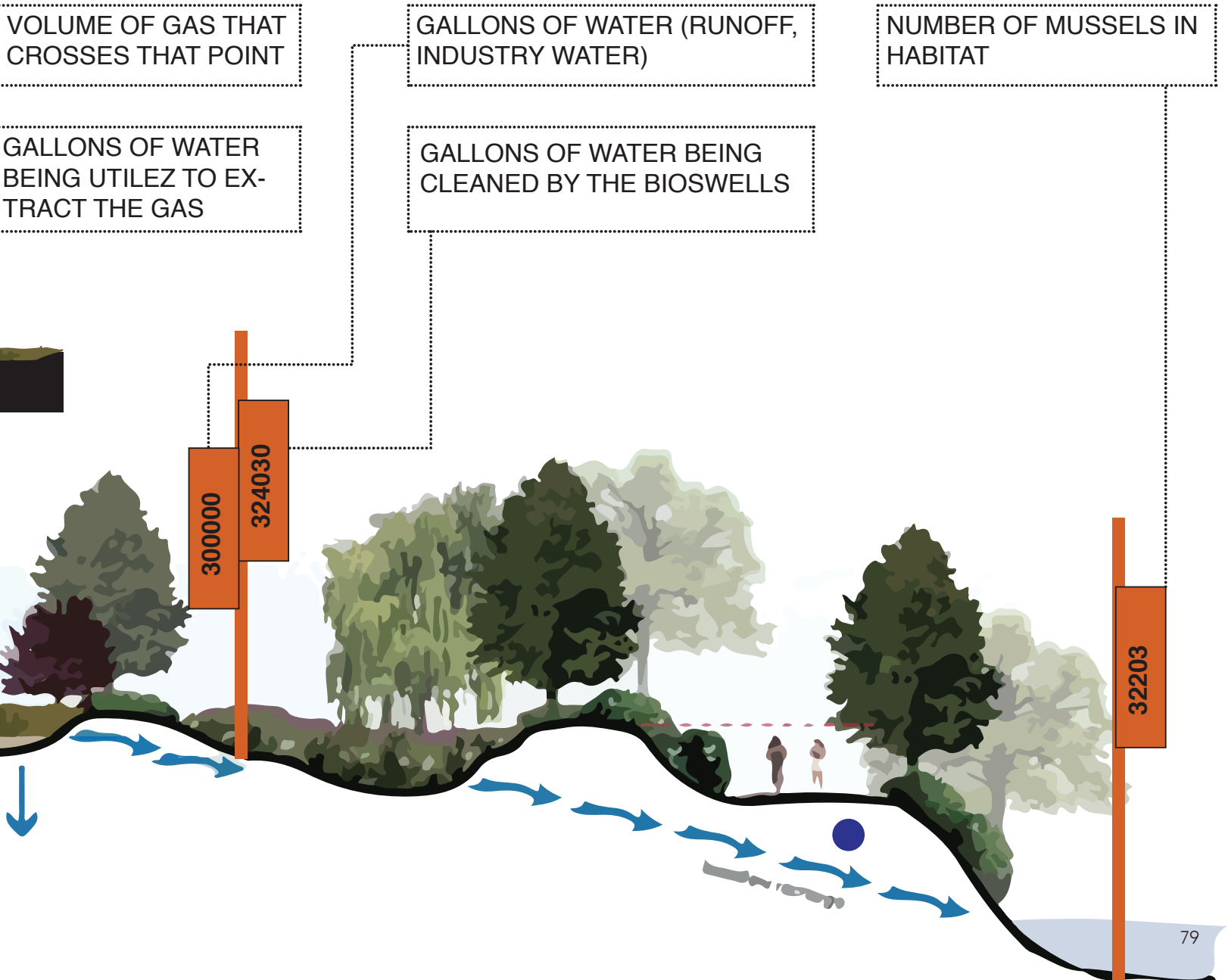


# Scheme 2. Natural Gas Data Display

The landscape performs as a display space of energy regimes data that fashions the node. Additionally, the screens can provide information about ecological processes occurring on site such as number of mussels that returned to the ecosystems after the disturbance, or the volume of water utilized to generate that volume of gas.

## Discoveries

Once again, the constrains of this strategy is the lack of clarity in the message to be revealed. It seemed that the success of the revelation depends not only on showing hard data. Creating a way to compare or show the meaning of that information on the landscapes can created a deeper understanding of the intangible processes.



# CREATE A RELATION BETWEEN EXTRACTION AND CONSUMPTION PROCESSES WITH MUSSELS HABITAT


## EXTRACTION

FRACKING PROCESS

Amount of water being used to produce the X volume of gas.

## TRANSMISSION

MUSSELS ECOSYSTEM

X Volume of Gas Crossing the point in relation on x# of samples in habitat

## CONSUMPTION

ENERGY CONSUMPTION

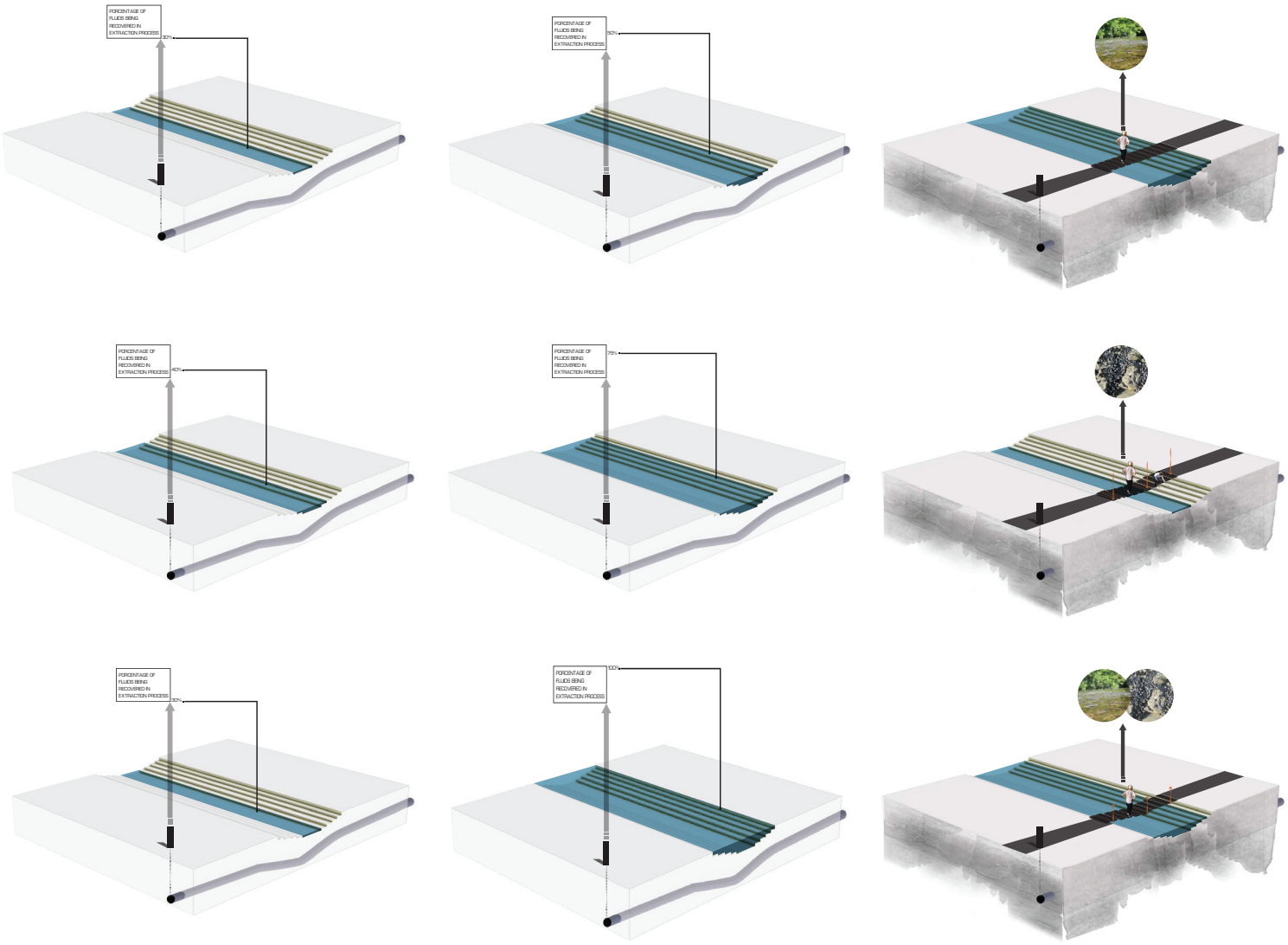
Amount of enegy Being consumed traduce in temperature.

## AMOUNT OF WATER

## TEMPERATURE OF WATER

### TEST 1

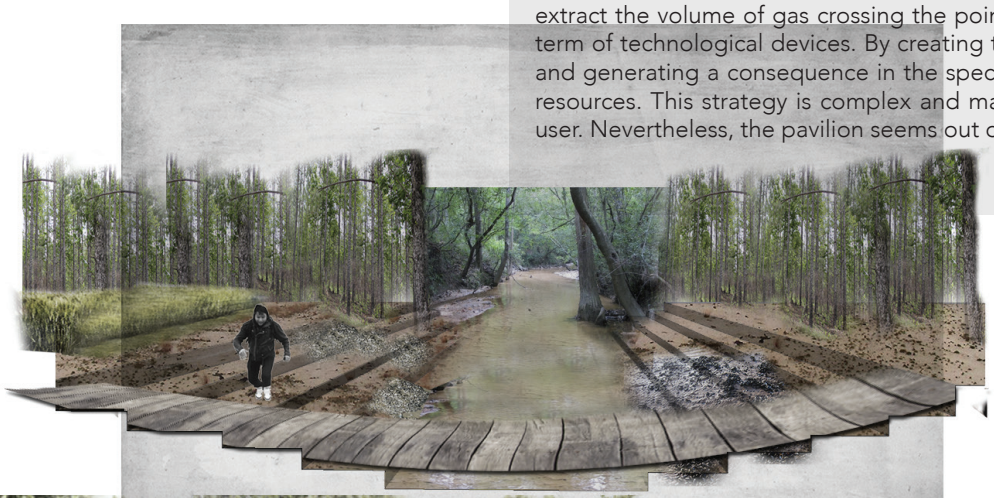
### TEST 2

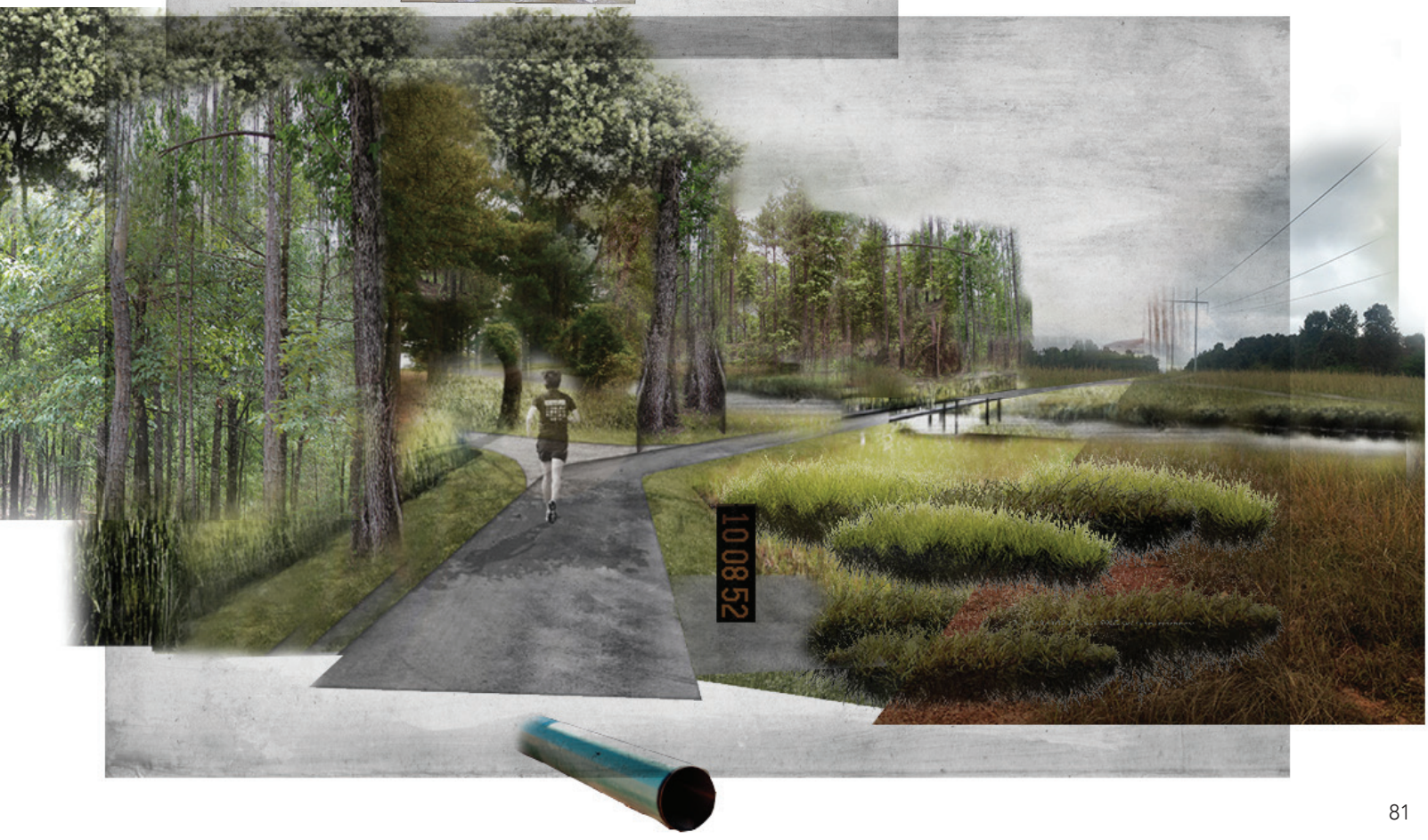


# Scheme 3. Extraction Simulation

## Discoveries

Trying to generate a one-to-one relationship with the node and places of extraction is the main goal of this strategy. To accomplish that, drilling effects to extract natural gas is analyzed. The proposal consists in a series of pools in the mussels' habitat along the corridor which tide fluctuates in relation to the volume of water utilized to extract the volume of gas crossing the point. This strategy requires big investment in term of technological devices. By creating this relationship between extraction places and generating a consequence in the specific node people may have a better use of resources. This strategy is complex and maybe a ground breaking experience of the user. Nevertheless, the pavilion seems out of place.





# CREATE A RELATION BETWEEN EXTRACTION AND CONSUMPTION PROCESSES WITH MUSSELS HABITAT


## EXTRACTION

FRACKING PROCESS

Amount of water being used to produce the X volume of gas.

## TRANSMISSION

MUSSELS ECOSYSTEM

X Volume of Gas Crossing the point in relation on x# of samples in habitat

## CONSUMPTION

ENERGY CONSUMPTION

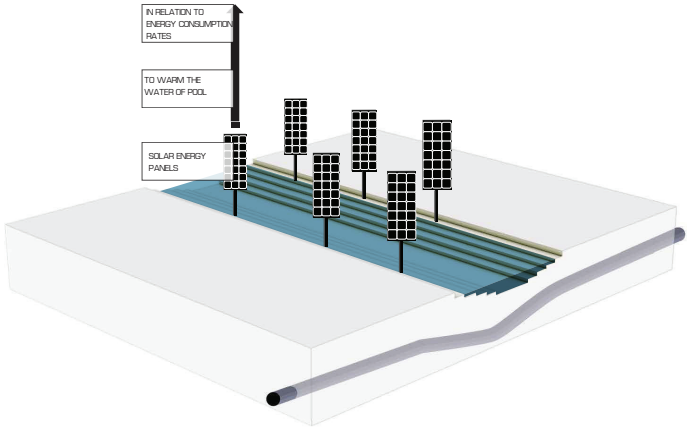
Amount of enegy Being consumed traduce in temperature.

## AMOUNT OF WATER

## TEMPERATURE OF WATER

### TEST 1

### TEST 2



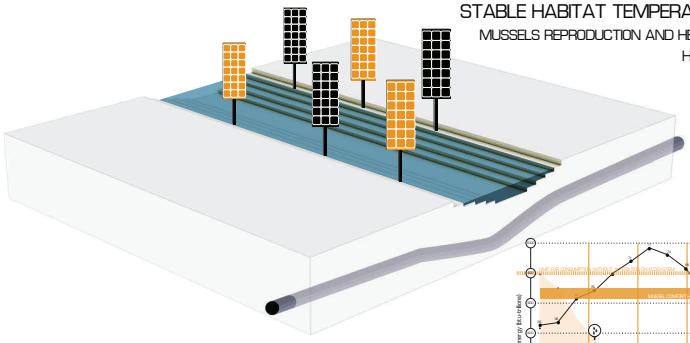

AVERAGE TEMPERATURE: 36°

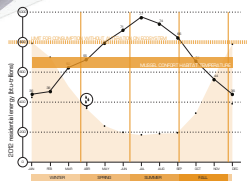
ENERGY CONSUMPTION: <800 BTU-TRILLIONS OR 844,000 J

WATER TEMPERATURE: 50-55°

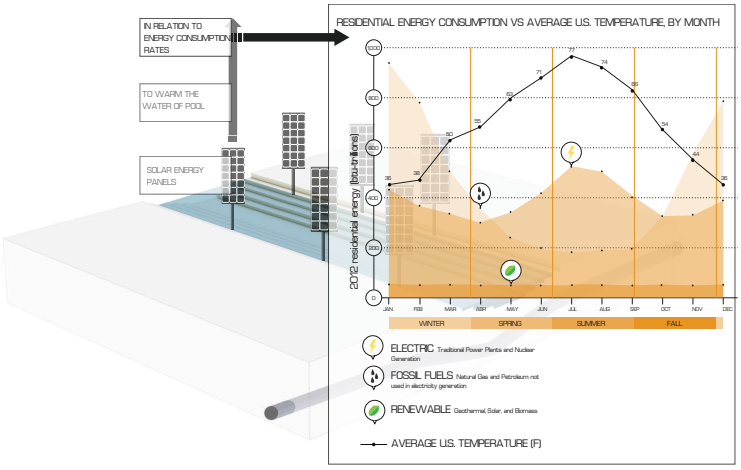
STABLE HABITAT TEMPERATURE

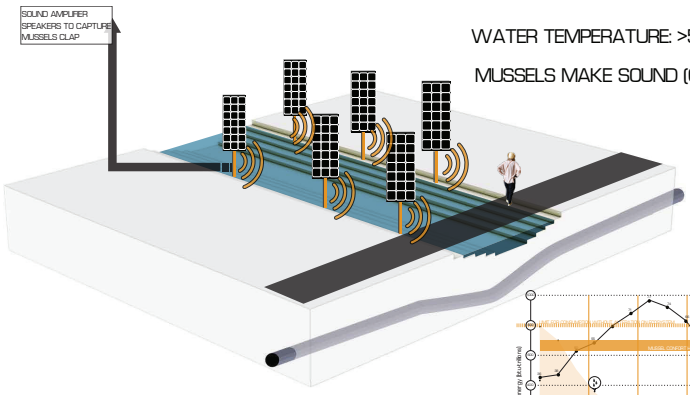
MUSSELS REPRODUCTION AND HEALTHY HABITAT





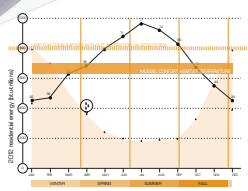
ITER: DECEMBER




WATER TEMPERATURE: >50-55°

MUSSELS MAKE SOUND (CLAP)

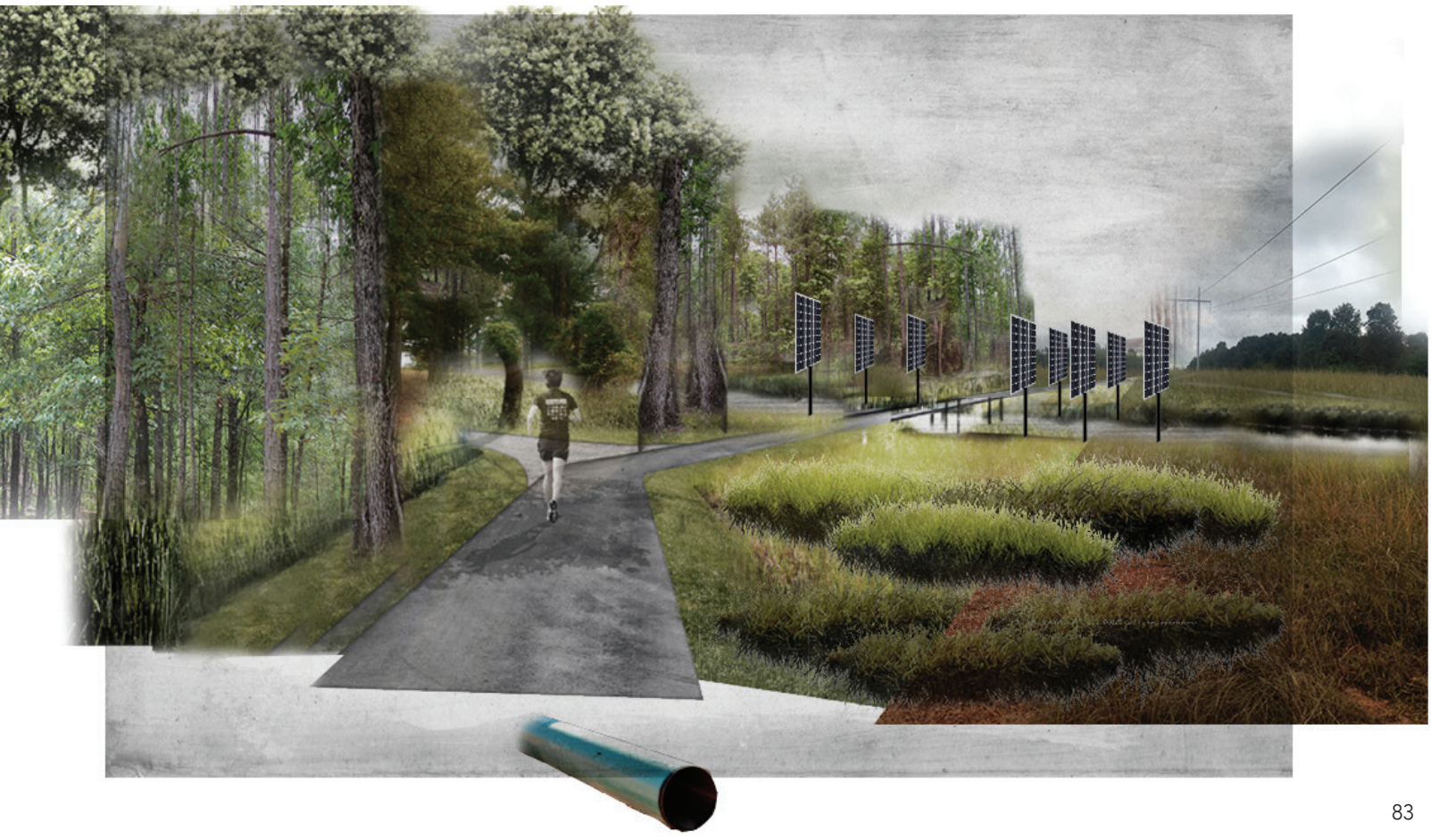


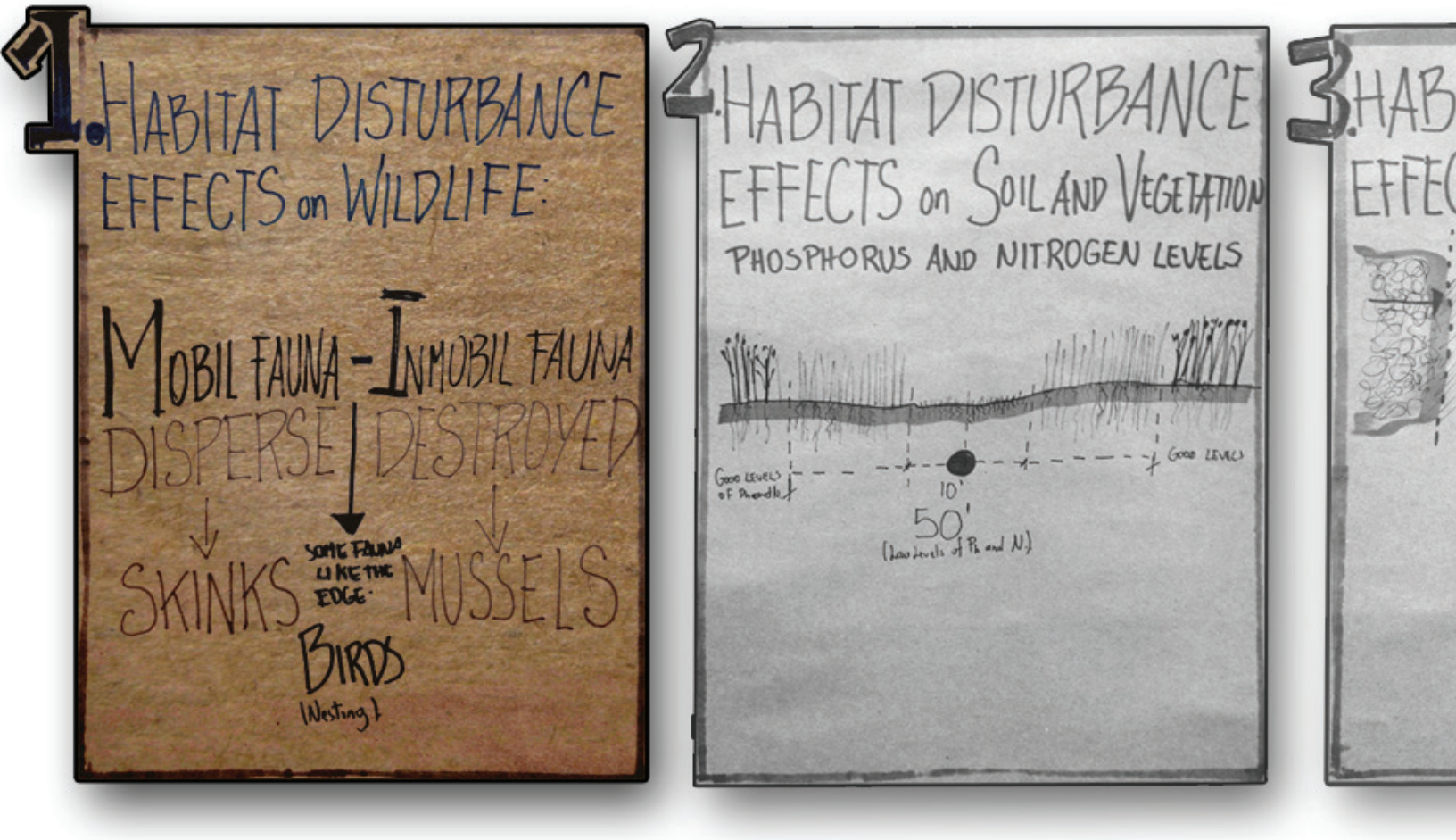
IER: MAY

# Scheme 4. Consumption simutation

## Discoveries

Similar to scheme 3 Consumption simulation is a strategy that attempts to create a one-to-one relationship with places of consumption. Energy consumption rates of Alabama, Georgia, and Florida will have a direct repercussion on site. The same pools are main piece of the proposal. This crafted mussel ecosystem will be connected to solar panels that will heat the water when consumption rates increase in the city. Mussels are highly sensitive to water temperature and when it rises they generate a clapping noise. This strategy also seems complex and prejudicial for the site ecosystem. The discovery of these set of strategies is that one-to-one relation landscapes may work in a different setting. The amount of energy and sources to make this proposal work can be beneficial in an area of the city with more accessibility to people.





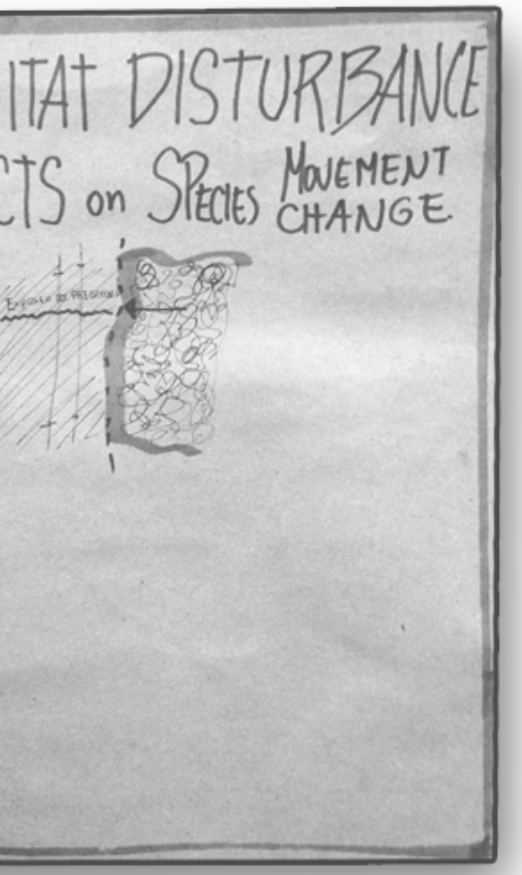

**Existing habitat** → **Pipeline construction** → **After Pipeline construction**

| | | |
|---|---|---|
| Inmobile species | Moved from habitat | Won't return without intervention |
| Mobile species | Dispersed from habitat | May return after disturbance stops |

**Remember the past** ← **Revelatory pavilion** → **Quantify the future.**

# [DESIGN ITERATION]

## Scheme 5. Habitat disturbance



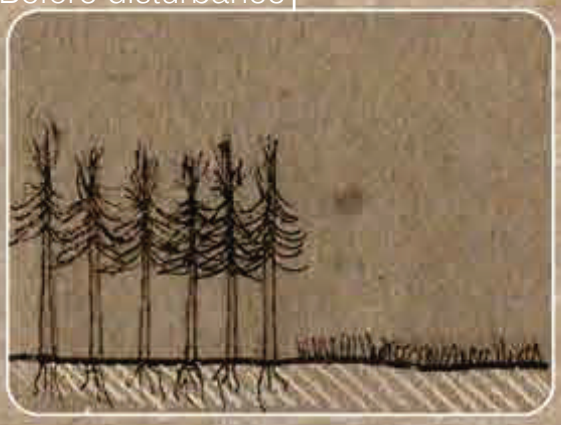

Moving forward to the idea of creating a relationship with intangible processes occurring far from the point, this strategy focuses on amplifying the site potential or indicator species. Scheme 5. Skink Museum utilizes the Southern Five Line Skink as an indicator of disturbance and ecosystem health. An underground pavilion is created. It utilizes the scale of the body to frame the view of the skinks ecosystem. Remaining logs from the pine plantation are utilized to create this constructed habitat. The tunnel frames the logs in a way that the human can have an advantageous point of view and may encounter a specie. The purpose is to reveal the presence of wildlife, represented by the skinks, in a highly disturbed type of landscape.

### Discoveries

This type of approach fits more into the local scale because the decisions and phenomena have a direct correlation with the site. In that regard, revelation appears to be stronger if it is defined by on site characteristics. The approach is not able to record the state of the ecosystem over time. It simply amplifies a moment in time.

# TEST #1

Before disturbance



Right After pipeline

Years After p

# TEST #2

Years After p

Before disturbance

Right After pipeline

# TEST #3

Years After p

Before disturbance

Right After pipeline

pipeline

## Results and Learning:

Using barks of removed pines to create a new skink habitat . Using this element revealed the prior ecosystem and the distrurbance as a remanecence on the land.

It is not revealing the proccess for the skinks after the pipeline, How they inhatit this land again or not.

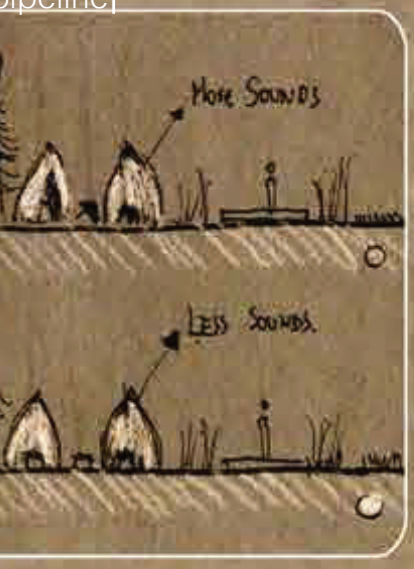
pipeline

## Results and Learning:

Using barks of removed pines to create a new skink habitat . In this test, path crosses thae ecosystems. User have more contact with specie

It is not revealing the proccess for the skinks after the pipeline, How they inhatit this land again or not. Humans itself will become the disturbance and the change for interaction is reduced.

pipeline




## Results and Learning:

Using barks of removed pines to create a new skink habitat . This pavilion has a shape that will increase the sound of the ecosystems. It mixes technology and revelation.

It may revealed procceses over time but if does not show the past or future. It is an experience that depend on a specific time and moment.

# TEST #4

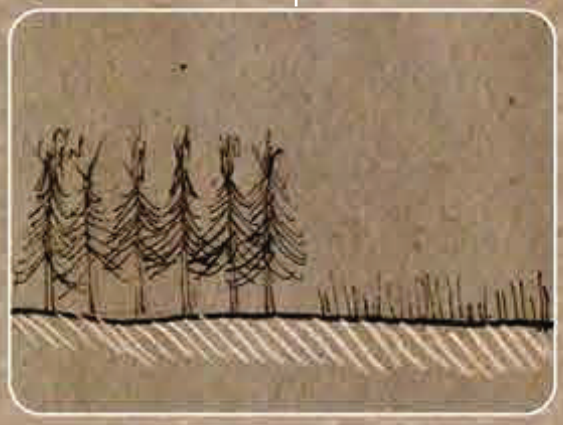
Before disturbance

Right After pipeline

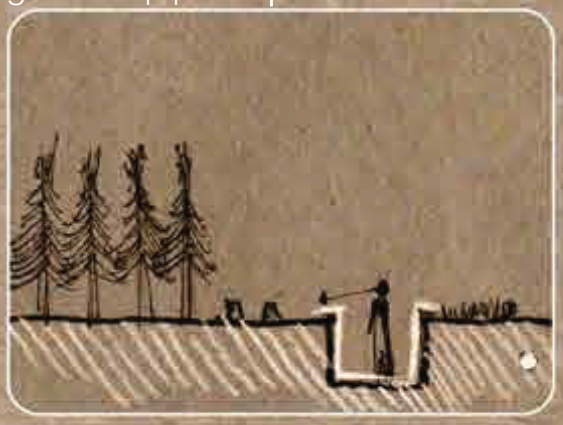
Years After p

# TEST #5

Before disturbance



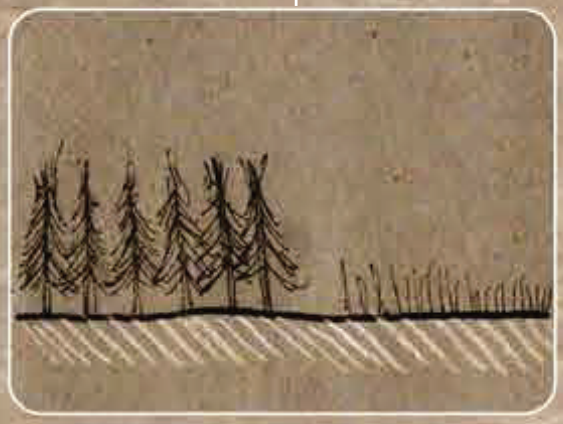
Right After pipeline



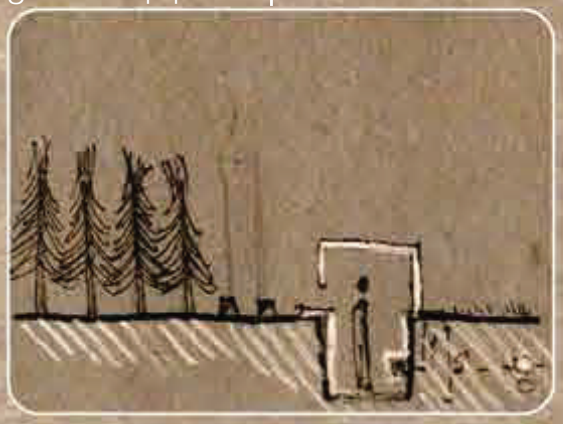
Years After p

# TEST #6

Before disturbance

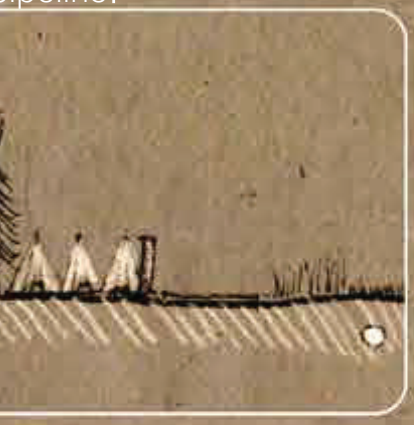


Right After pipeline



Years After p

pipeline



## Results and Learning:

Using barks of removed pines to create a new skink habitat . This pavilion has a shape that will increase the sound of the ecosystems. It mixes technology and revelation.

Addition of signs that will quantify the number of individuals in the ecosystems. It showing the past. and also present and future. Humans are still a disturbance.

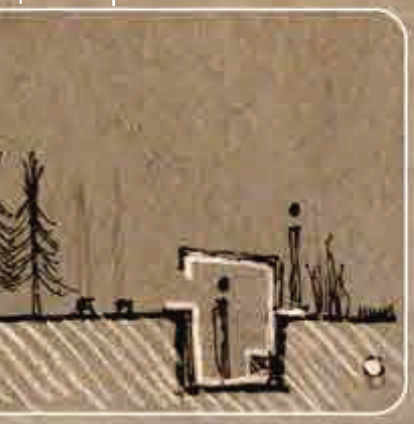
pipeline

## Results and Learning:

Using barks of removed pines to create a new skink habitat .The human scale is important. By taking the eye view to the ground the user will be able to experiencce other scales of the skink ecosystem. therefore there is more change of interaction.

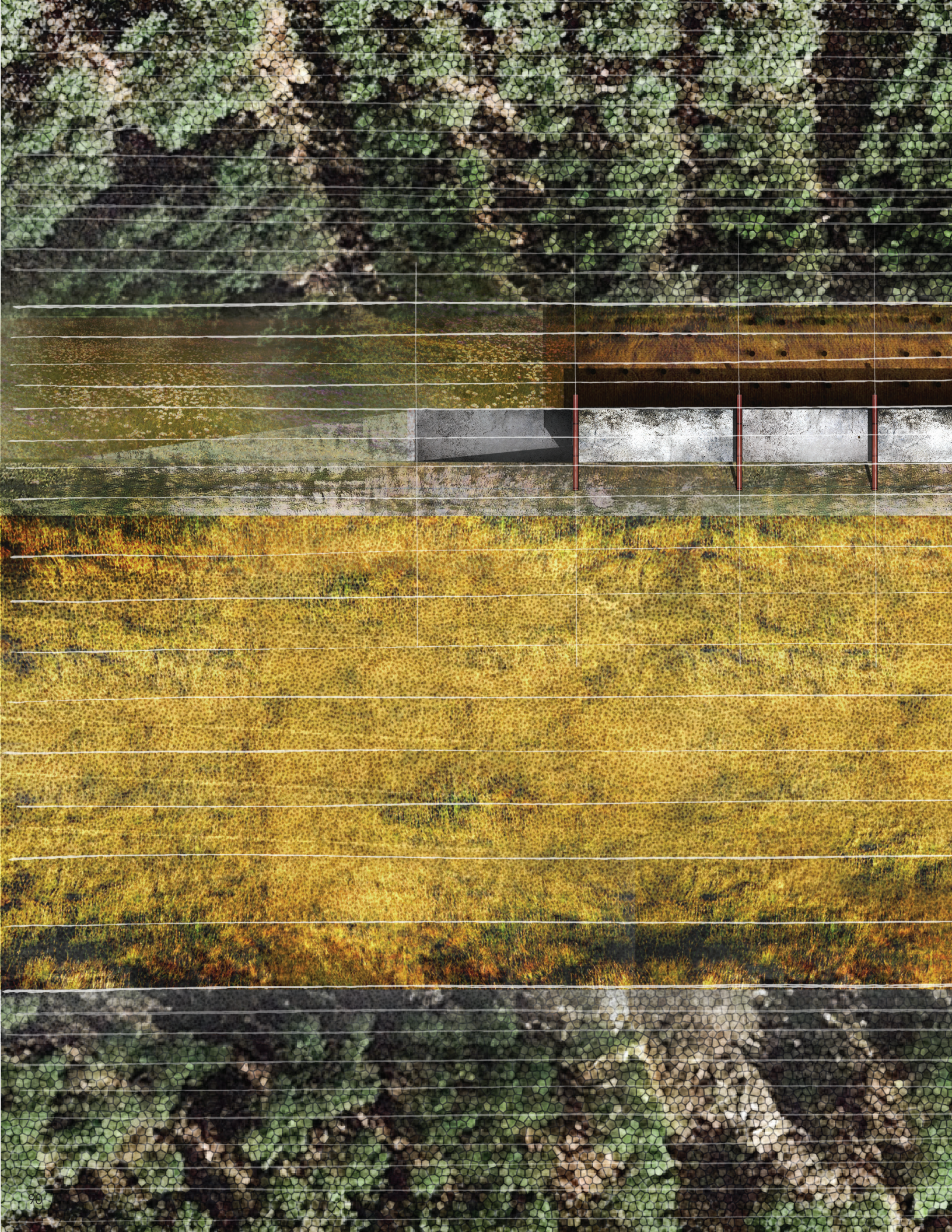
It is not revealing the proccess . It is quantifuying the past by using steel panels with wholes. The ecosystem is not being strongly revealed.

pipeline

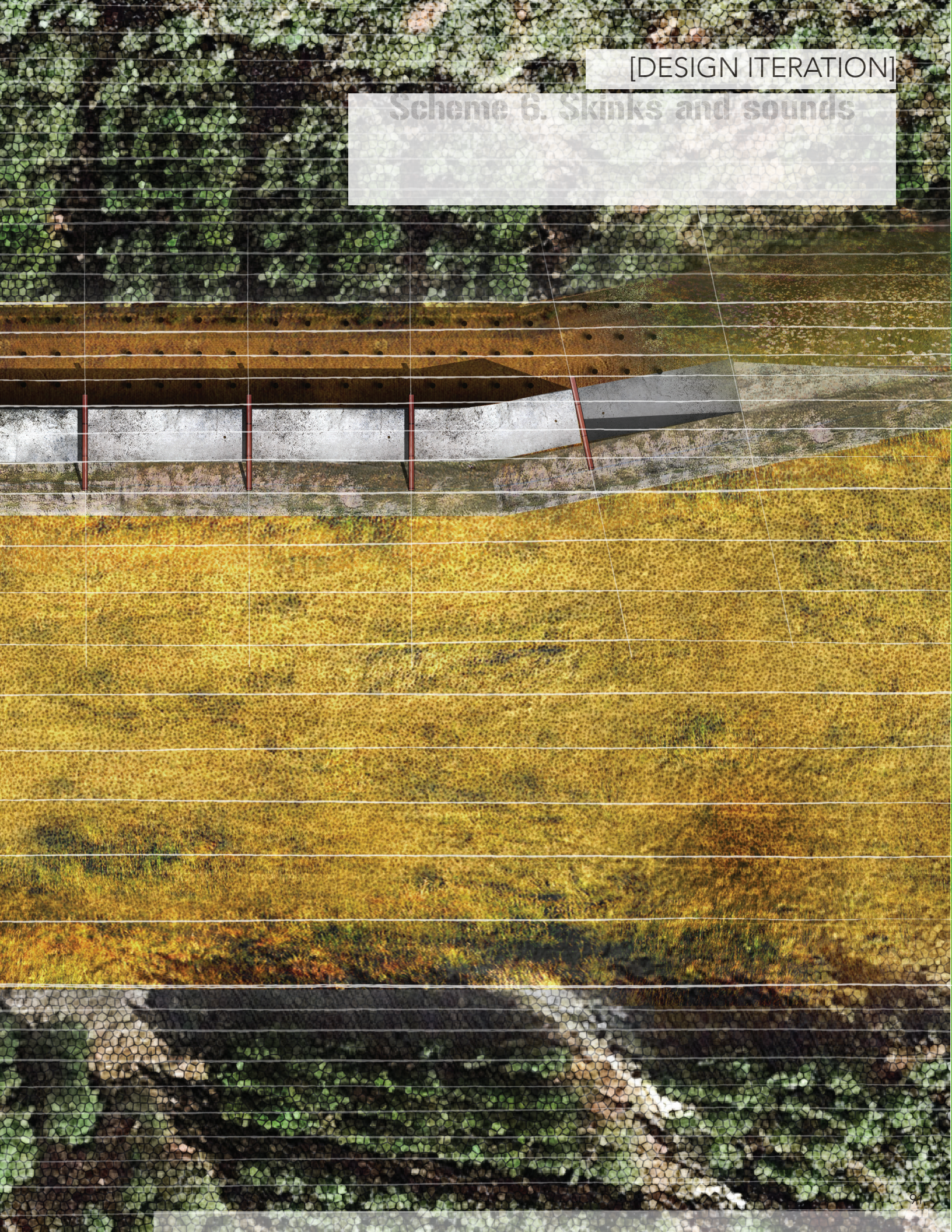


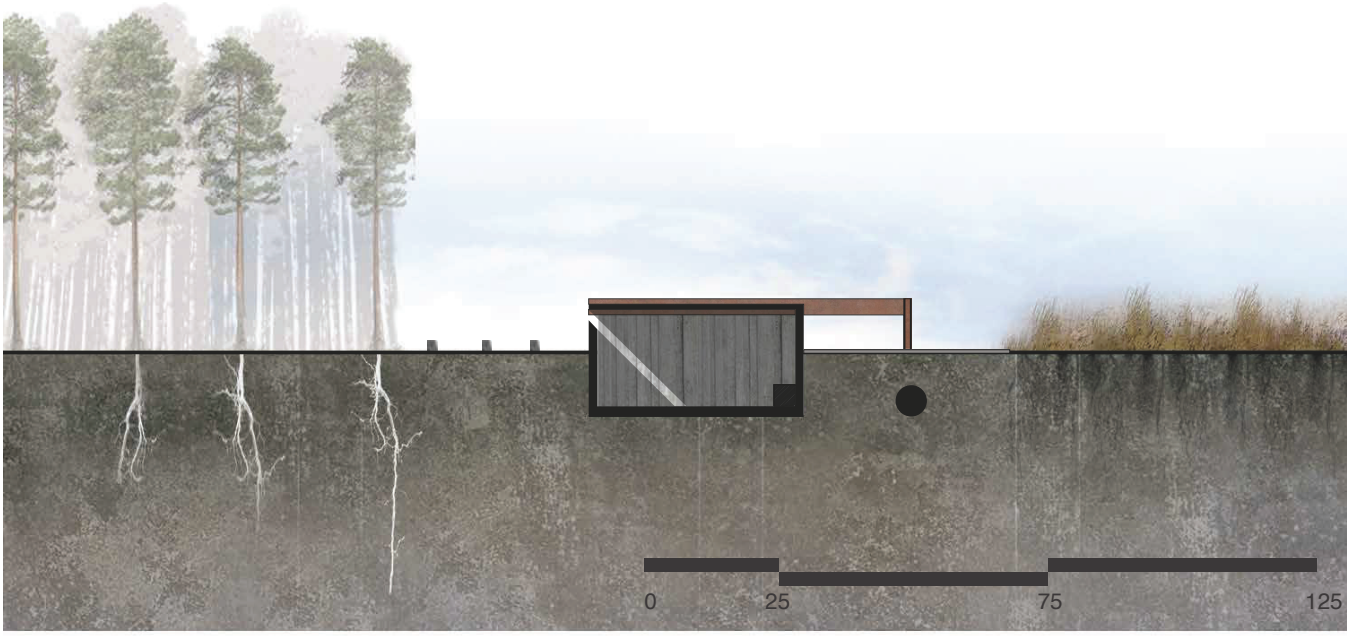
## Results and Learning:

Using barks of removed pines to create a new skink habitat .The human scale is changed to experience the skink ecosystems, plus the user is hidden so it wont be a disturbance for the skinks. Succesful showing past. Still weak showing the future..



# Scheme 6. Skinks and sounds

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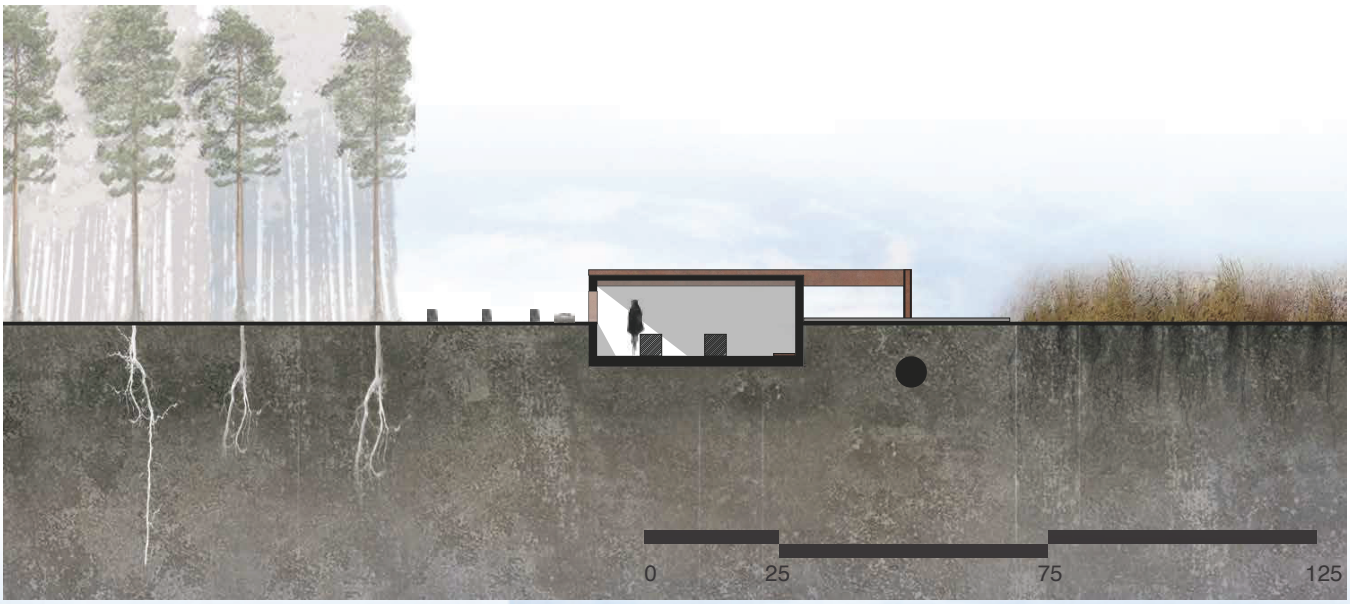
75
125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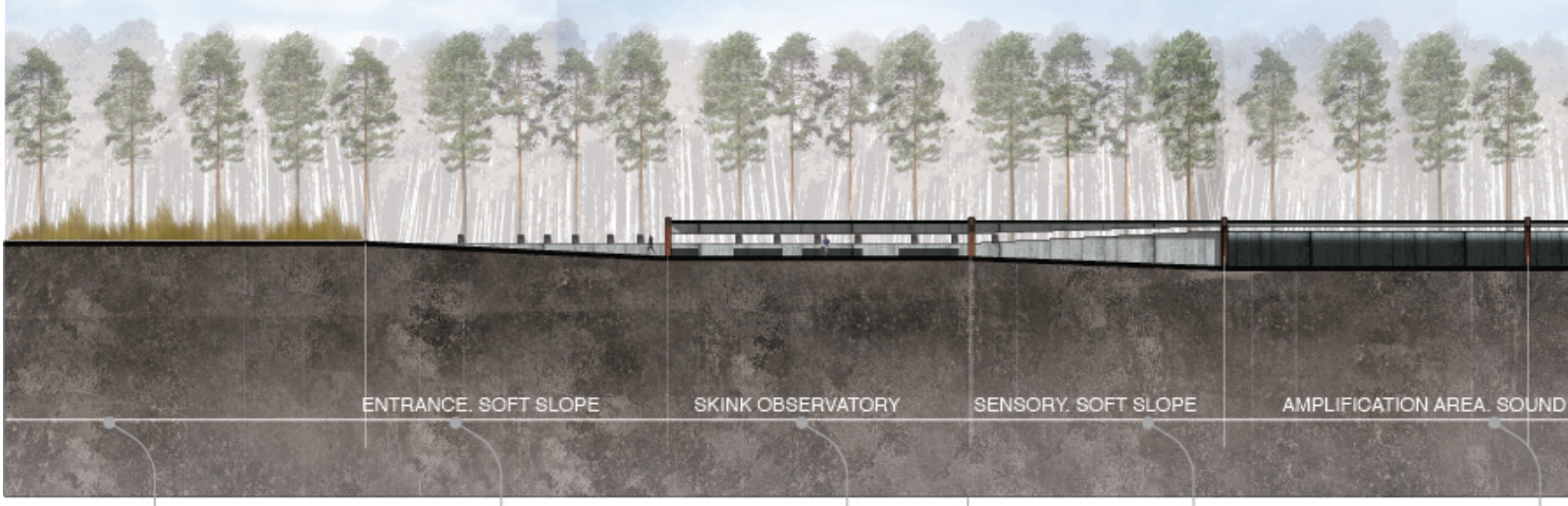
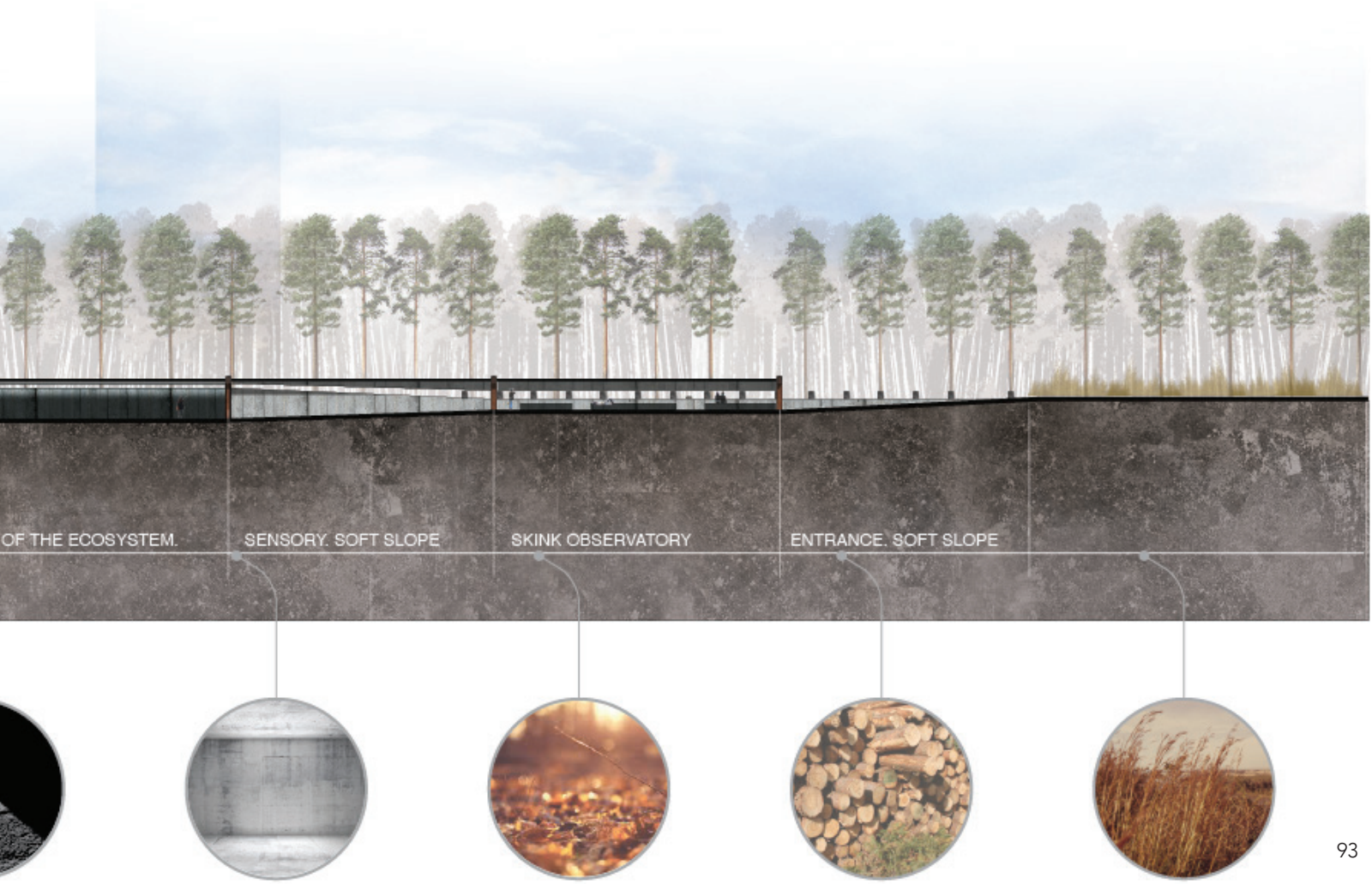

ENTRANCE. SOFT SLOPE
SKINK OBSERVATORY
SENSORY. SOFT SLOPE
AMPLIFICATION AREA. SOUND

# [DESIGN ITERATION]
## Scheme 6. Skinks and sounds

## Discoveries

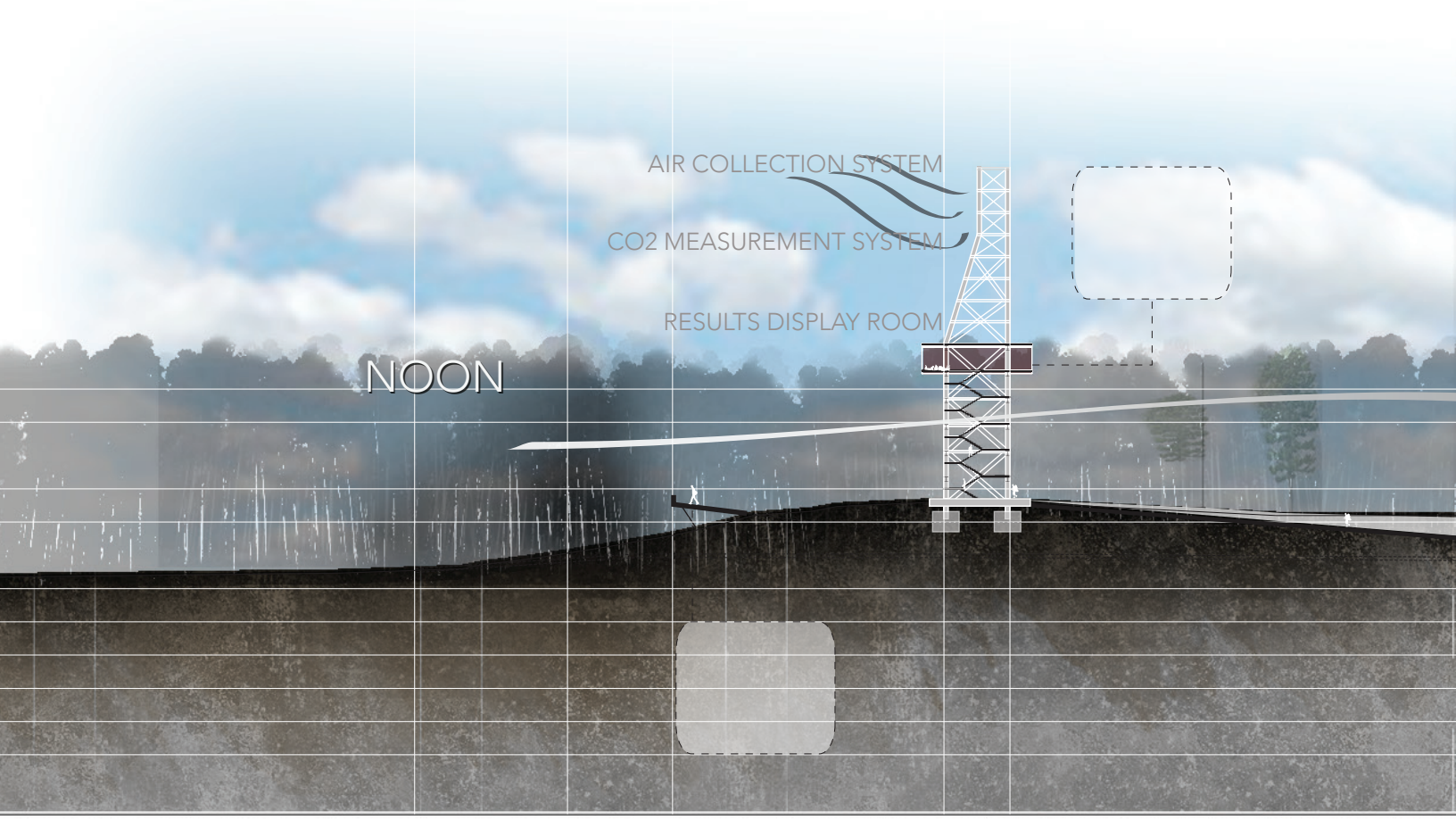
Hearing is a great sense to generate connections with a site. This pavilion proposes to amplify the existing sound of the forest in order to reveal the visitor the presence of wildlife in the corridor that may seem imperceptible to the eye. A sensorial experience is provided. By creating dark spaces, sounds can be experienced in a deeper manner. The user will walk a soft transition until arriving to the darkest room. Here the sounds of the adjacent ecosystem will be amplified. This strategy allows the human to have a connection with the place and to experience a very intimate moment with the site. One of the main questions generated by this iteration is whether or not the space should record and quantify indicator species in case the sound revelation is not enough.




5 MIN WALKING
2 MIN WA

## Scheme 7. Camping over night

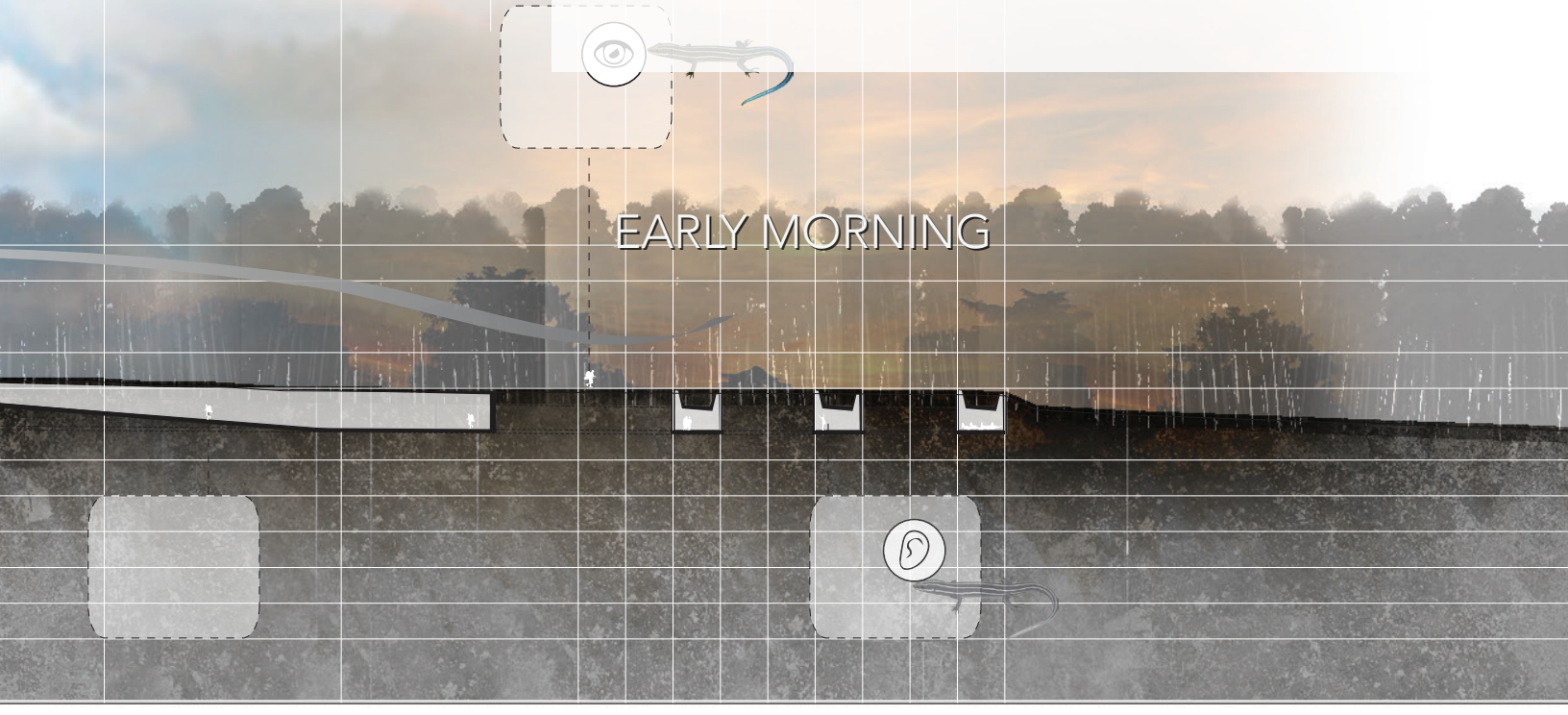

LATE AFTERNOON


AIR COLLECTION SYSTEM
CO2 MEASUREMENT SYSTEM
RESULTS DISPLAY ROOM
NOON

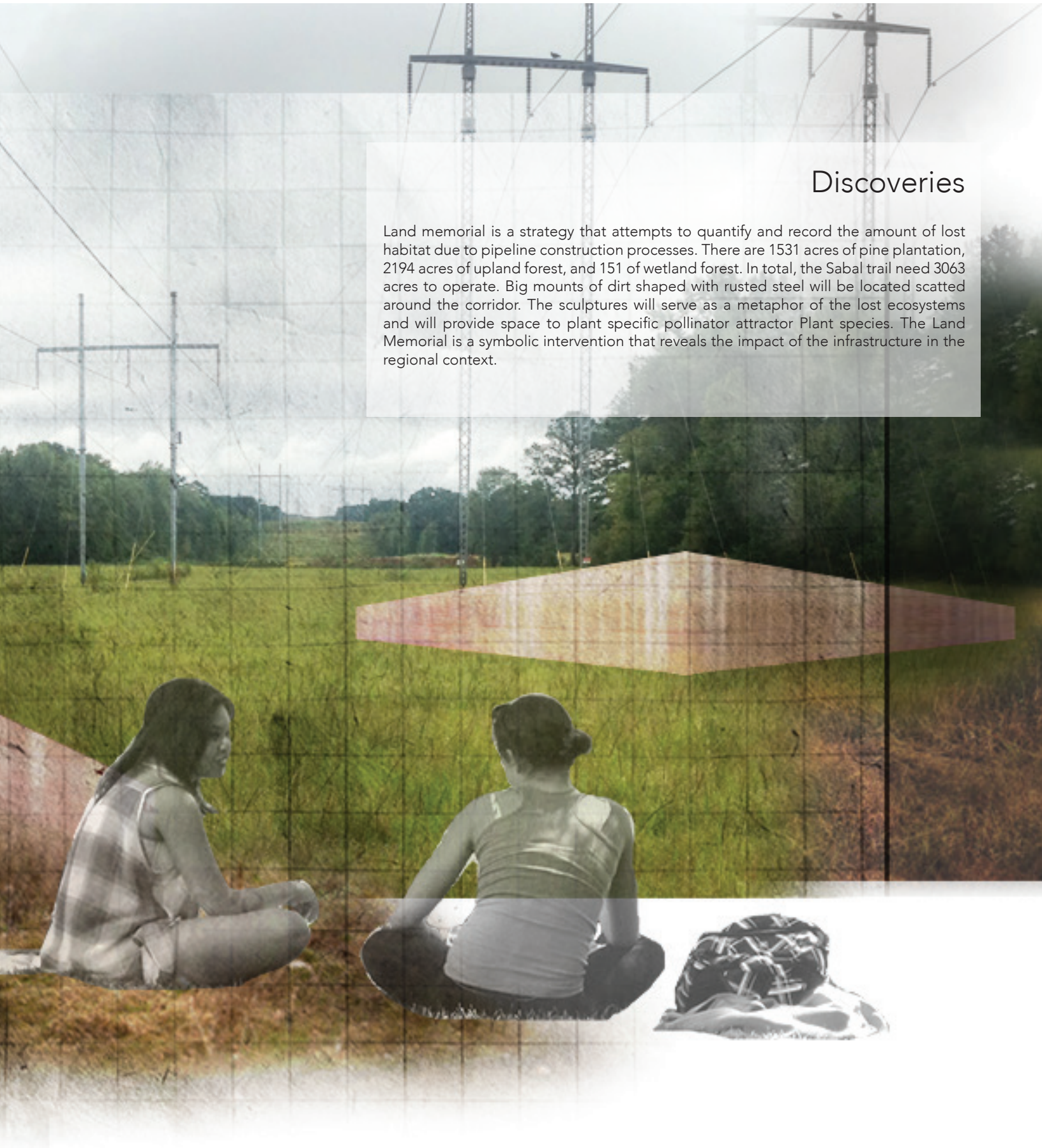
# Scheme 7. Camping over night


## Discoveries

Providing a detailed experience for the visitor can be beneficial to ensure that the message is revealed. The major question that emerged by this iteration was how can the design generate the same experience if the user doesn't follow the detailed schedule and times proposed for the visit. Measuring the area in terms of minutes and steps is beneficial to understand the experience of the user walking the space.

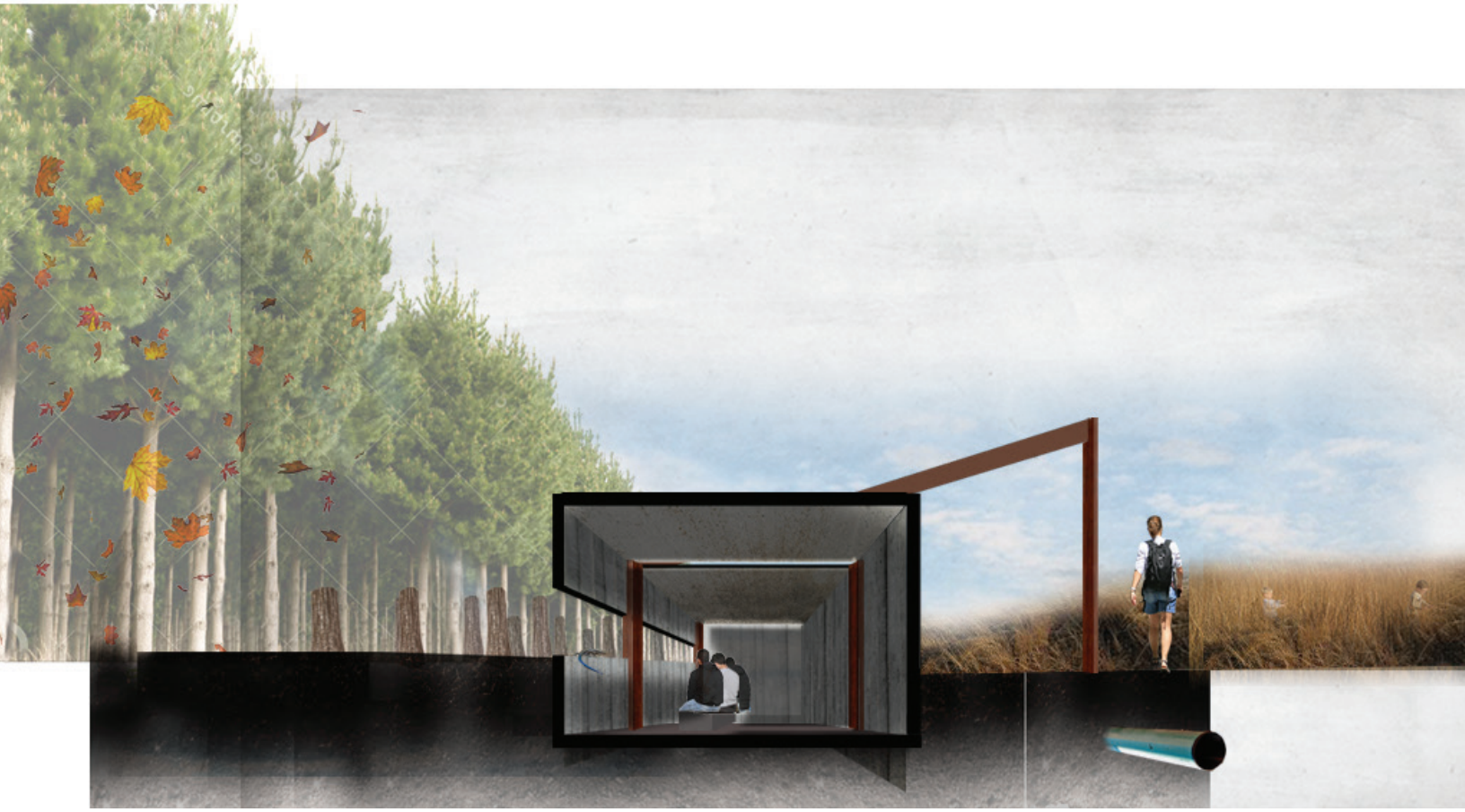


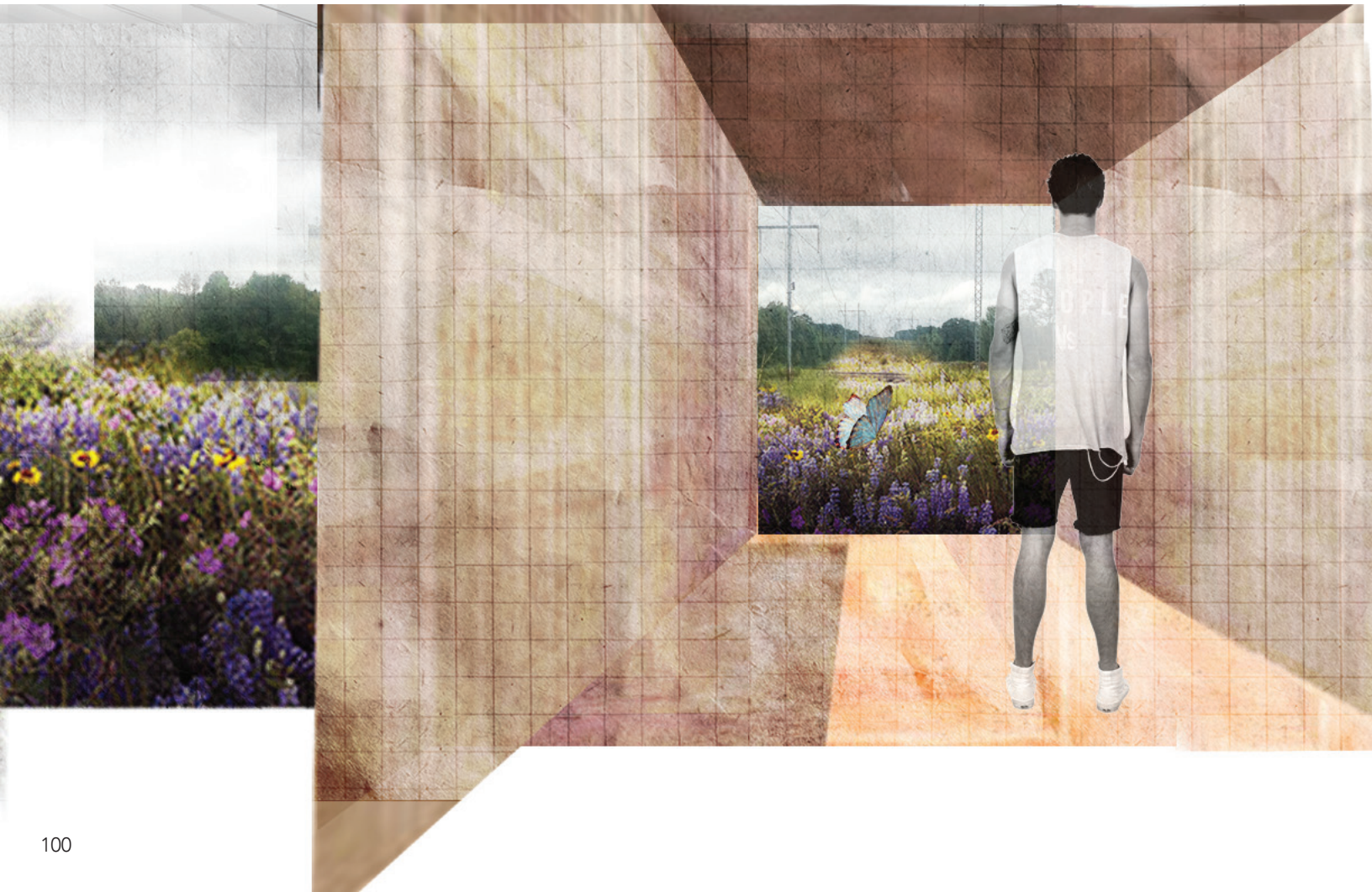
# Scheme 8. Land Memorial



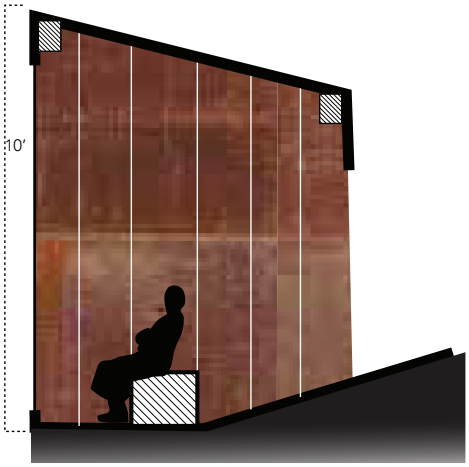
## Discoveries

Land memorial is a strategy that attempts to quantify and record the amount of lost habitat due to pipeline construction processes. There are 1531 acres of pine plantation, 2194 acres of upland forest, and 151 of wetland forest. In total, the Sabal trail need 3063 acres to operate. Big mounts of dirt shaped with rusted steel will be located scatted around the corridor. The sculptures will serve as a metaphor of the lost ecosystems and will provide space to plant specific pollinator attractor Plant species. The Land Memorial is a symbolic intervention that reveals the impact of the infrastructure in the regional context.



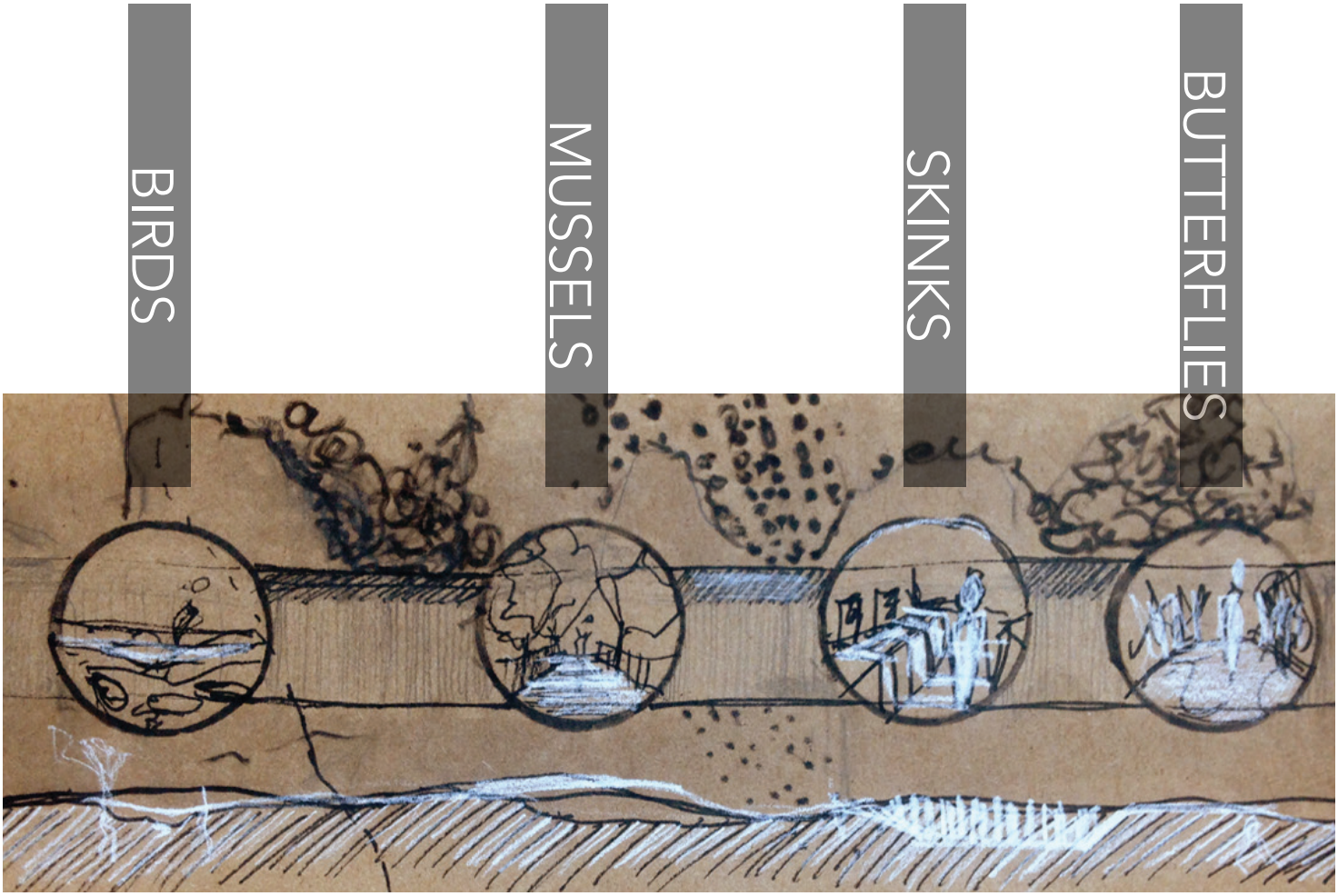


# Scheme 9. Camouflage Landscape

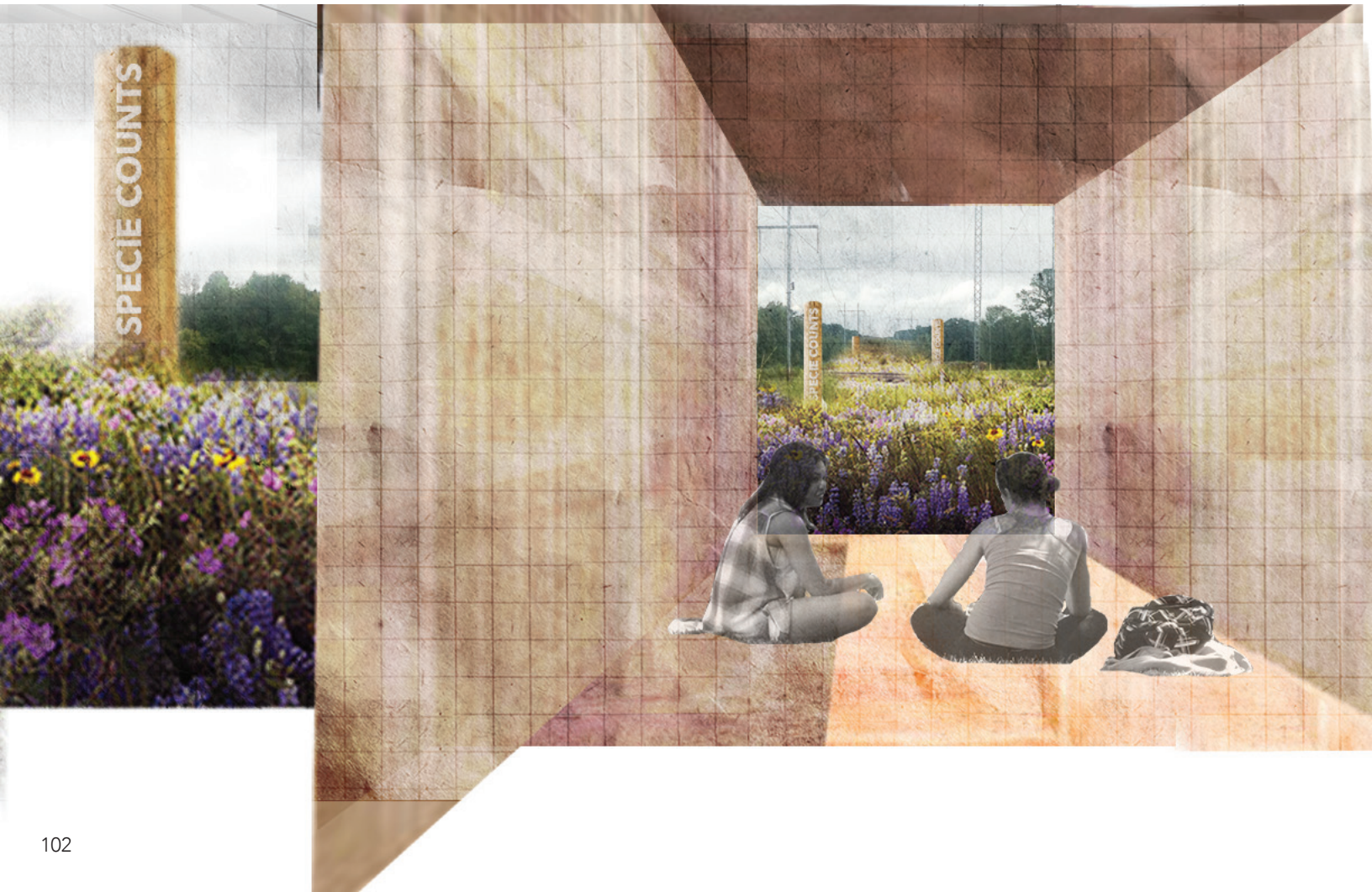



## Discoveries

Scheme 9 seeks to design spaces where the visitor can experience the presence of indicator species. These set of pavilions intent to hide or camouflage humans in the open corridor with the goal to encounter mammals, birds, pollinators, and reptiles that in normal conditions wouldn't be perceptible to the eye. The strategy frames the view and uses the body scale to create comfortable spaces where people can stay for longer periods of time if they are interested in any of these species. Pavilions designed under this rule can serve as overnight rooms for hikers as well.



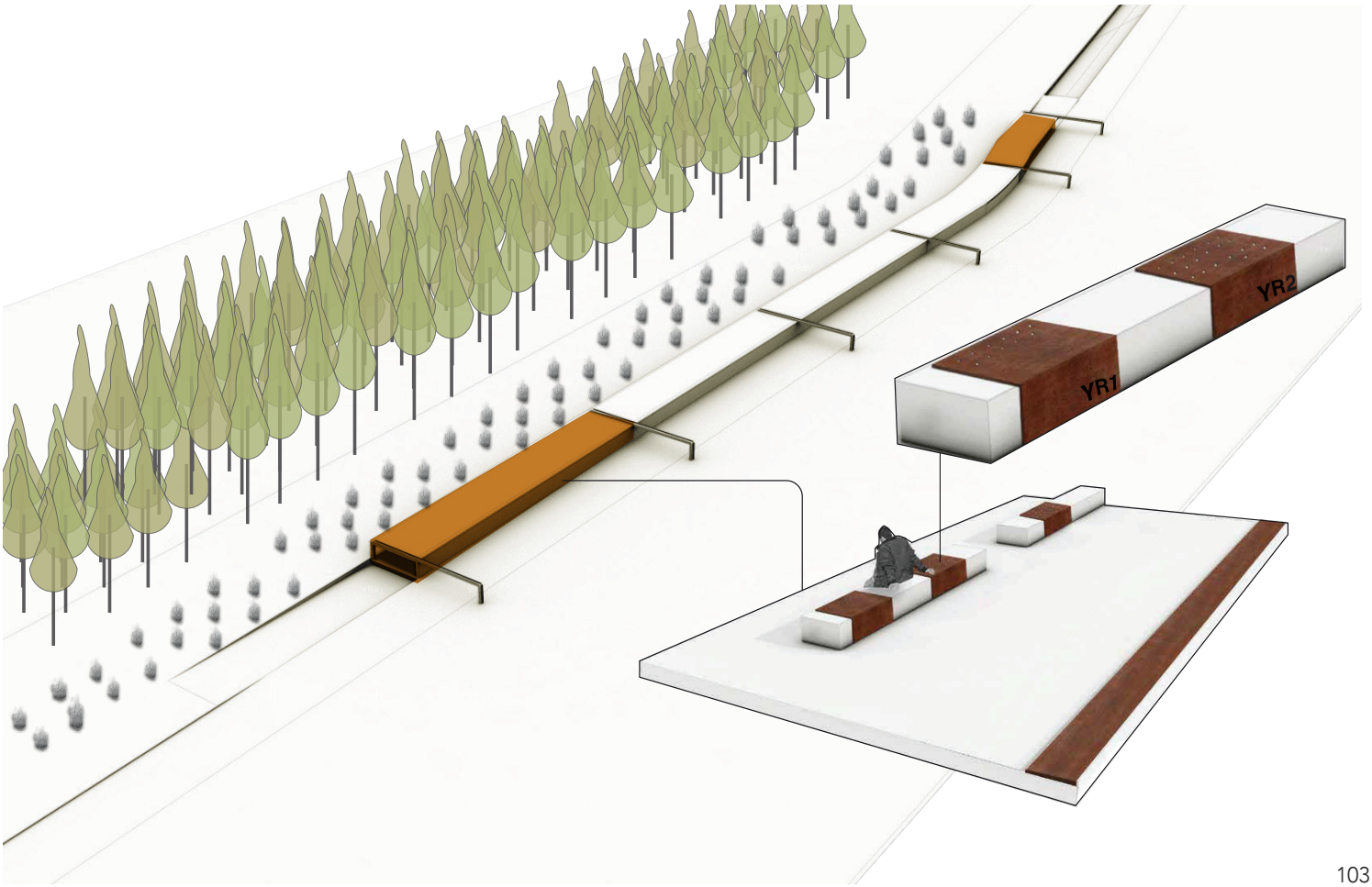

SPECIE COUNTS

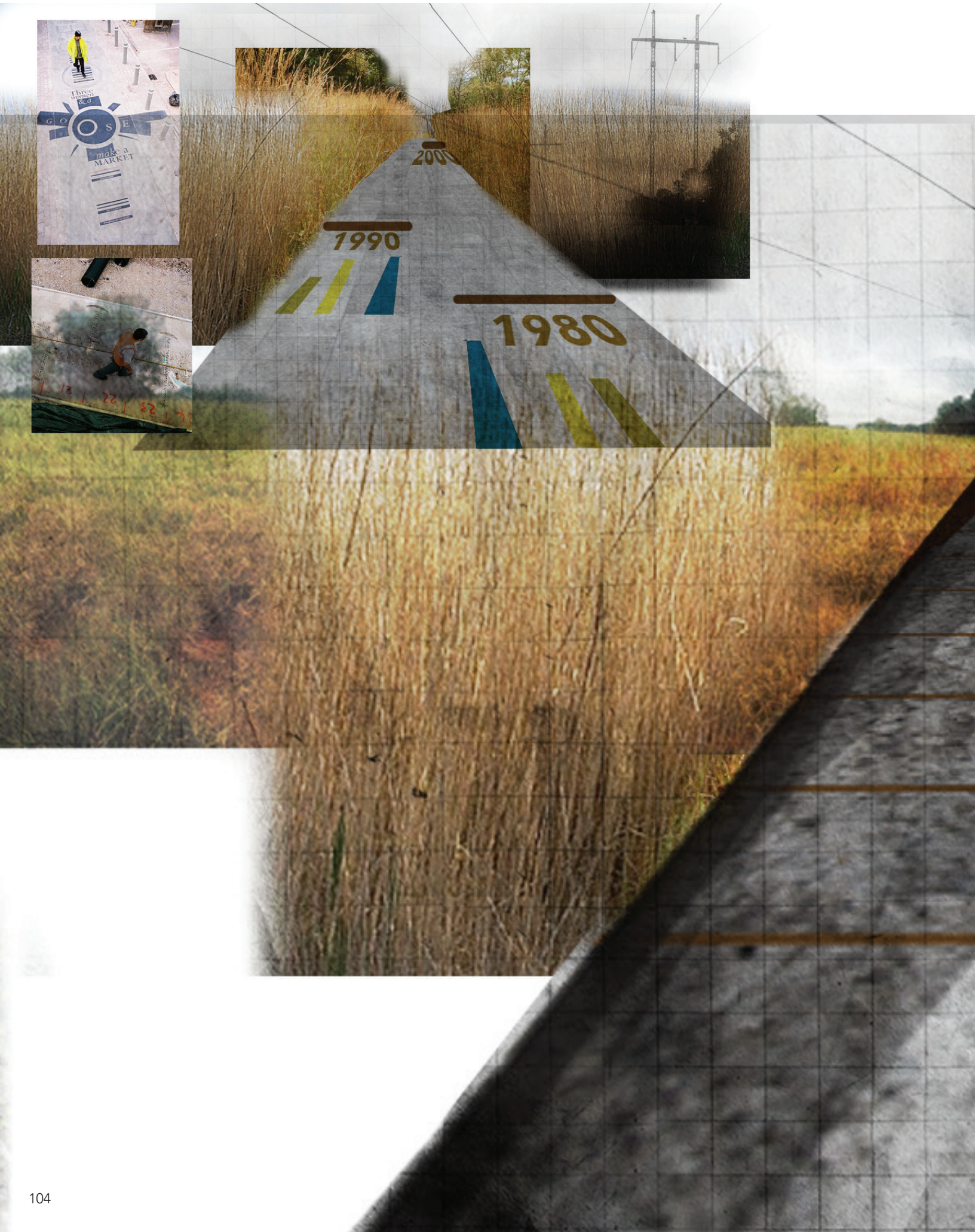

SPECIE COUNTS
SPECIE COUNTS

# Scheme 10. Species Count

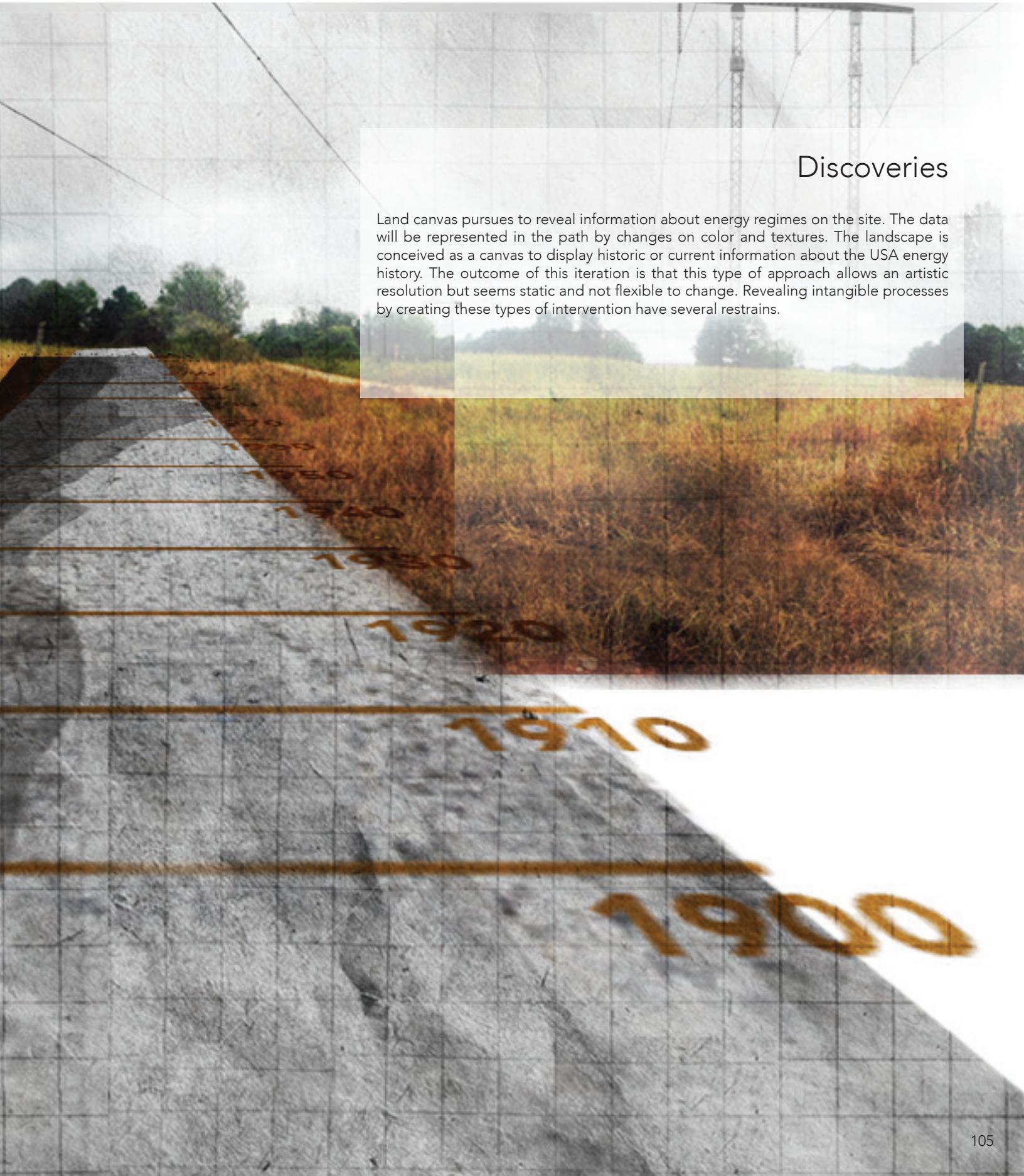
## Discoveries

The Specie Count scheme is simple. Elements that can record presence of different species along the corridor are designed and placed in the nodes. The user can be a part of the data collection process. If the hiker or visitor witness any of the indicator species, then they can record it in the assigned areas. This strategy allows to build a data base over time and reveal how well the ecosystem is functioning even thought the constant disturbance. The constrain is that it depends highly on the user.




make a
MARKET
2000
1990
1980

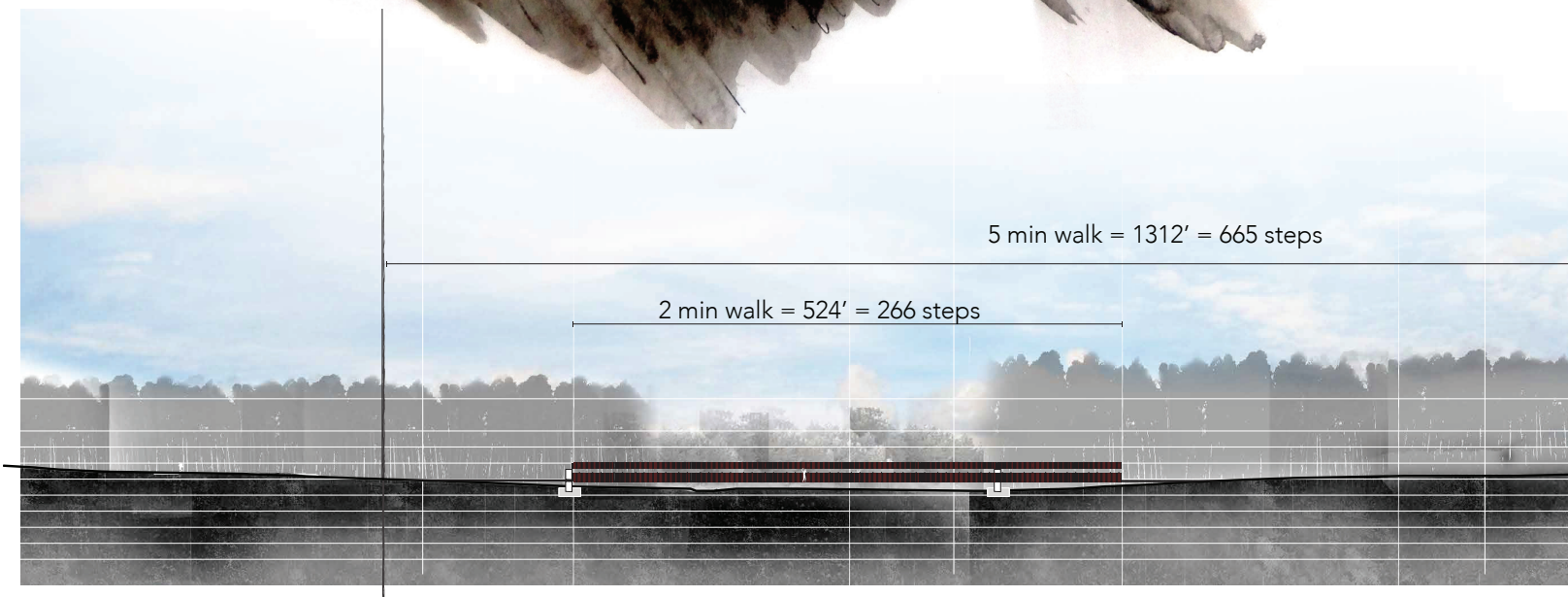
# Scheme 11. Land Canvas

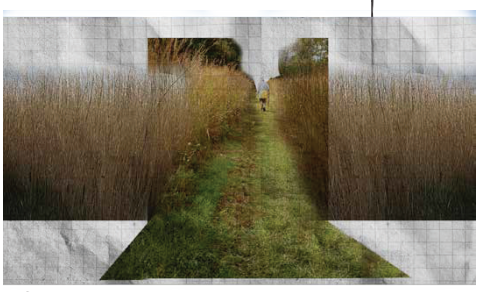



## Discoveries

Land canvas pursues to reveal information about energy regimes on the site. The data will be represented in the path by changes on color and textures. The landscape is conceived as a canvas to display historic or current information about the USA energy history. The outcome of this iteration is that this type of approach allows an artistic resolution but seems static and not flexible to change. Revealing intangible processes by creating these types of intervention have several restrains.

# Sensitive to light

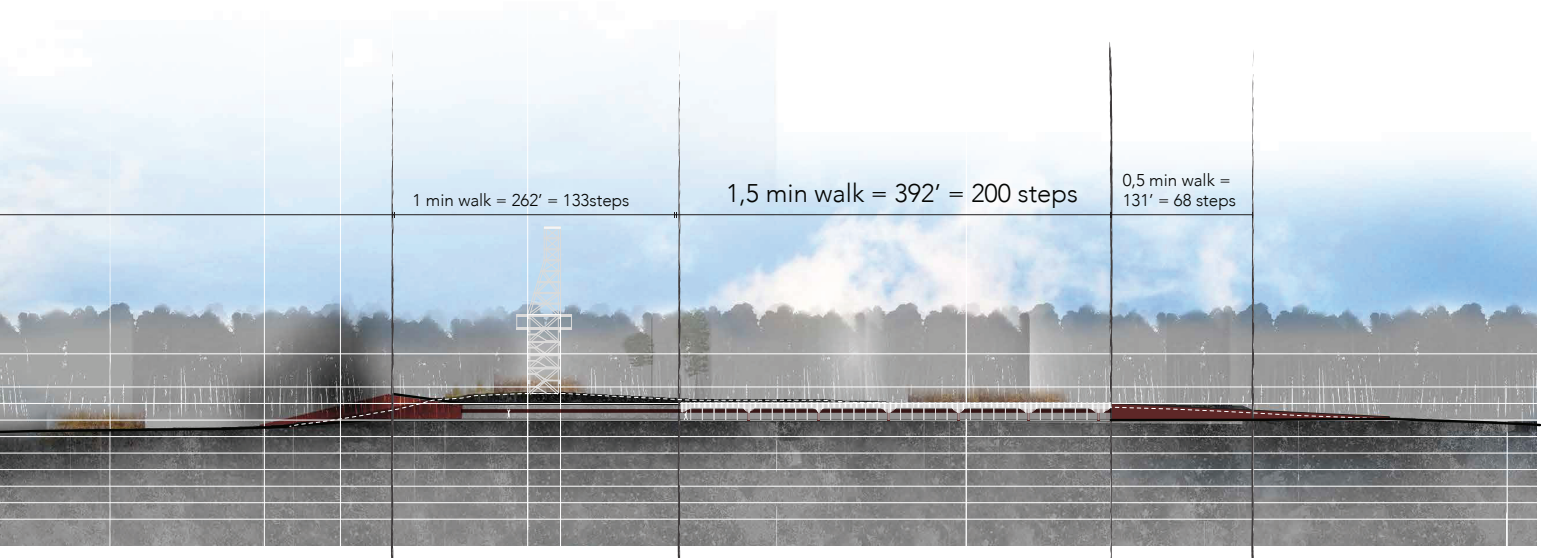


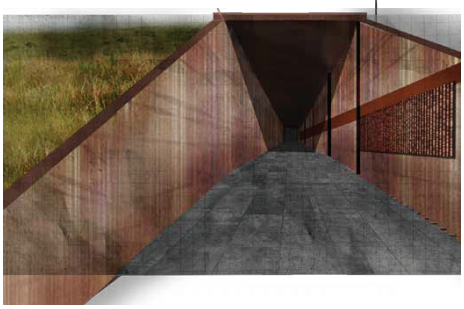



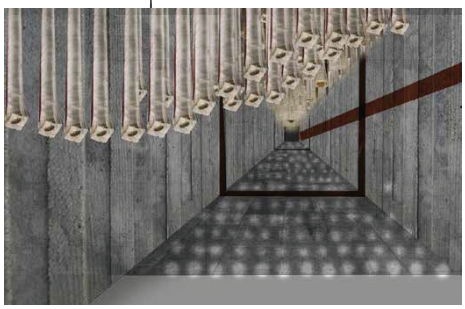
# Scheme 12. Mussel Memorial

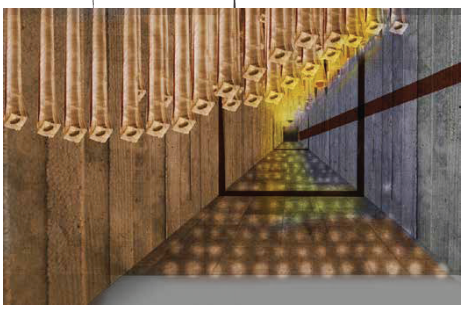
## Discoveries

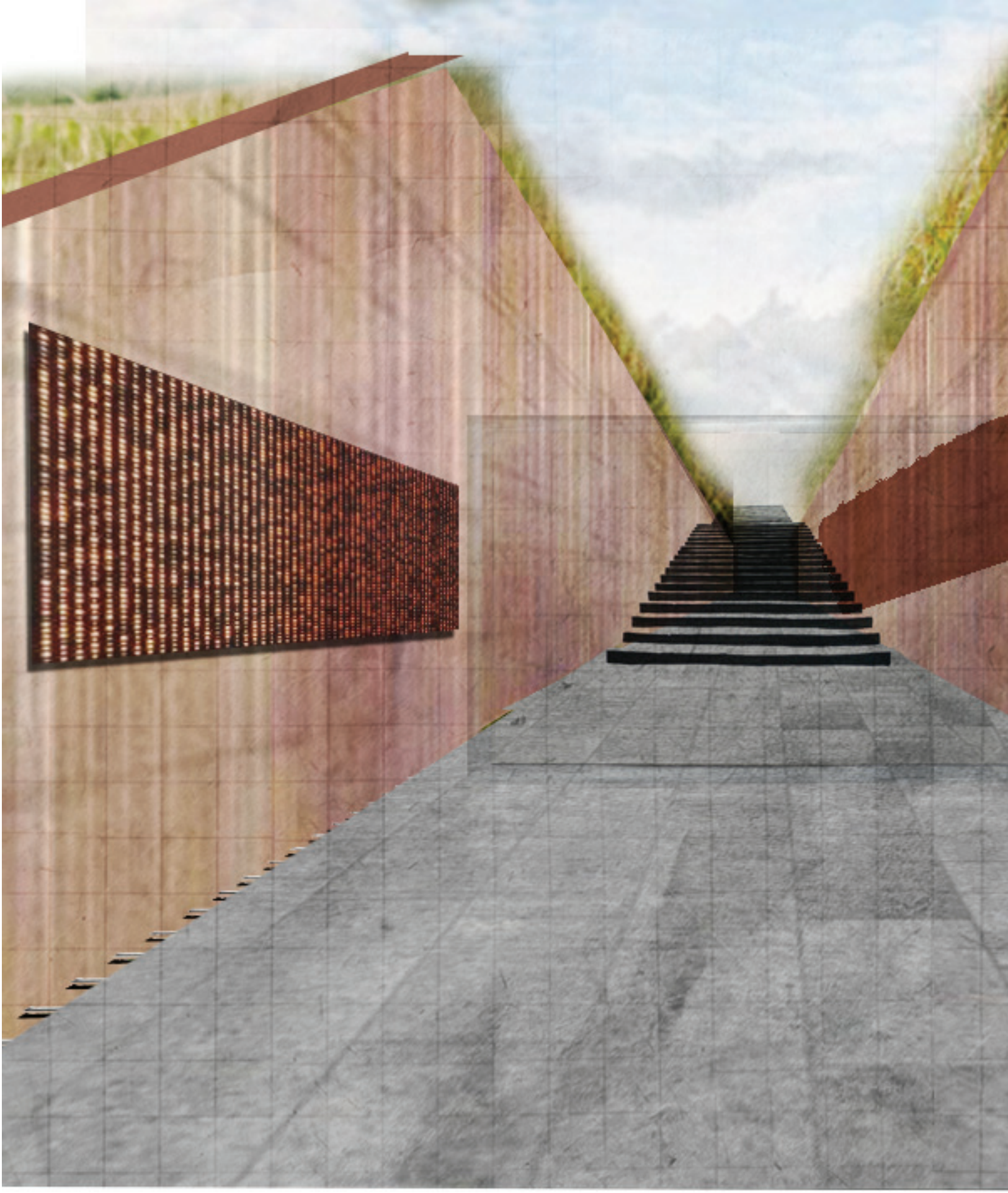
Mussel memorial performs as a landscape observatory that frames the views on the mussels' habitat revealing its ecosystem and then records specie count of individuals that have return after the disturbance as an indicator of ecosystem health. The goal of this iteration was to reveal the evolution of the mussel ecosystem after the disturbance. A bridge with a metal grid on the floor and a solid material for ceiling and walls exposes the creek and mussel's ecosystem. The hiker will walk from this point to the underground memorial pavilion where the rooftop will hold acrylic pieces that are sensitive to light. In the end of the piece, a mussel shield will be place. Each acrylic piece represent a new mussel identified on the creek. Simultaneously, the same pavilion will show a color-coded light display to reveal energy use sources in the state of Alabama. The pavilion performs as an educational center for people to be revealed and to learn about wildlife natural processes occurring in the node.









## Discoveries

Data memorial scheme explores how to overlay intrinsic messages of the place with broader scale cultural messages such as energy consumption rates, or carbon foot print reduction. This allows to rethink eco revelatory design as an energy revelatory design. How can a designer show energy-related messages? Eco-visualization "offers a novel approach to display the real time consumption statistics of key environmental resources for the goal of promoting ecological literacy. Data-driven animations that display ecological information of any sort in real time." Tiffany Holmes from the Department of Art and Technology Studies School of the Art Institute of Chicago argues that "real time data display can be a potent tool for increasing conservation behavior." Architectural theorist McDonough and chemist Braungart suggest that global reliance on oil and natural gas is a problem to be solved through creative enterprise and a new appreciation for ecologically-sensitive work across disciplines. (McDonough and Braungart quoted by Holmes). Responsive Landscapes (2016) by Justine Holzman and Bradley Cantrell explains how incorporating technology and real data in landscape design will improve the "ability to sense and respond to environmental phenomena inviting new ways to understand, interpret, experience, and interact with the landscape."

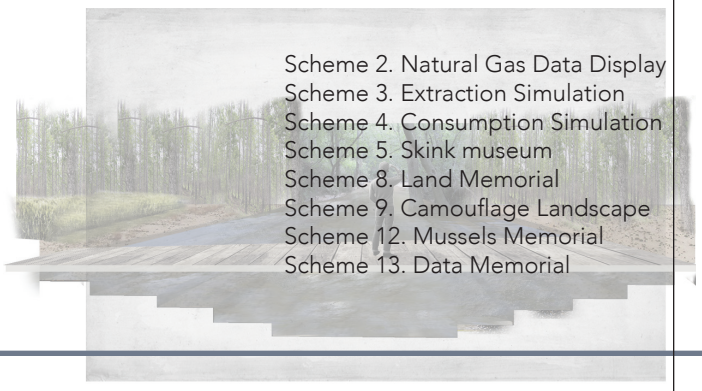
# PART 6 **[CRITICAL APPRAISAL]**

Evaluating Revelatory design strategies

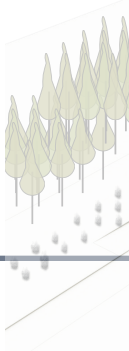
Revelatory design provides strategies that help the designer to approach the landscape. Upon reflection, all the schemes reveled valuable information and three different strong strategies have been done through out the iterations. These strategies are Simulation of phenomena, Metaphor of processes to reveal phenomena, and framing views that can help understand the phenomena. Each strategy reveals the three different scales of messages in a deeper or shallower way. The chart shows an evaluation of every scheme and how it can fit into the three Revelatory design strategies.

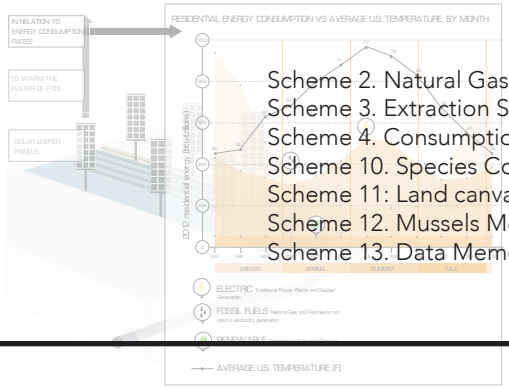
Scheme list:
Scheme 1. Datum of land-uses
Scheme 2. Natural Gas Data Display
Scheme 3. Extraction Simulation
Scheme 4. Consumption Simulation
Scheme 5. Skink museum
Scheme 6. Skinks and sounds
Scheme 7. Camping over night
Scheme 8. Land Memorial
Scheme 9. Camouflage Landscape
Scheme 10. Species Count
Scheme 11: Land canvas
Scheme 12. Mussels Memorial
Scheme 13. Data Memorial

[SIMULATION]

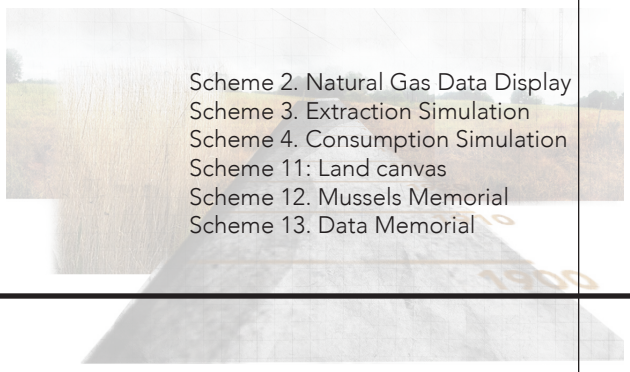


Scheme 2. Natural Gas Data Display
Scheme 3. Extraction Simulation
Scheme 4. Consumption Simulation
Scheme 5. Skink museum
Scheme 8. Land Memorial
Scheme 9. Camouflage Landscape
Scheme 12. Mussels Memorial
Scheme 13. Data Memorial



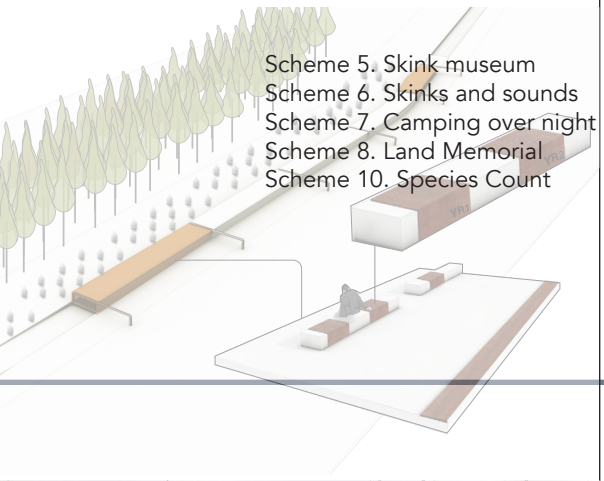



Scheme 2. Natural Gas Data Display
Scheme 3. Extraction Simulation
Scheme 4. Consumption Simulation
Scheme 10. Species Count
Scheme 11: Land canvas
Scheme 12. Mussels Memorial
Scheme 13. Data Memorial

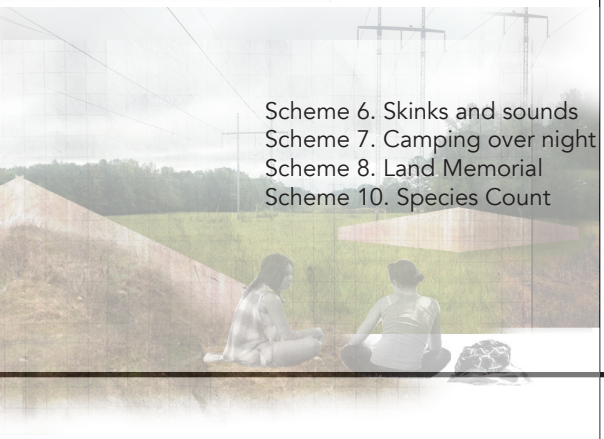


Scheme 2. Natural Gas Data Display
Scheme 3. Extraction Simulation
Scheme 4. Consumption Simulation
Scheme 11: Land canvas
Scheme 12. Mussels Memorial
Scheme 13. Data Memorial

## [METAPHOR]

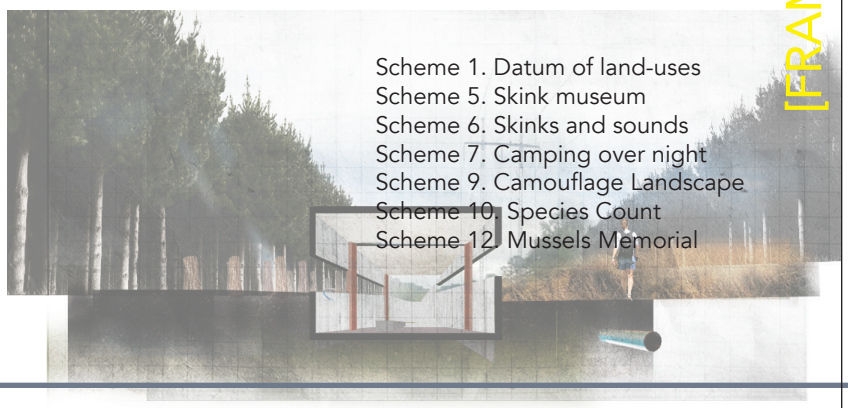


Scheme 5. Skink museum
Scheme 6. Skinks and sounds
Scheme 7. Camping over night
Scheme 8. Land Memorial
Scheme 10. Species Count

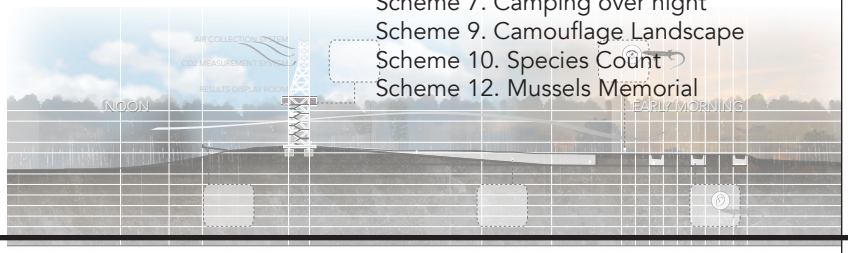


Scheme 6. Skinks and sounds
Scheme 7. Camping over night
Scheme 8. Land Memorial
Scheme 10. Species Count

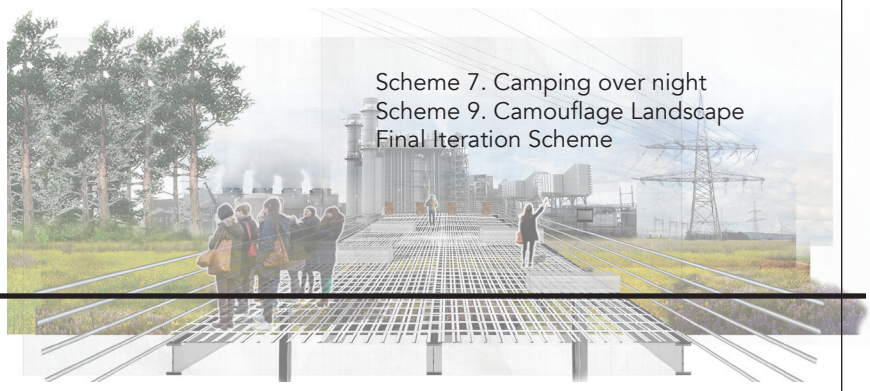
## [FRAMING VIEWS]



Scheme 1. Datum of land-uses
Scheme 5. Skink museum
Scheme 6. Skinks and sounds
Scheme 7. Camping over night
Scheme 9. Camouflage Landscape
Scheme 10. Species Count
Scheme 12. Mussels Memorial



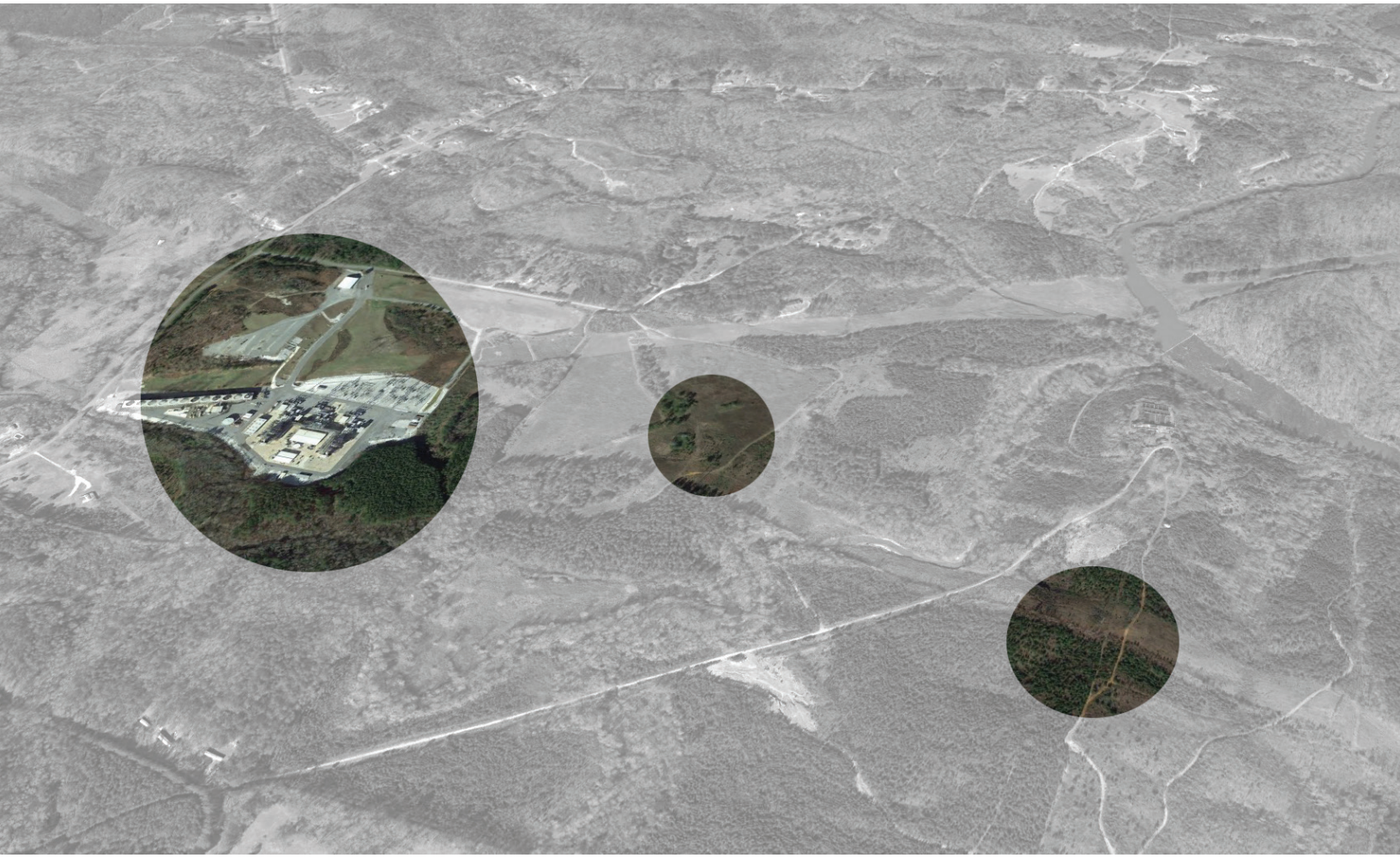

Scheme 6. Skinks and sounds
Scheme 7. Camping over night
Scheme 9. Camouflage Landscape
Scheme 10. Species Count
Scheme 12. Mussels Memorial

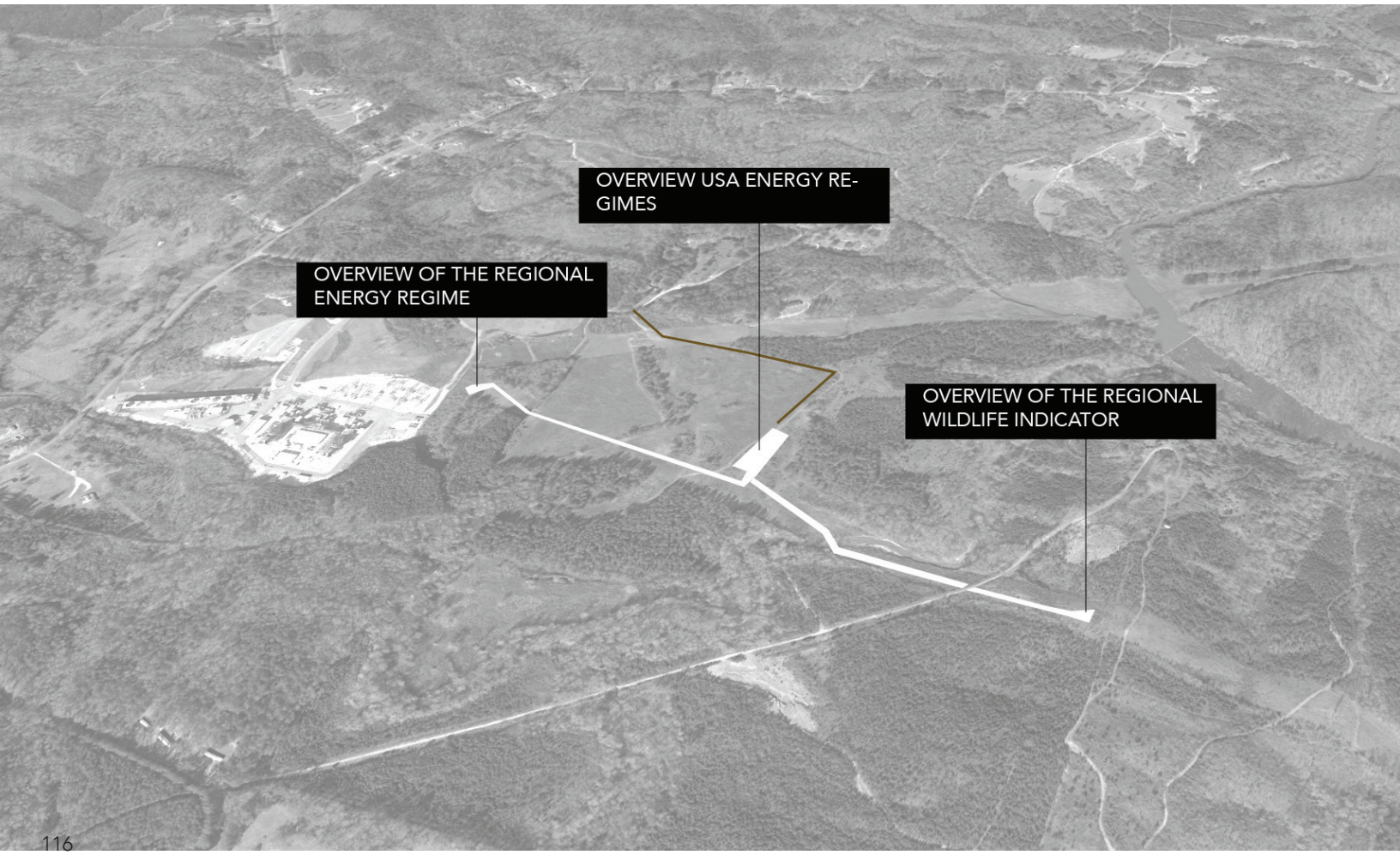


Scheme 7. Camping over night
Scheme 9. Camouflage Landscape
Final Iteration Scheme

# PART 7 **[FINAL ITERATION]**

Applying lessons learn

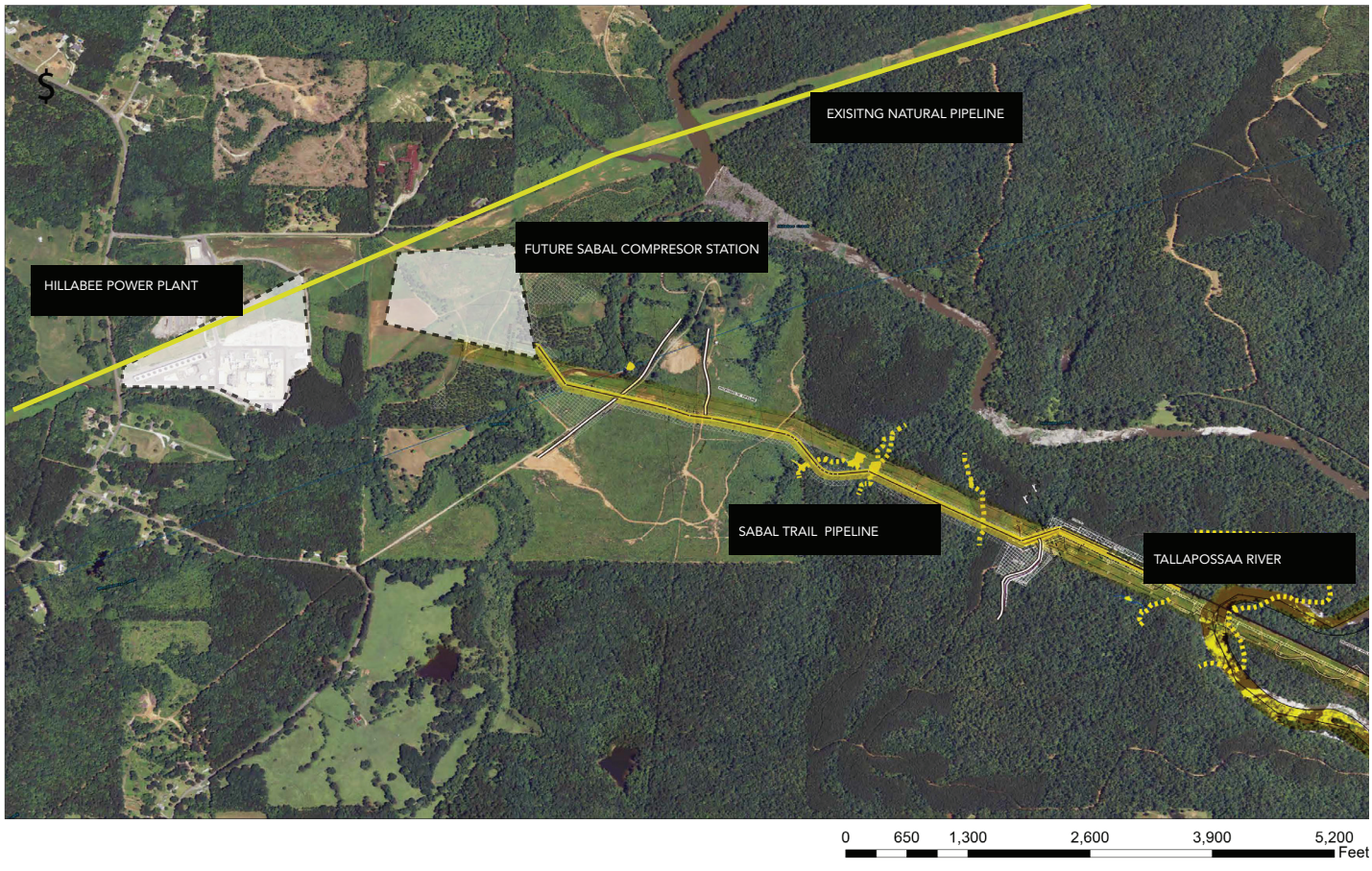


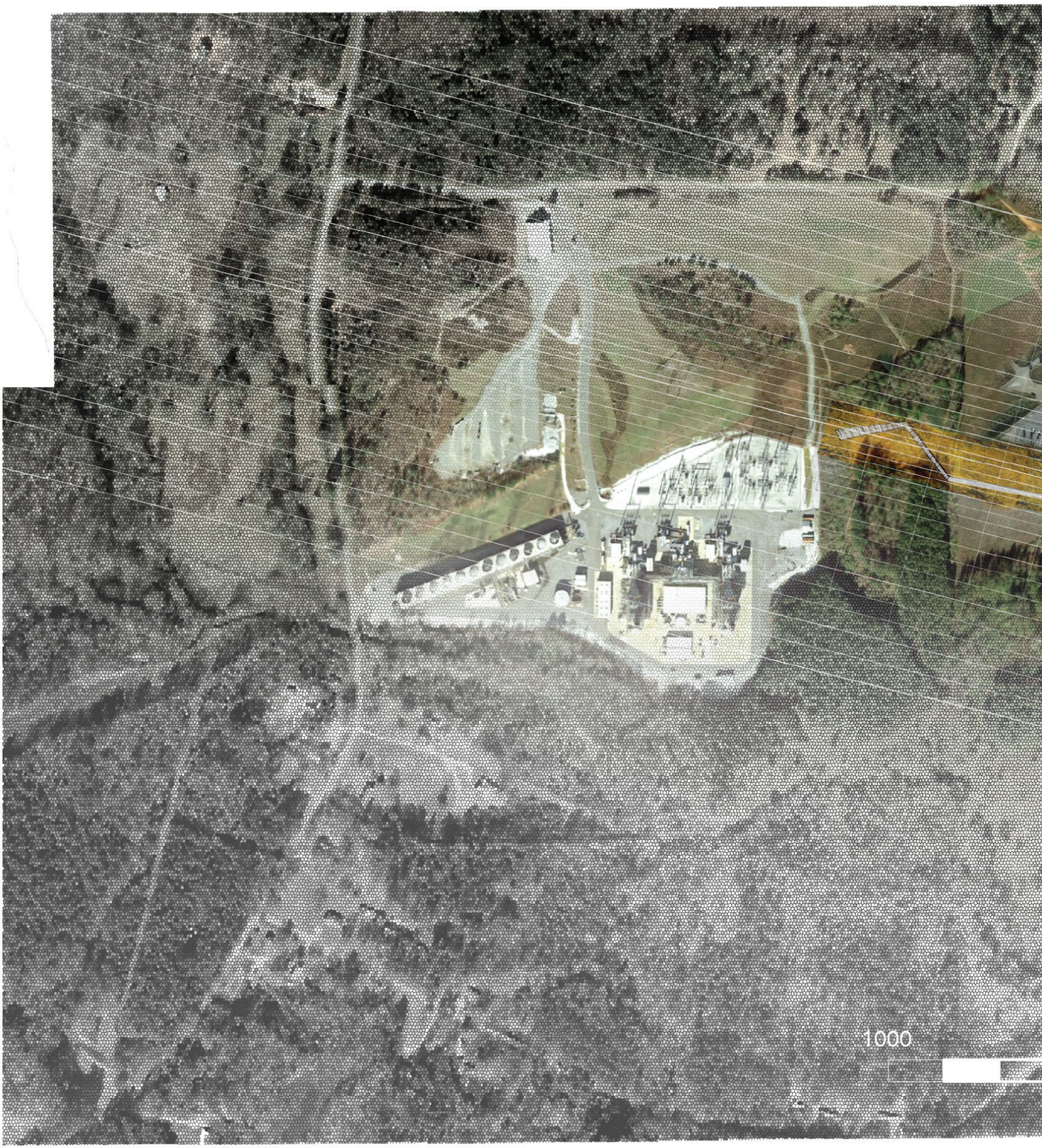

OVERVIEW USA ENERGY RE-
GIMES
OVERVIEW OF THE REGIONAL
ENERGY REGIME
OVERVIEW OF THE REGIONAL
WILDLIFE INDICATOR

# [FINAL ITERATION]
## Design desicions

A critical analysis over a one-year body of work had enlightened and influenced the final iteration. After valuing the clarity of the messages that every revelatory design strategy allows, the conclusion is that Framing views is the most successful way to approach for the Trail.
The area to be designed belongs to the typology 1 in the node classification, which means that it has the potential to reveal the message related to the nation scale and the regional scale.

The design decisions are based on terms of existing conditions. Infrastructure elements are identified as well as advantageous points of view where the visitor can experience certain phenomena. In the site, different scales of natural gas infrastructure interact: A power plant, a compressor station and several pipeline corridors emerge into the scape. According to the trail design strategy, this node will have a strong path as a line in the landscape that takes the inhabit to walk thought several areas and to pause in specific moments to frame the views of moments that will most likely reveal the message. There are three main pause point in the site. 1. The arrival area, 2. The Power plant area. 3. The beginning of the pipe area.




1000


0
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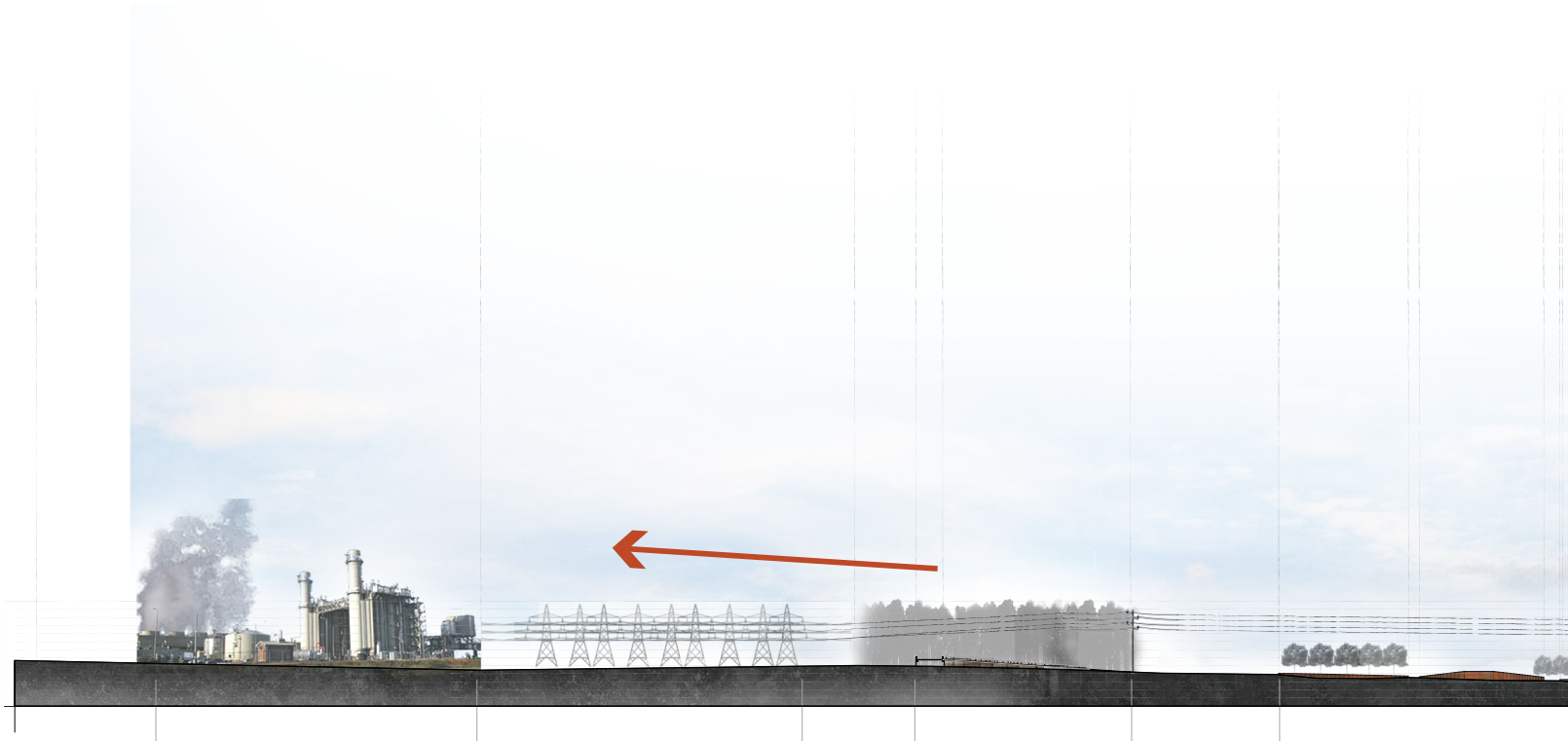
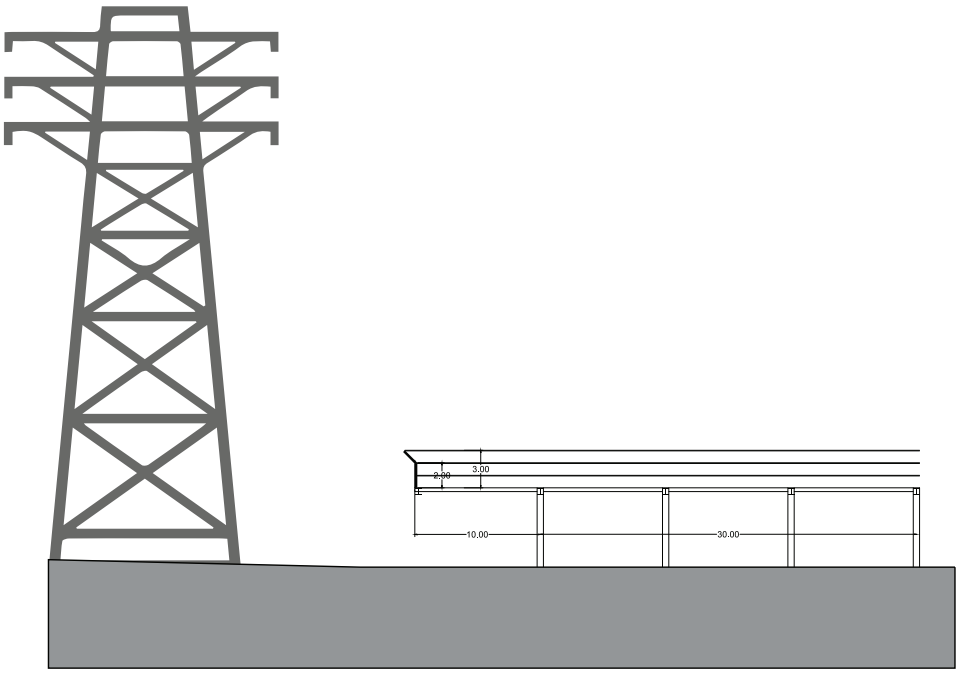
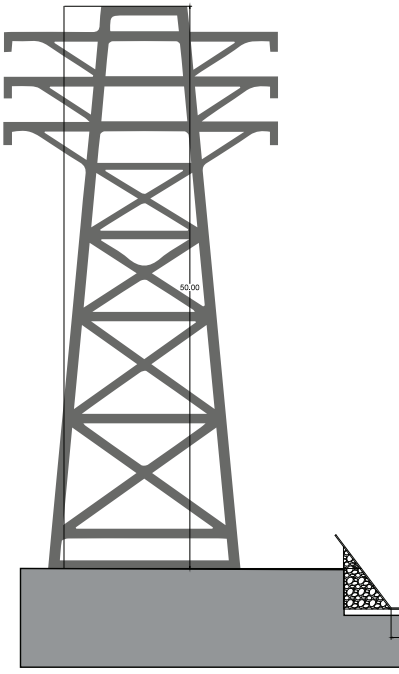
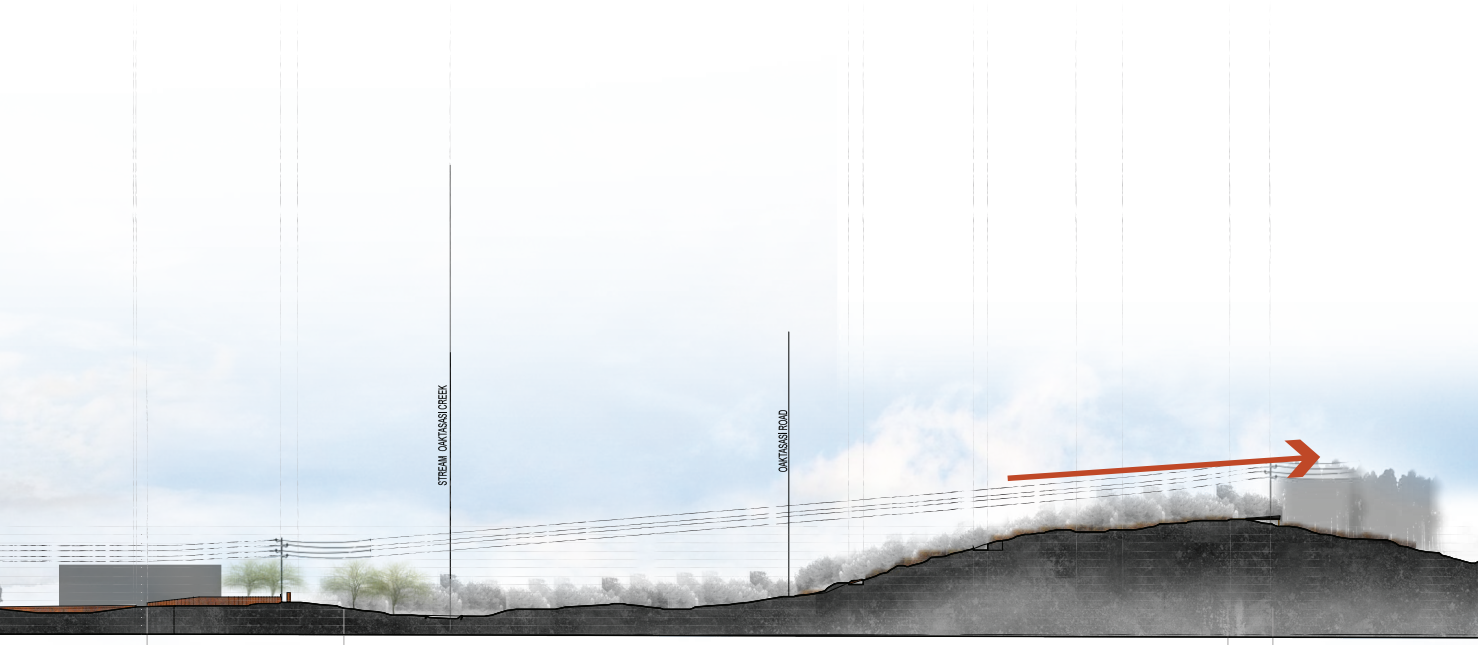
3000



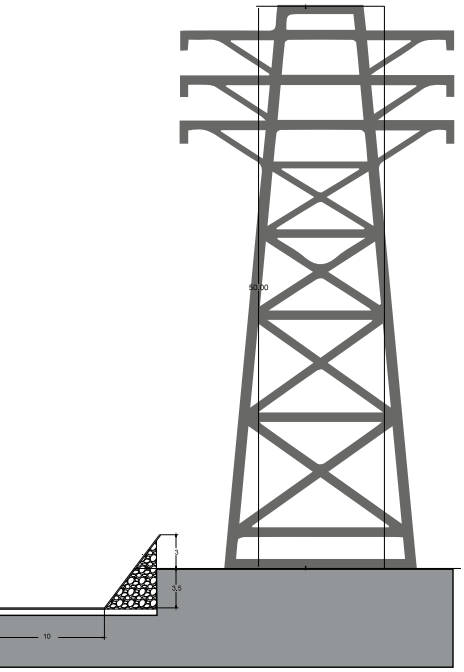
HILLABEE POWER PLANT | POWER TRANSFORMATION | OVERLOOK. FRAMING ENERGY | REVEALING NATURAL GAS PR

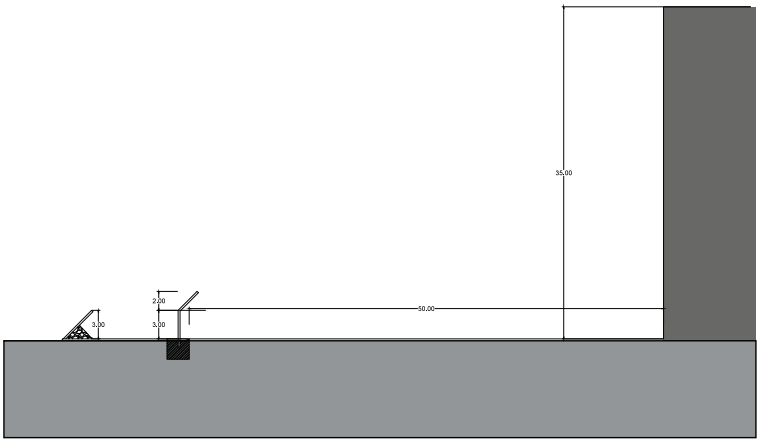


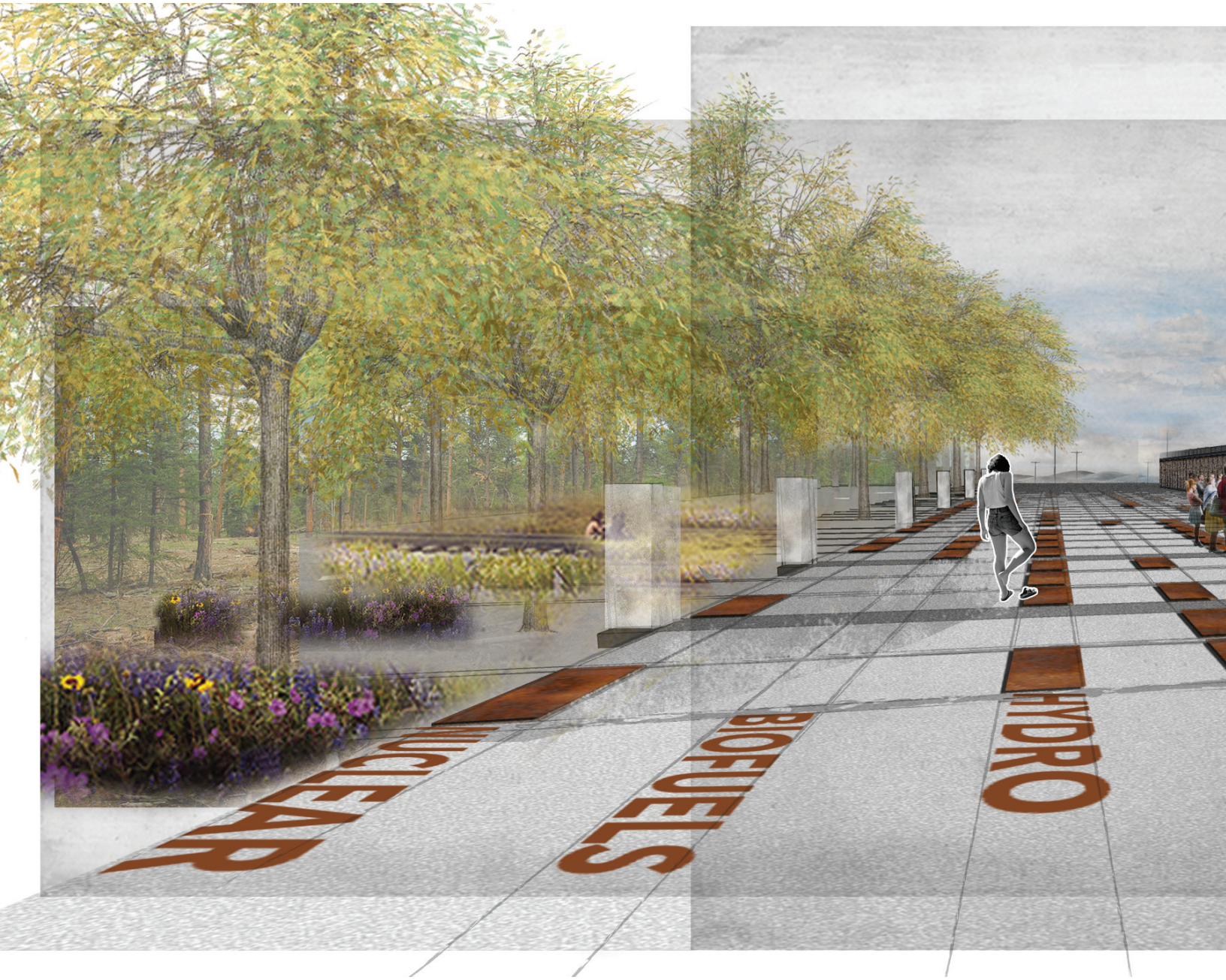






ROCESS DISTRIBUTION SPACE SIMPLE WALK OVERLOOK. FRAMING THE TRAIL

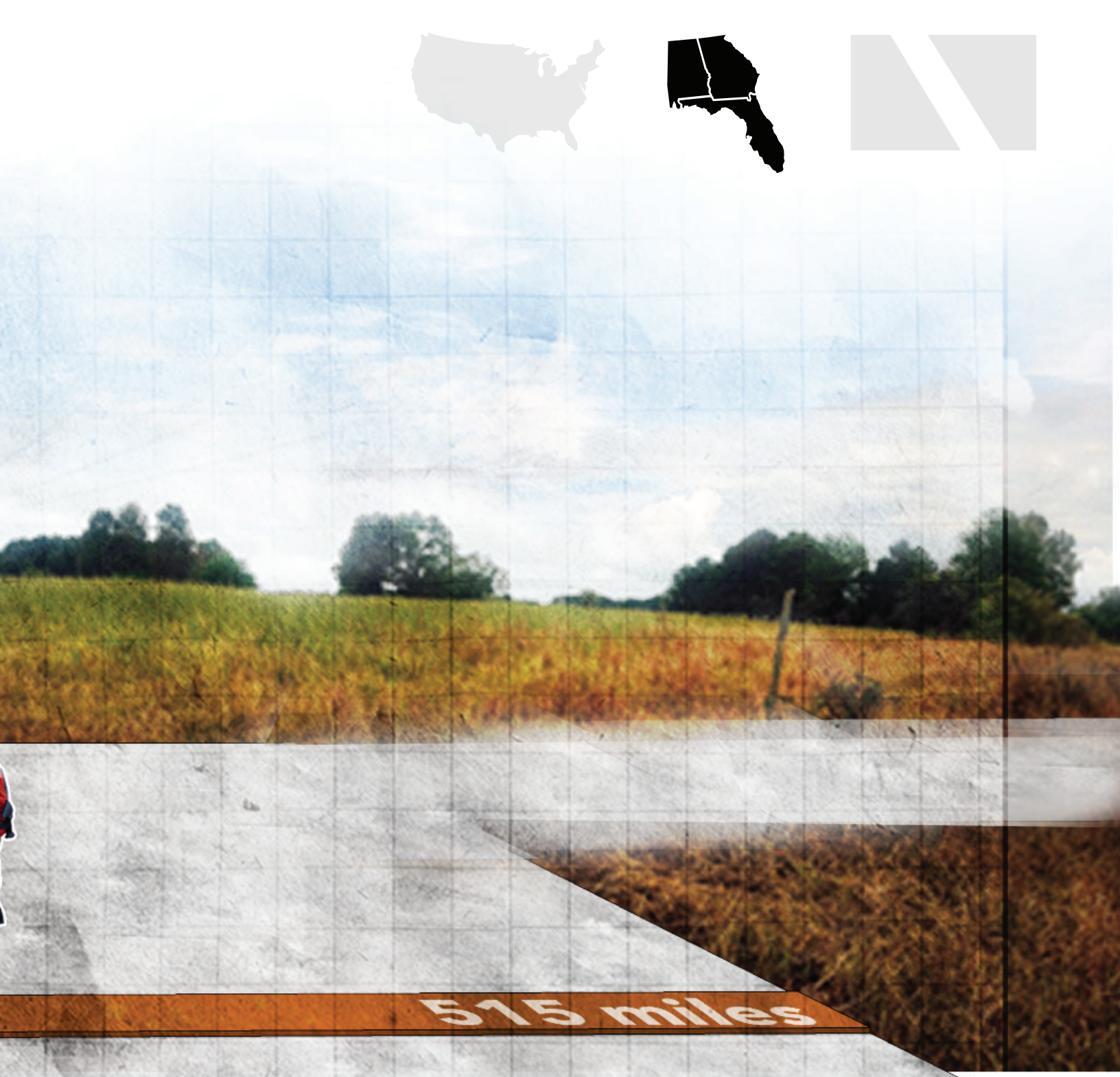


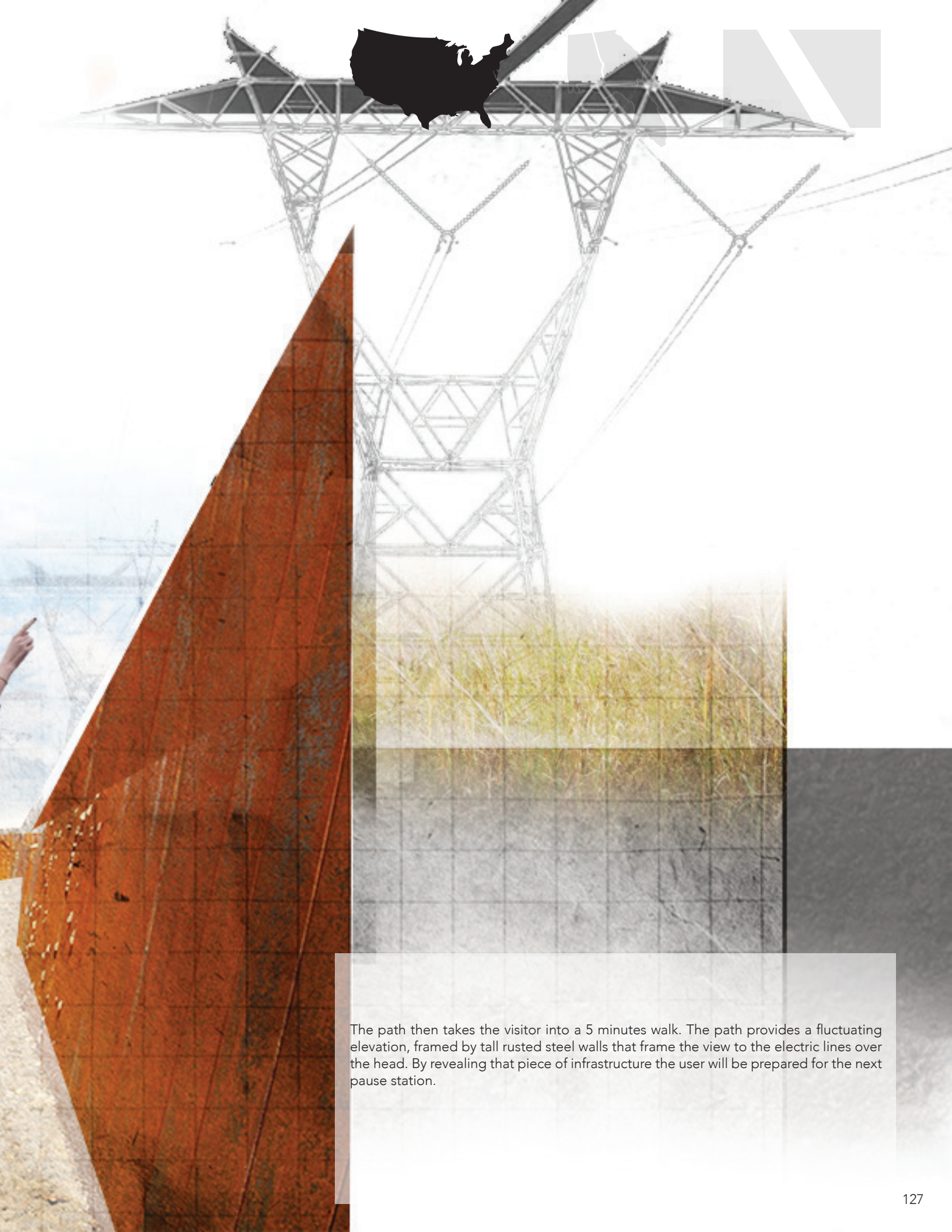

NUCLEAR
BIOFUELS
HYDRO


One-day visit experience
The first pavilion and the starting point is an Environmental and Educational area with a modest building. This space will perform as a museum for the USA Energy history. The first outdoor plaza represents by Metaphor the message about the National scale. It intents to reveal the Hot Spot on America's energy production. The groundcover of the open plaza provides a grid that represent the type of energy every state region produces.


0
mile
VOLUME OF GAS
POWERS
HOUSES




The visitor starts walking down the path to encounter the first mileage signage. A change of material in the white gravel path marks the starting point of the 515 miles pipeline. The signage intents to show the volume on gas crossing that point in comparison with the number of houses that consumes that energy. These values will change daily. Additionally, this station will have utilitarian purpose for the pipeline company thus it can work as a meter station for the pipeline.



The path then takes the visitor into a 5 minutes walk. The path provides a fluctuating elevation, framed by tall rusted steel walls that frame the view to the electric lines over the head. By revealing that piece of infrastructure the user will be prepared for the next pause station.

# [DESIGN ITERATION]

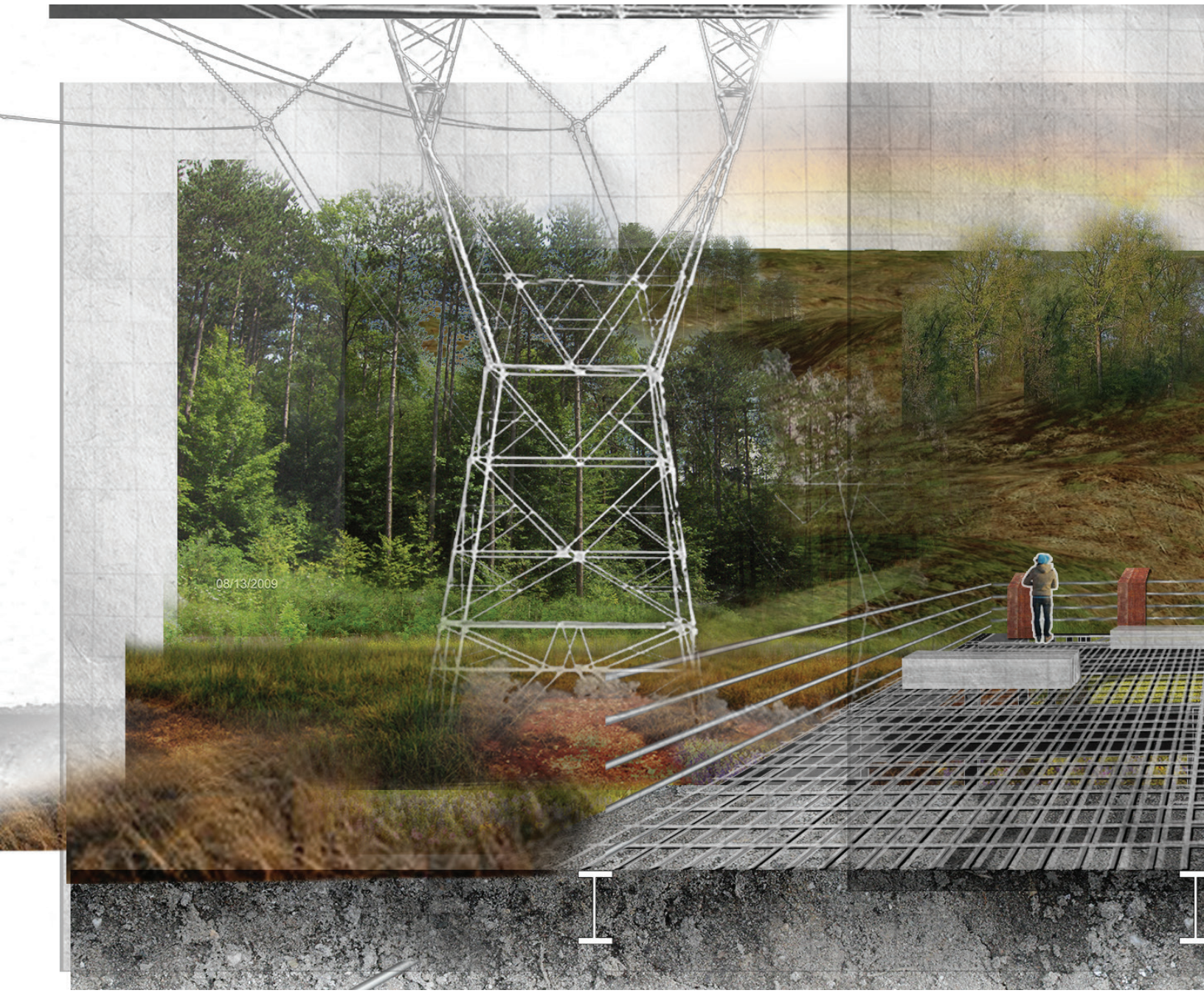
## Section



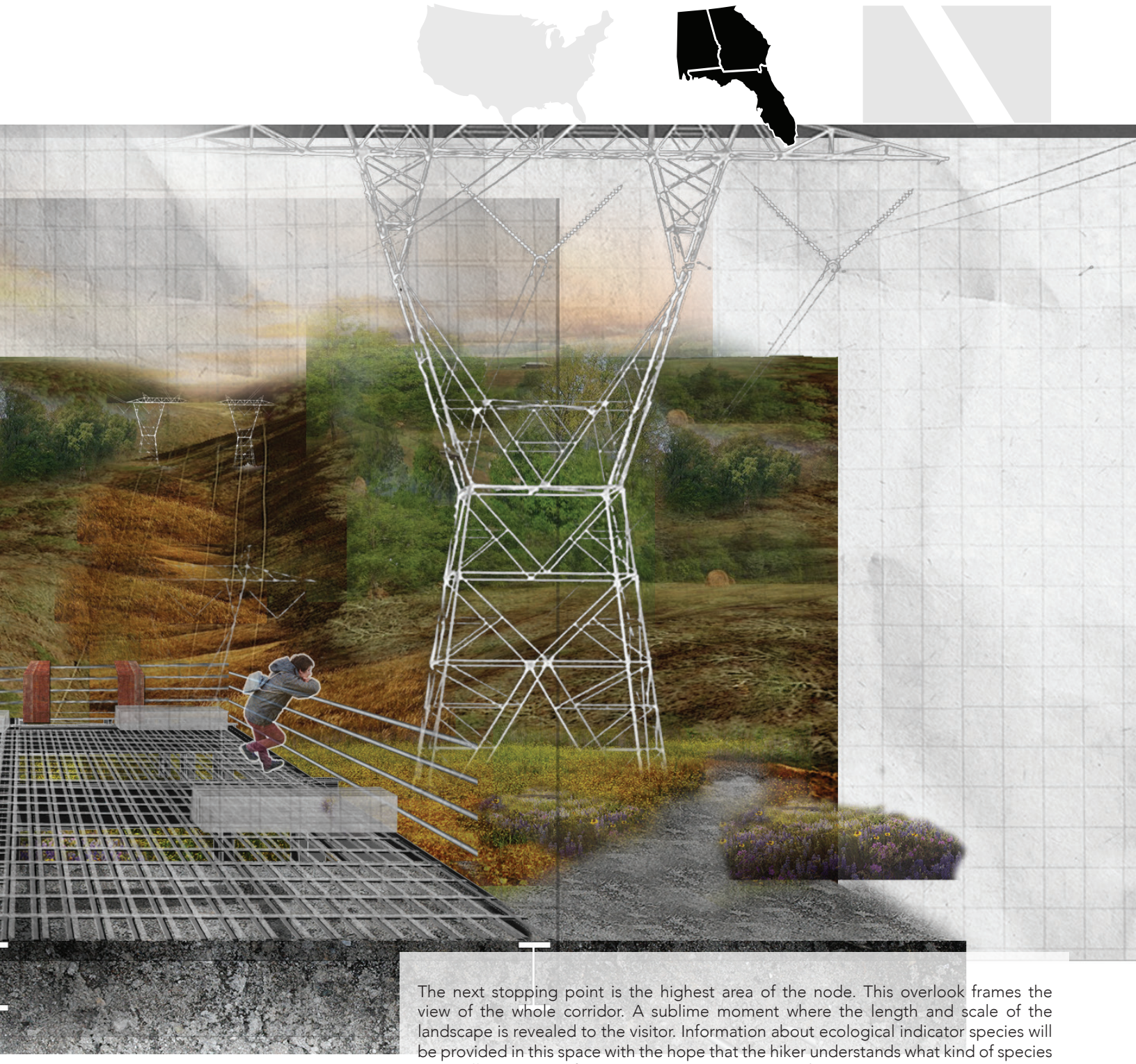


The white path leads the visitor to an area of the corridor surrounded by dense forest in both sides. A metal frame bridge elevates the human to a point where it is easier to overlook the Hilllabee Power Plant. In this point the sounds of the infrastructure are overwhelming. In this pause, moment signage will provide information about Energy production and consumption of the State. Framing the view and utilizing the body scale creates a space where the visitor will experience phenomena related to the Natural Gas infrastructure and will be revealed to the operation of the infrastructure.

The hiker walks back and after a 10 minutes walk or 500 steps a creek is encounter. The change of material from a white gravel into a metal grid permeable flooring frames the view into the creek. The user can see the water running under their feet and will also be aware of the tide. When the tide is low the rocks in the bottom will have a presence, when the tide is high, the running water will provide sounds and textures.
Dus quosto te vendam eum, quatem idis pa videlecus ipsunt re nus raepudigente nonet aut pra coratiorro que cus eume


08/13/2009

# Section



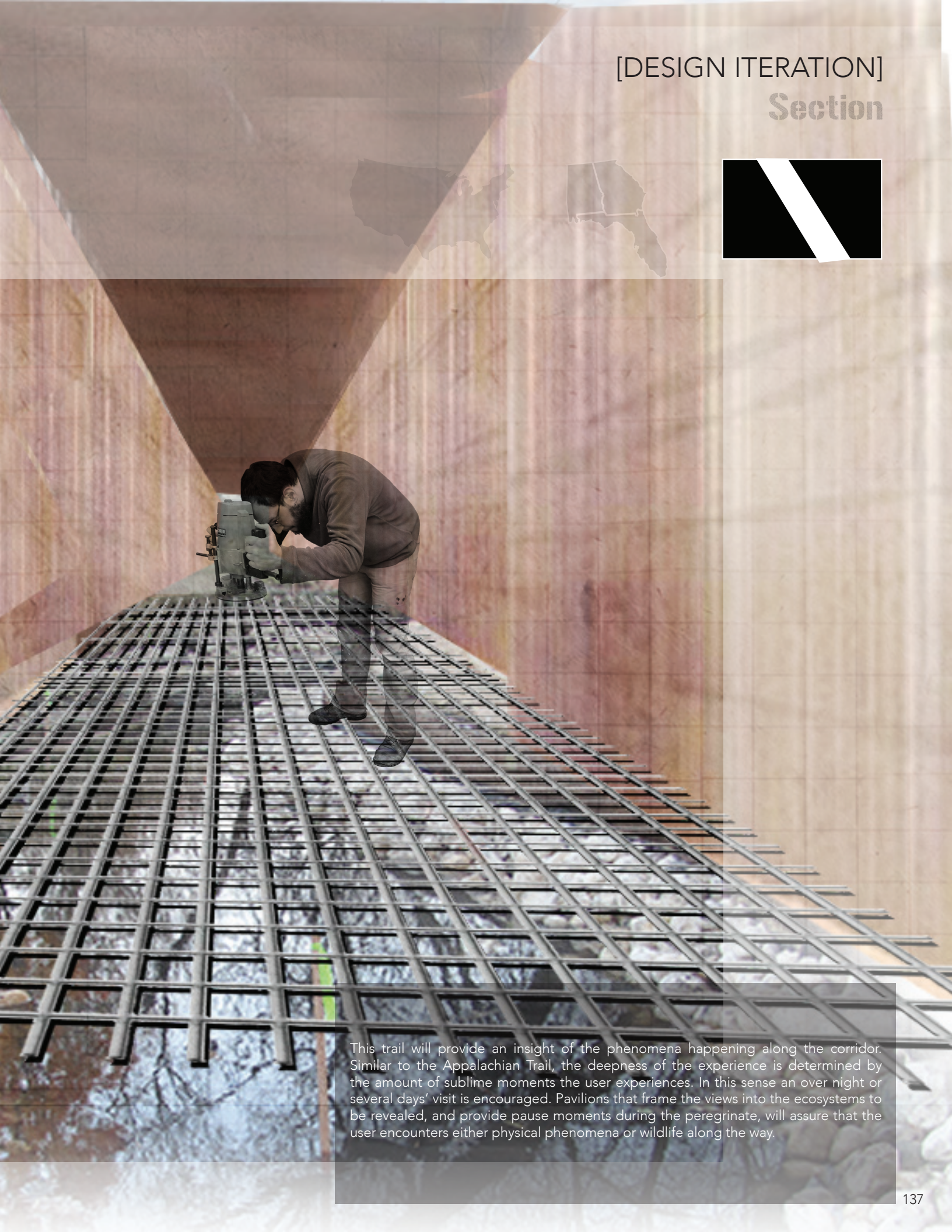
The next stopping point is the highest area of the node. This overlook frames the view of the whole corridor. A sublime moment where the length and scale of the landscape is revealed to the visitor. Information about ecological indicator species will be provided in this space with the hope that the hiker understands what kind of species they will encounter if they decide to do the thru-hike. A moment where the sound of the ecosystem can be experienced, in contrast with the sublimity and scale of the infrastructural landscape, will provide a moment of extreme clarity. In this point the user will understand that even landscapes that are highly manipulated for utilitarian reasons are also home for great amount of species and that they are worthy experienced.

## Section

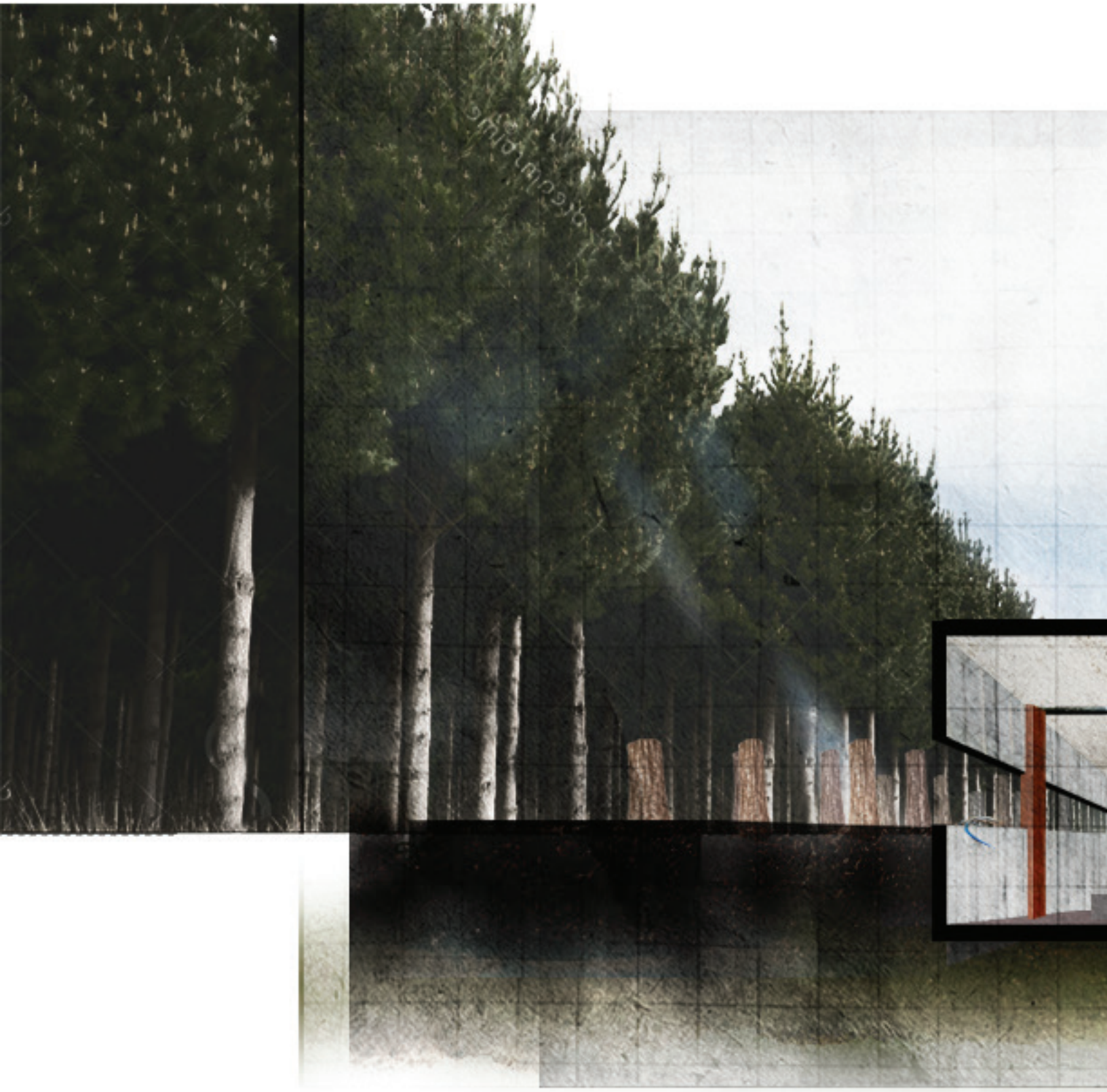
The next section directs the visitor to the highest point. The undulating path emerges the body into the tall grasses. Beautiful sounds of the grasses moving with the wind accompany this peregrinate. The colors of the vegetation and the soft textures that touch the skin of the walker intend to increase the sensorial experience of the site and to reveal the local phenomena. This immersive strategy will be replicated through out the wholel trail.

# [DESIGN ITERATION]

## Section



This trail will provide an insight of the phenomena happening along the corridor. Similar to the Appalachian Trail, the deepness of the experience is determined by the amount of sublime moments the user experiences. In this sense an over night or several days' visit is encouraged. Pavilions that frame the views into the ecosystems to be revealed, and provide pause moments during the peregrinate, will assure that the user encounters either physical phenomena or wildlife along the way.



# [DESIGN ITERATION]
## Scheme 7. Land Memorial

The overnight pavilions will camouflage humans so mammals and other species will show themselves and therefore, provide a worthy experience for the hiker. These nodes will be provided with commodities such as phone charging stations and lavatories for the commodity of humans.
Equatem ant velestioris sit, que volorero con nonecer fercius andam, sape voloribus, coribust, cum qui simolum et, officita coribus nobis modis atur? Quis explibu scimagnatem nossim sust mi, conet explicat odipsam doluptias el et labori debitia sin re, sequi adis aciet acipicillat.
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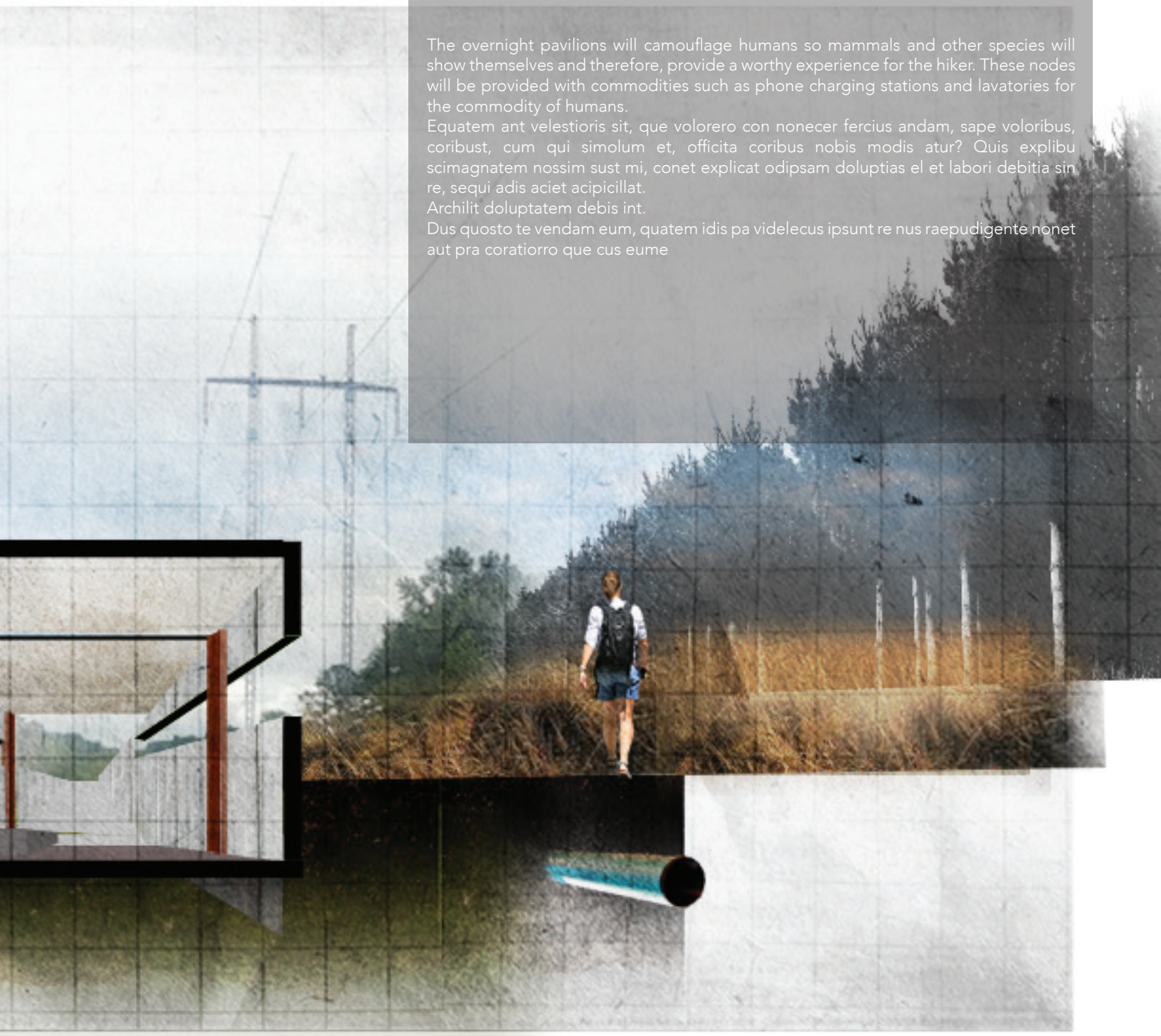

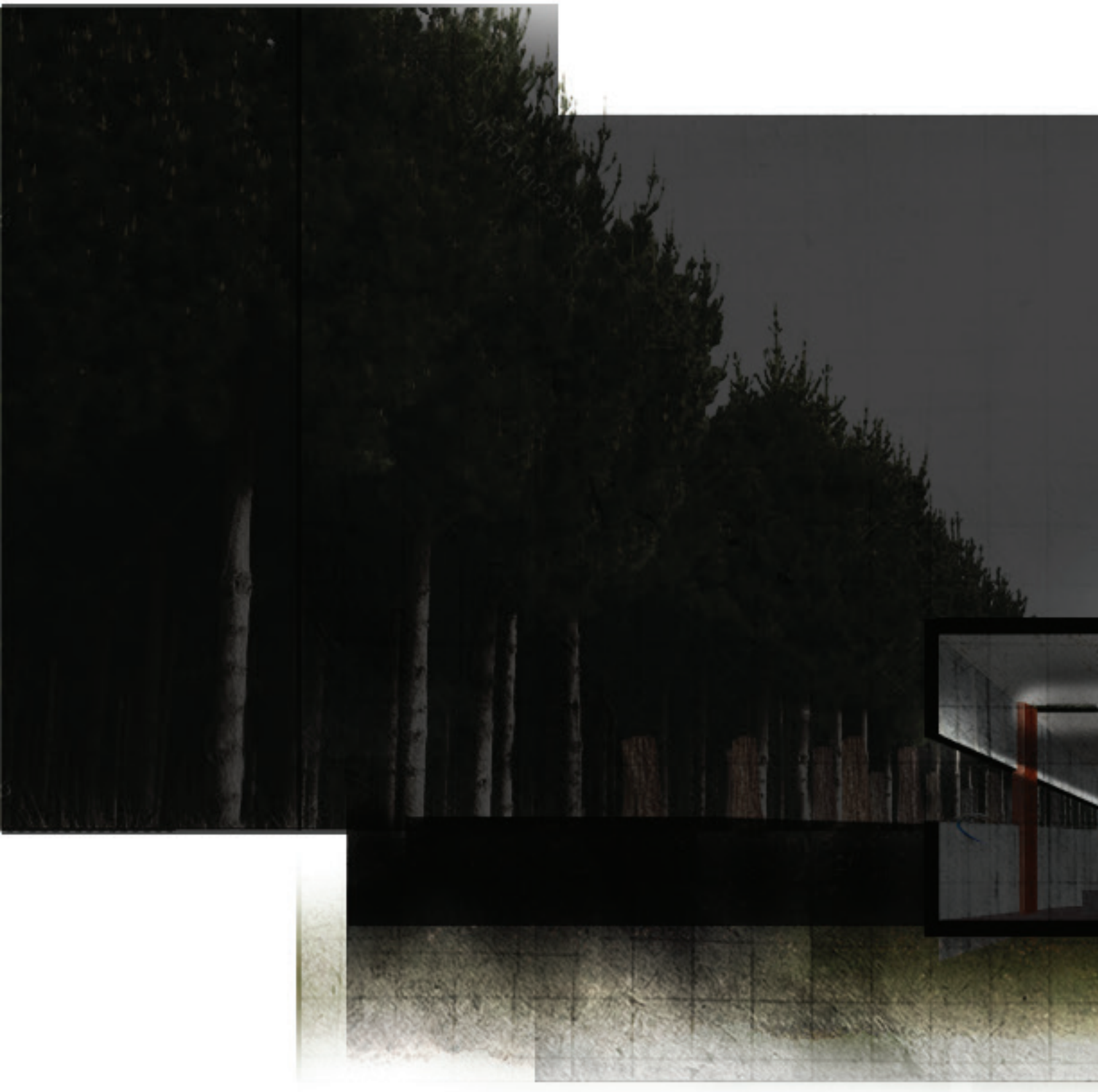

# [DESIGN ITERATION]
## Scheme 7. Land Memorial

Over night, sounds of the existing ecosystems will be amplified in order to recognize the presence of certain species near. The visitor will be aware of this presence and will be revealed to the great connectivity this type of landscape provides. Once the user has experienced several moments in the trail, the relationship with utility corridor will change Now people understand how energy regimes shape landscapes and how beautiful and sublime these places are. Maybe he or she will come back home, with a different perspective of the world.

Equatem ant velestioris sit, que volorero con nonecer fercius andam, sape voloribus, coribust, cum qui simolum et, officita coribus nobis modis atur? Quis explibu scimagnatem nossim sust mi, conet explicat odipsam doluptias el et labori debitia sin re, sequi adis aciet acipicillat.

Archilit doluptatem debis int.

Dus quosto te vendam eum, quatem idis pa videlecus ipsunt re nus raepudigente nonet aut pra coratiorro que cus eume

# PART 8 **[REFLECTIONS]**

Lessons in Revelatory Design

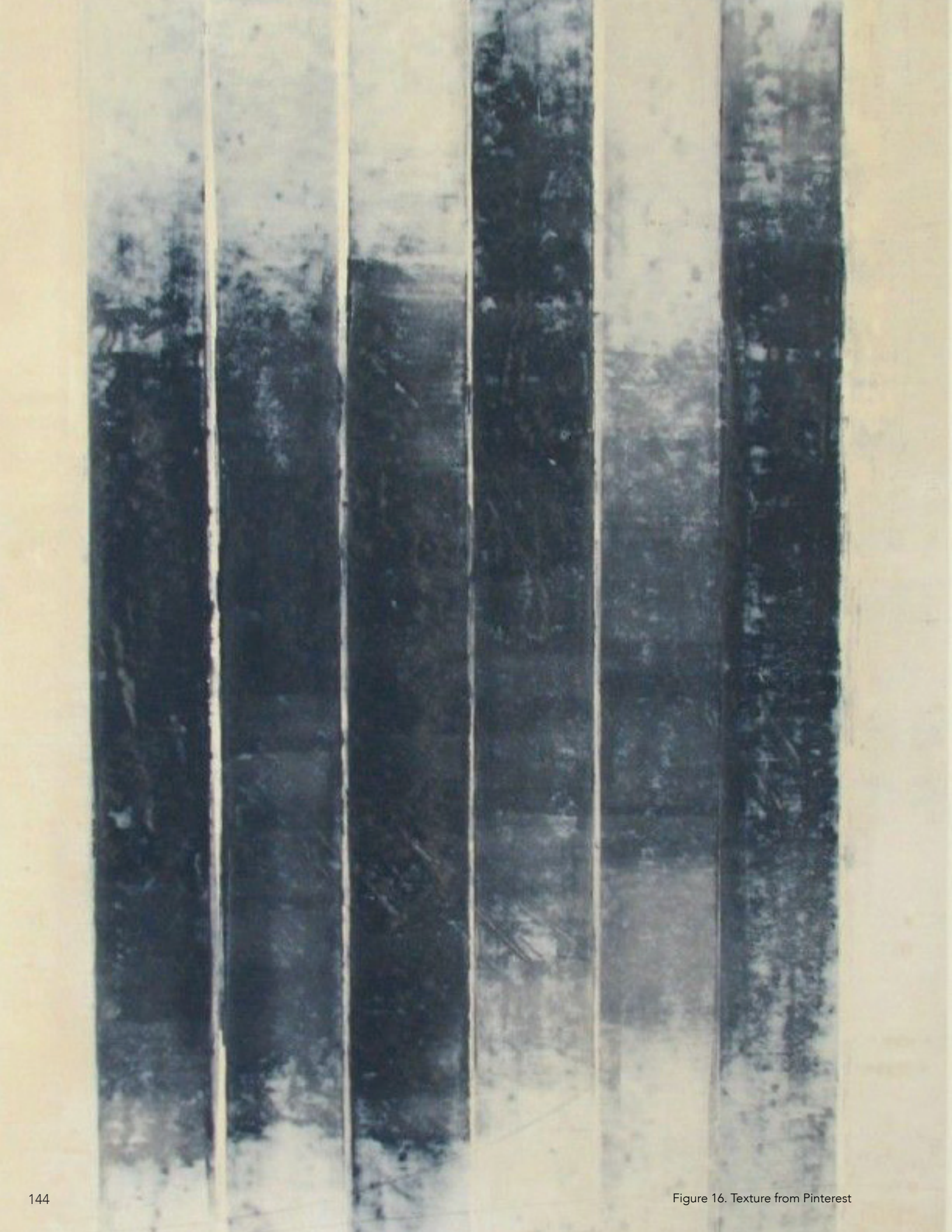



Figure 16. Texture from Pinterest

# [REFLECTIONS]
## Lessons in ERD

Several lessons were learned from the design process. First; every design needs to have a clear message and defined scales. An Eco-revelatory design that focuses mostly in ecological processes which are invisible to the eye don't struggle with this type of dilemma. Energy regimes processes tend to be more intangible; therefore, they are resolved by strategies such as simulation or metaphor. The Regional scale message that involves tangible and intangible phenomena on the site can also be designed through simulation of metaphor; the strategy of framing views seems to be equally successful.

Secondly, it is important to understand that revelatory design has a limit. When the investigation started, the goal was to test how much can be revealed without confusing the messages. Towards the end of the process and after a rigorous evaluation of the iterations, several examples forced the user to experience different kind of environmental and cultural processes and to learn from them. Nevertheless, the beauty of eco revelatory design lays on the fact that it trusts in chance in a certain level. A modest approach such as a differentiation of ground material in areas where people are most likely to experience site specific phenomena is more valuable than forcing a moment of interaction.
The biggest learning in regards to this notion is that Ecological Phenomena with a presence on site can be revealed by a physical interaction and these moments are a powerful and sublime.

The third lesson is tied to Energy Regimes: maybe eco-revelatory design is not the correct definition. It is necessary to reframe the practice and move towards an Energy Regime Revelatory design. The challenge is that macro scale environmental patterns related to Energy regime processes are not often locally register or directly experience due to their intangible nature. Maybe more elaborated technologies can help open the horizons of insight and understanding about this processes.

Looking utility corridors through the lends of revelatory design was successful. The exercise allowed to test several strategies but it was not enough to show complex and intangible cultural and environmental processes. A missed opportunity with the research was to remain in the utility corridor. Maybe some of the Energy revelatory design should also be located in populated areas.
Towards the end of the investigation and with the discovery of the America's Energy Hot Spot, a new idea emerged. If the America's scenic trail map is analyzed, there are several options of north-south trails in the periphery of the States. If we consider the richness of landscapes of transmission and the diversity of energy regions and eco-region in the center of the country, maybe a hiking trail that crosses the country East West can be developed. In this trail, people will experience a boarded variety of energy regimes infrastructure such as natural gas, wind power, solar power, and future energies that the USA government is developing.

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Thoreau once said "One destination is never a place, but a new way of seeing things". This is the biggest outcome of this thesis investigation.

# PART 9 **[APPENDIX]**

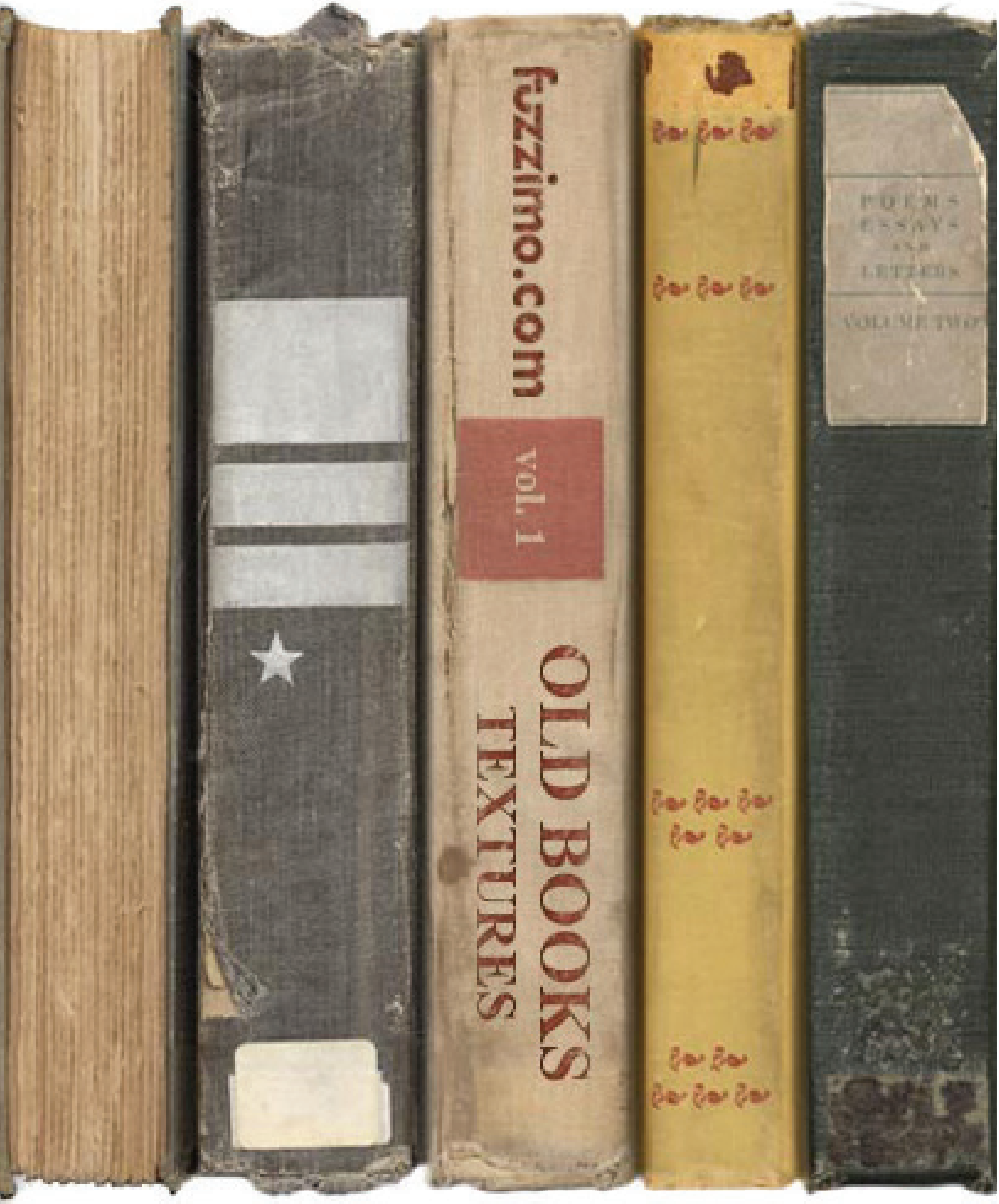




Figure 17. Texture from Pinterest

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# [APPENDIX]
## Figure List

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