BEYOND THE PRISTINE

Reframing the notion of nature conservation
through the agency of plant 'vagabonds'
in Toronto's Rouge National Urban Park

by

Saman Soltani

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Abstract

Protecting nature in its pristine state and within designated geographic boundaries is embedded within historical framings of conservation. Yet, in the context of today's rapid anthropogenic change, this concept is increasingly flawed and irrelevant. This thesis draws from interdisciplinary literature in political ecology, geography, and landscape architecture to explore Rouge National Urban Park, Toronto's newest category of urban nature preserve. It foregrounds Botanist Gilles Clément's research on "vagabonds" as valuable ruderal species with design agency. Using fieldwork, mapping, document analysis, and model making as catalysts for design intervention, the work proposes the park's transformation into a vagabond living lab, employing a network of experimental design instruments across the landscape. Each design frames the site as a testing ground for new understandings of nature conservation within urban contexts—done by exploring the role of vagabonds. Ultimately, this thesis speculates what future urban landscapes can be like in conditions of environmental flux.

Figure 1 : Vagabond habitat within Toronto's Rouge National Urban Park

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Table of Contents

Part One: The History of Nature Conservation in North America

Part Two: Vagabonds

Part Three: Site Description

Part Four: Design Research and Proposal

Figure 2 : A collection of vagabond plants from Toronto's Rouge Park.

List of Figures

Original by author unless otherwise noted

Part Three: Site Description

Part Four : Design Research and Proposal

Introduction

Vagabonds are ecological travelers who journey far and long to colonize human-disturbed landscapes. The term was first used by French Botanist Gilles Clément to describe opportunistic, wild species that inhabit spaces where "man [sic] abandons the evolution of the landscape to nature alone" (Clément, 2003, p 2). Despite often being overlooked as weeds or invasive species, Clément refers to vagabonds as valuable ecological agents that create biodiverse landscapes.

Clément's ideology created a new, fresh perspective to existing understandings of nature conservation, particularly at a time when vagabonds were perceived as ecological enemies to indigenous ecosystems and a war was being waged on them in the name of conservation (Clément, 2010). Therefore, by looking at vagabonds instead as valuable, ecological passengers with design agency, we can challenge the connotation of nature conservation that is conventionally understood as constrained, isolated geographic areas with designated boundaries needed to preserve an environment in its original state. Instead, this thesis views conservation sites as dynamic biophysical landscapes with vague, transient, and ever-changing thresholds that adapt easily to local environmental changes. It uses an area in Toronto's Rouge Park—Canada's first national urban park—in order to explore what today's conservation sites can be like in a time of environmental change and uncertainty.

Critical texts that helped establish the grounds for this thesis include the works of Gilles Clément and, in particular, his recent publications, *In Praise of Vagabonds* (2002) and *The Third Landscape* (2003), which are considered some of the most important theoretical writings on the subject. Fred Pearce's *The New Wild* (2016), Peter Del Tredici's *Wild Urban Plants of the Northeast* (2010), and Emma Marris *Rambunctious Garden in a post-wild world* (2013), were equally important, as were a series of propositions, speculations, and experimental design projects that focus on a new understanding of nature conservation through reframing the role of vagabonds within the urban context.

This thesis is divided into four parts. *Part 1: The History of Nature Conservation* in North America introduces the origins of the notion of nature conservation and its dramatic transformation through a 200-year conservation movement history. Part 1 defines and frames how the thesis engages with the concept of nature conservation amidst its definitional evolution. It also reviews existing literature as a means of unfolding this history to better understand the challenges of defining conservation in our contemporary time of climate change uncertainty. *Part 2: Vagabonds* introduces and explores vagabonds as valuable yet overlooked or avoided species with potential agency. This is done through reviewing examples of their real-life evolution and landscape utility, as well as unpacking significant theoretical contexts. *Part 3: Site Selection*, identifies the site for experimental design, selected from Toronto's Rouge National Urban Park. The site is introduced and briefly described through my firsthand fieldwork, mapping, document analysis, and location-specific research, and lab experiments. It is in *Part 4: Design Proposal* where a series of experimental design instruments are registered into the site to test the agency of vagabonds for the purpose of reframing nature conservation.

Landscape design

Political ecology

Architectural representation

Figure 3 : Essential literary texts.

Methods

In this thesis, I used five main research methods to learn, explore, and analyze the site data and findings while also informing my design process. These main tools include mapping, site documentation, on-site observation, lab experiments, and material explorations/tank models. Each method was conducted in different time periods during the thesis for the purpose of data gathering, visualization, analysis, and design approach. The instruments used in each method served to inform my initial ideas and observations.

1. Mapping

This work employed mapping as a tool to familiarize myself with the site and its characteristics, while also revealing some of the invisible site qualities, including visualizing local wind movements. This method was also conducted as a medium to explore the interconnections between my in-person site observations and statistical data analysis. Mapping was used throughout the thesis, starting from site visits to the design proposals. In the thesis document, it provides a helpful means of visual communication to the reader, explaining regional connections and the broader biophysical conditions of Rouge National Urban Park.

Figure 4 : A local map of Rouge National Urban Park and its Surrounding.


Water Flow
Topography Lines
Wind Rose
Park Boundries
Beyond "Conservation'
Site Visits
2.5
5 km
Lake Ontario

2. Site documentation

Site documentation involved a series of actions and tools to expand my understanding of Rouge National Urban Park and its context while also providing me with firsthand data for further analysis. This practice was conducted largely through recording my field trips to several areas in and around the park via videos and photographs. Site images were the most important component of my research and were used at every step in the work, from initial site visits to visualizations as a part of the final design proposal. Site documentation was also conducted through the collection of site organic samples, such as plant 'vagabond' debris, gathered for further off-site experiments. Later, these samples and material collections became a driving factor in the design process of instruments such as seed catchers, vagabond experimental farms, and floating vagabond collectors.

Figure 5 : Site documentation under a bridge located outside of Toronto's Rouge National Urban Park.

3.On-site observation

On-site observation involved a series of in situ monitoring, surveying, and experimenting of site elements and activities that were relevant to the thesis. The on-site study mainly included monitoring the water level rise of Rouge River and surveying vagabond seed dispersal in different sites. It also involved watching the activities of park visitors, including those walking, hiking, cycling, and fishing. The data produced was then visualized through a series of collages and mappings. They also became important elements of the design process, informing the proposed instruments, such as seed catchers and vagabond experimental farms.

Figure 6 : On-site experiment of the vagabond seed dispersal.

4. Lab experiments

This method involved a series of tests on site samples and material collections. The main experiment included a five-day investigation of the water holding capacity of Common Reeds using glass jars as enclosed containers. This analysis not only initiated a new idea for the design of some of my instruments, such as the vagabond experimental farms, but it also helped me to propose some of my thesis questions.

Figure 7 : Off-site experiment exploring the water holding capacity of Common Reed species.

5. Material exploration/tank models

Material exploration and tank world experiments were research tools that allowed me to further develop and explore my design instruments through firsthand making. In this thesis, I used material explorations for testing one of my design concepts for the vagabond experimental farm. The result was the creation of physical new forms which could have only been explored through this direct material study. The tank model experiments were also a way of prototyping the performance of two of my design instruments, the biomass harvester and the vagabond experimental farm. This technique used complex natural processes of growth and composting to explore the performance and potentials of each instrument.

Figure 8 : A close-up photo including the material exploration of one of the design instruments.

PART 1:

The History of Nature Conservation in North America

"Conservation, viewed in its entirety, is the slow and laborious unfolding of a new relationship between people and land."

Aldo Leopold (Meine, 2017, p. 217)

Figure 9 : A view of the Rouge Wetland located in Toronto's Rouge National Urban Park.


OZARK TRAIL

Preface

The beginning of modern nature conservation practices in North America has been paralleled with the change of the human conception of what is known as *"pristine wilderness"* (Cronon, 1996, p.8). Originally, the essential idea of *"wilderness"* has been described as a sacred place that is pure and untouched by human activities (Ibid.). This pure image of wild nature that has been influential in the creation of the first national parks in North America was explored by 19th and 20th century romanticism writers such as Roderick Frazier Nash (1989), Henry D. Thoreau (1854), and painters such as Katherine E. Manthorne (1837) (Denevan, 1992) (Cronon, 1996). This perspective is completely different than the idea of modern conservation movement in North America which considers nature as resource and is about "protecting species and ecosystems in their own right and as resources essential to humanity" (Holdgate, n.d., p. 3). However, it is important to note that the modern conservation movement is itself an outcome of romanticism ideology, which is why it is no accident that so many conservationists such as A. Leopold, J. Muir (1912), and Henry D. Thoreau (1854) figured out their position relative to the wilderness movements (Cronon, 1996).

Looking back at the history of the nature conservation movement in North America not only helps us to discover our changing attitudes toward biophysical processes in a broader sense, but also allows us to trace back their shortcomings relative to our present environmental crisis and climate change imperatives. To distill useful research from such a long period of history, this chapter breaks down the historical record of only the last 200 years of nature conservation, an era which is not only considered as the most influential in the North American conservation movement but also in the world (Denevan, 1992). This timeframe contains indicators of cultural shifts toward human understanding of what we know today as nature conservation.

Figure 10 : Black and white postcard of the former Rouge River conservation landscape in 1910.

The North American Conservation Movement From Late 19th Century to the Present

The timeline of the modern conservation movement is aligned with the environmental movement in North America. The Canadian Encyclopedia defines the conservation movement in four waves as follows: (1) 'National parks'; (2) 'Environmentalism'; (3) 'Globalism'; and (4) 'Climate change' (Environmental Conservation Movement in Canada | The Canadian Encyclopedia, 2020). Each wave is a period marked by an important environmental, global change in our modern history.

From the late 1800s, action for conservation in North America began from the creation of geographically bound national parks (Ibid.). Simultaneously, the first national park selection followed the romanticism ideology of "wilderness" where the most sacred landscapes simply appeared worthy of protection (Cronon, 1996). Thus, the first national park in the United States and Canada including Yellowstone in 1872 and Banff in 1885 were pictured as large, sacred wildlands without human inhabitants (Environmental Conservation Movement in Canada | The Canadian Encyclopedia, 2020) (Cronon, 1996). Later, the idea of national parks also became relative to the environmentalist idea of nature and work which has looked at protected areas as places of recreation (Cronon, 1996) (White, 1996).

The first decade of the twentieth century was the most influential period of North America conservation history which was based on the idea of preserving wilderness from human reclaim/use. This was a crucial time when the original romanticism idea of wilderness and the main purpose of national park creation became challenged (Cronon, 1996). Rapid urbanization and industrialization started arguments over whether conservation was about keeping human impact away from areas of wilderness or controlling the use of natural resources (Holdgate, n.d.)

This became the beginning of contradictory arguments toward the conventional idea of nature conservation, centered on protecting the landscape from human use.

While the initial European settlers-colonial view of North America was a vast, infinite wilderness of unexplored resources, efforts to preserve these areas were increasingly developed as the major landscape shift from forest to farmland happened. This era came to determine North America's second wave of the conservation movement. From the 1960s to 1970s, a group of conservationists became worried about the human impact on the environment. Thus, the conservation goal focused more than ever on major environmental issues (Environmental Conservation Movement in Canada | The Canadian Encyclopedia, 2020).

As environmental issues grew global in scale, the conservation movement was led into a third wave. From the 1980s to the end of the 2000s, there were many international conservation movements and agreements between nations including the most significant one, the Canadian Coalition on Acid Rain in 1981 (Ibid.). The international pack, which was held between Canada and the United States, assisted in reducing nitrogen oxide emissions in North America (Ibid.).

From the beginning of the 21st century to today, climate change has become a comprehensive concern on global, national, and local scales which brings the conservation movement to the recent wave: Climate Change. This period has drawn international attention to the question of what should the future of nature conservation practice in response to global-scale climate change be?

Today, nature conservation in Canada has also expanded to include nature preserves within urban settings. In 2011, there was the introduction of the new category of national parks which was initiated with the first Canadian national urban park known as 'Rouge National Urban Park'. The eponymous park established around the Rouge River is about a 35-km drive from the east of downtown Toronto, neighboring Markham and Pickering. The park's size is approximately 79.1 square kilometers, confined between the Oak Ridges Moraine area and Lake Ontario, covering the various uses of agriculture, recreation, fisheries, and forestry (Rouge National Urban Park | The Canadian Encyclopedia, n.d.)(figure 11).

The vision for creating the first and largest urban nature reserve in Canada evolved over decades. Historically, Rouge Urban Park was only a local neighborhood park in the east of Toronto. Due to the rapid geographic expansion of the city eastward, by early 1975, a group of citizen activists concerned with the destruction of their ecological environment decided to preserve the ecosystems of the Greater Toronto Area (Lopez, 2018). They formed an organization called *'Save the Rouge Valley System'* in 1975 and promoted conservation projects in the region for more than a decade (Rouge National Urban Park | The Canadian Encyclopedia, n.d.). Finally, after 15 years of campaigns by civil actors, a smaller version of today's Rouge Park was instituted in 1995, consisting of 40 square kilometers of original wetlands and forested areas. In 2011, the small park shifted to the first Canadian national park, where governance was controlled through the centralized Parks Canada agency, since the Canadian government announced that it would environmentally be beneficial to the ecology of Rouge River Valley (Lopez, 2018). Thus, *"National Urban Park"* is considered the recently developed model of National Parks Canada's nature conservation (Rouge National Urban Park | The Canadian Encyclopedia, n.d.).

On 15 May 2015, the *"Rouge National Urban Park Act"* was created to officially establish the park conservation schemes and regulations (Ibid.). This act leads to the top priority of the park's while also demanding the strongest

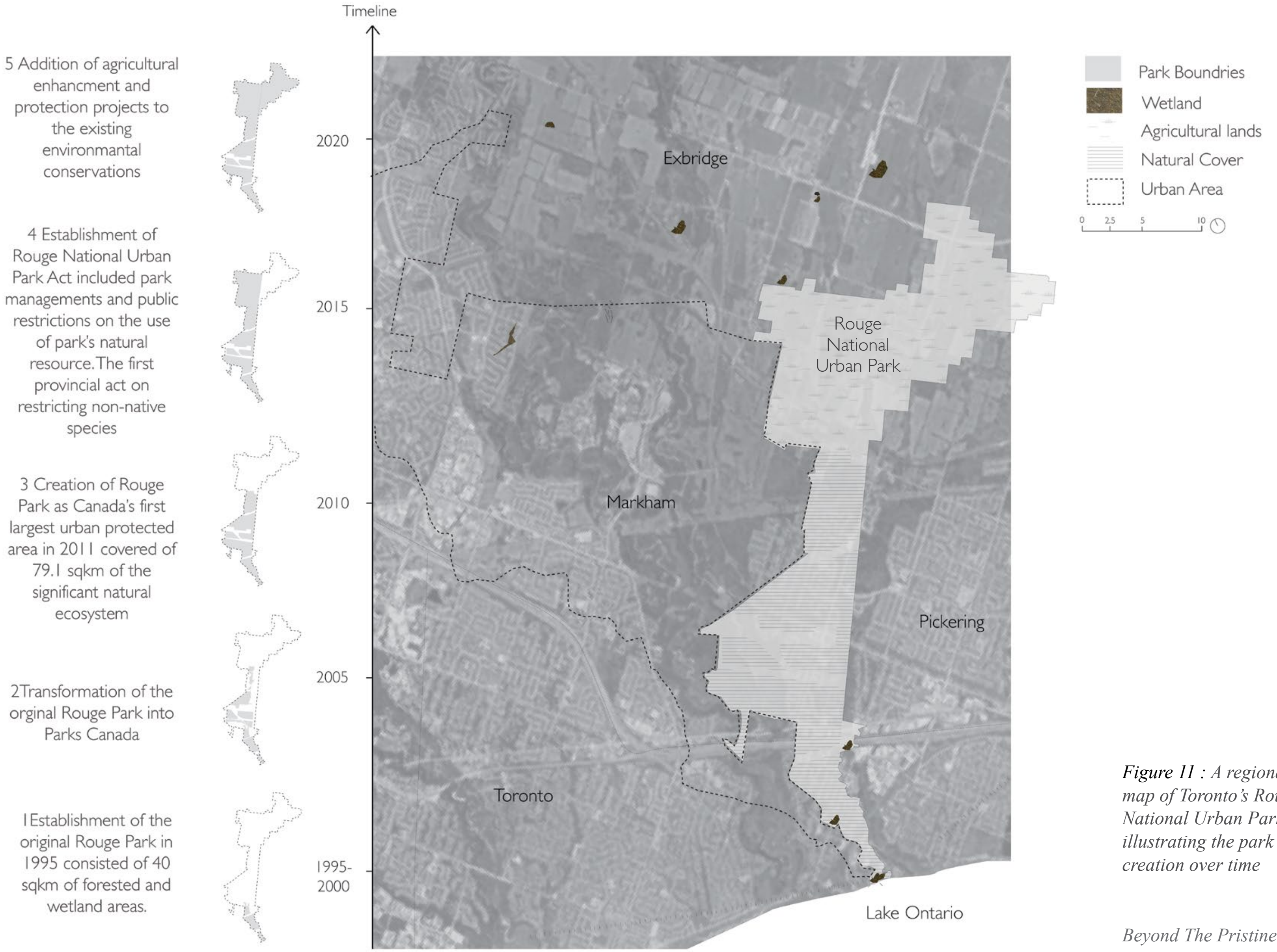


Figure 11 : A regional map of Toronto's Rouge National Urban Park illustrating the park's creation over time

environmental conservation. Since 2015, the park has gone under the farm practices protection policies, which makes it the first national park in Canada with farming protection and management. The government has added more than 30 square kilometers of agricultural lands to the boundaries for the purpose of heritage and natural conservation (Lopez, 2018).

While there was uncertainty and questions about how people and the environment can effectively coexist in an urban setting, the Rouge Park project is in the important process of redefining this relationship (politis, 2015). The park therefore acts as an experimental site to explore some of the important questions regarding natural conservation, including what should comprise an urban park. This makes it a perfect site for this thesis to explore and to push the ideas of conservation within a rapidly evolving urban context.

Moreover, looking back at the 200-year period of conservation movement history in North America, an important question is raised: Despite the primary idea of protecting nature in its pristine state and within protective borders, what can be the next wave of the conservation movement, one based on the realities of today's changing environment? And how can we redefine the notion of conservation so that it can be responsive to future mutability?

Figure 12 : Agricultural land as part of Toronto's Rouge National Urban Park.

Conservation Beyond Pristine Nature and Designated Boundaries

For decades, many have unquestionably accepted the conventional conservation perspective that has tried to sustain nature in its untouched origins. However, several scholars, such as Fred Pearce and Emma Marris, have come to observe this framing as outdated and irrelevant—one that prevents progressive ideas of having a more fulfilled human relationship with our surrounding environment. Based on the previous works of these scholars, this section intends to set an argument on how the conventional notion of conservation can be perceived as flawed in today's context of environmental changes, and based on that asks: what can we consider as our future conservation approach?

In her book, *The Rambunctious Garden*, American Environmental Writer Emma Marris focuses on conservation science, drawing attention to how the concept of conservation can be flawed since there is always continual evolution, change, and flux in ecological systems—both human and non-human (Marris, 2011). While the long-held belief that supporting ecosystems to stay in their primary conditions is the only way to save nature, an understanding of the changing environment and natural selection based on Darwin's theory of evolution is a driving force of successful ecosystems (Camuti, 2015; Society, 2019). This means that, as an example, seeking to only save endangered species leads to a slowdown in natural evolution and change (Camuti, 2015). "If we want to assist nature to regenerate, we need to promote change, rather than hold it back" said Fred Pearce, a journalist reporting on the global environmental issues and climate change, in his publication *The New Wild* (Pearce, 2015, p.20). Based on his statement, the notion of conservation should not freeze in time and space but rather be celebrated for its capacity for change.

Moreover, the recent environmental changes resulting from climate change have led to a shifting ecosystem and greater future uncertainty. Accelerating rates and expanding scales of anthropogenic climate change mean even the remotest places now bear the fingerprints of humanity, the conventional notion of conservation can thus be seen as a paradox to ecological needs (Meine, 2017). Hence, it is important to understand that the future will demand new ideas, strategies, and approaches in conservation practice. Instead of preserving a landscape as a permanent condition, we should consider such places as a temporal, flux network that needs to be negotiated and re-negotiated with climate change across multiple scales (Mathur & Cunha, 2009).

Based on the future of environmental change, the notion of conservation should, therefore, be more resilient than ever. Moreover, it is important to always remember “nature persists, even flourishes, in the most unlikely, most damaged, and apparently least pristine nature” (Pearce, 2015, p.150).

This will help us to rethink landscapes considered previously untouched while also taking into account resilience and adaptation in response to future conservation approaches.

Figure 13 : A photo of thriving vagabond habitats within the transmission corridor site located outside of Toronto’s Rouge National Urban Park.

PART 2:

Vagabonds

‘’Vagabondage becomes invasion on the pretext that the species expands happily. If we find a use for a species (fertilizer, cosmetics, fodder, etc.) it disappears from the record, and we no longer class it among weeds but among useful plants. Otherwise, the species feeds nationalist neuroses.’’

(Clément, 2011, p. 286)

Figure 14 : Prescribed fire as a control method in deconstruction of invasive species.

Vagabonds: Origins and Definition

The term *'vagabond'* was originally used by Gilles Clément in his article *In praise of vagabonds* (Clément, 2011). Clément is a landscape architect, gardener and botanist who introduced several progressive ideas into the field of ecological landscape architecture (Bratton & Clément, 2008). The term vagabond is also present in his recent theory *The Third Landscape, or Tiers Paysage,* published according to his landscape experiment of the Vassivière site in Limousin, France, commissioned by the Center d'Art et du Paysage de Vassivière in 2003 (Clément, 2003). Clément refers to vagabonds as a "third estate" inhabiting spaces where "man [sic] abandons the evolution of the landscape to nature alone" (Ibid, p.3).

Overall, vagabond is an umbrella term for a variety of wild, opportunistic plant species that quickly travel overseas, colonize disturbed lands, and/or sometimes displace desirable native species of plants or wildlife in a natural host environment (Skinner, 2011). Based on the thesis's definition of vagabonds, there are three associated scientific definitions to this term, including *'ruderal,' 'noxious weed,'* and *'invasive species'* (Figure 15). These definitions are described as follows:

i. ***Ruderal species*** are plants associated with human dwellings, agriculture, or the most disturbed spaces. The term ruderal was originally used after the Second World War by Berlin ecologists, Herbert Sukopp, to refer to unintended ecologies found in high-disturbed areas. They are often considered as type of weeds that are inhabited in environments with high-level human disturbance (Stoetzer, 2018).

ii. ***Weeds*** are a broad category used for plant species that causes economic losses or ecological damage, to human, animals, or on account of an undesirable place where it is growing (WSSA GLOSSARY | Weed Science Society of America, n.d.). A noxious weed is a specific group of weeds listed in the 'Schedule of Noxious Weeds' found in Regulation 1096 made under the Ontario Weed Control Act (Weeds Act - Frequently Asked Questions, n.d.).

They are defined as species that are difficult to manage on agricultural land once established, or those that affect the yield and quality of the crop being grown, negatively changing the health and well-being of livestock, or posing a risk to the health and well-being of agricultural workers (Ibid).

iii. ***Invasive species*** are those that are harmful to or likely to harm the natural environment, regardless of whether they are native or non-native (Law Document English View, 2014). The term *"invasive"* implies a disturbance that may disturb the normal functions of a biotic community (Foster & Sandberg, 2004). It is worth noting that the notion of *"invasion"* is a transient concept since species are always in move from one context to another (Ibid.). Considering the constant change of landscape patterns, the geographical region of almost any species consistently shifts over time, even if it is only a meter in distance. Thus, any species can be considered "invasive" by the ideal soil, moisture, and disturbance conditions (Ibid.). Looking at the complex definitions of such species, an important question is raised: Despite the negative connotation of vagabonds, what could be the potentials or possibilities for such species in reinforcing a new, resilient notion of nature conservation?

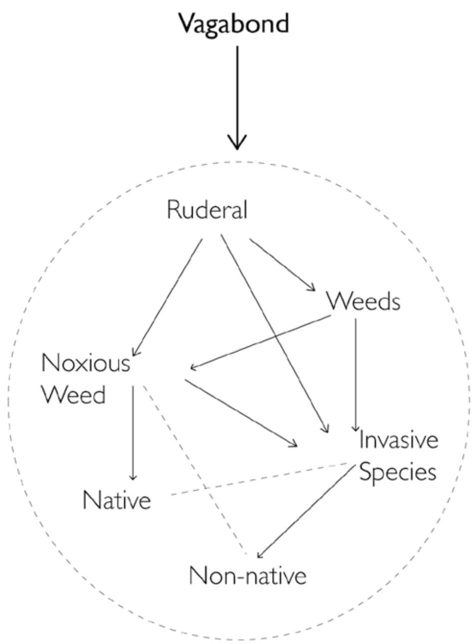


Figure 15 : Terminology Map defining 'Vagabond'

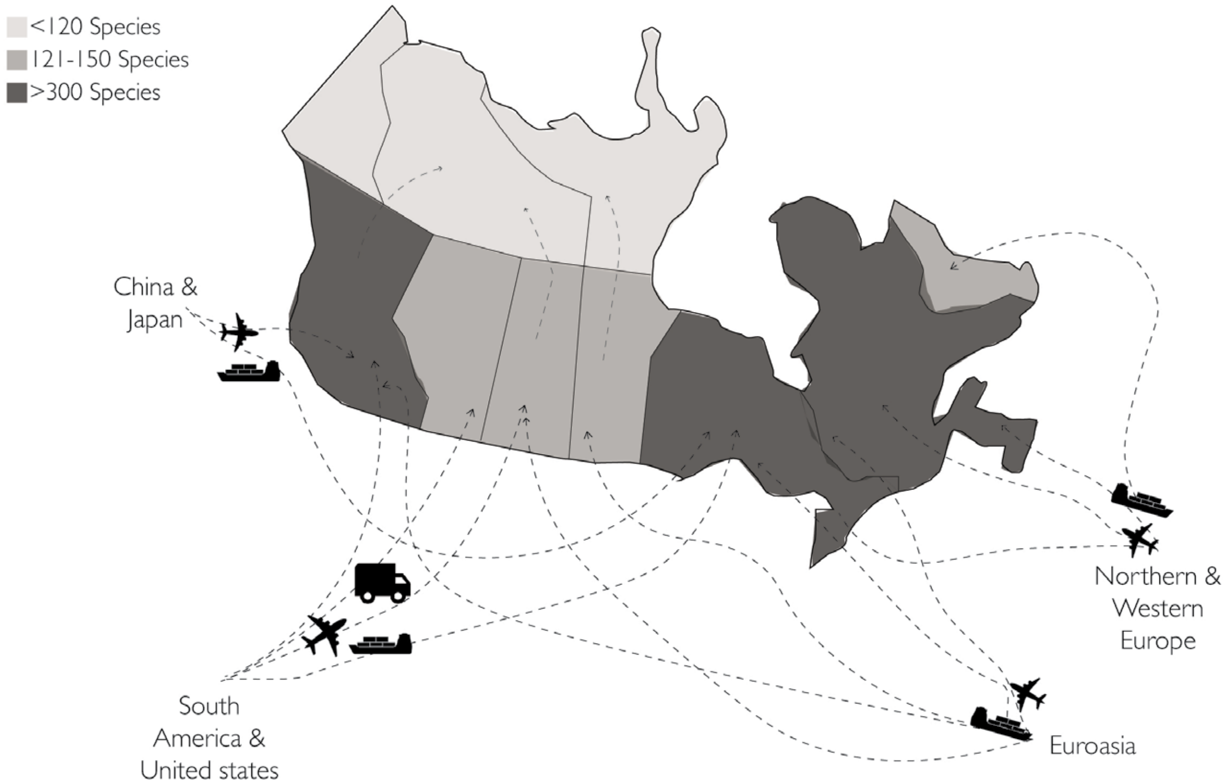
Un/Intentional Species Introduction

As ecological passengers, vagabonds constantly travel into new geographic areas through the natural, animal, or human introductions (Clément, 2011). Based on Canadian Food Inspection Agency or CFIA report, there are global, regional, and local ways a species introduced into a new region which is called a *'pathway'* (Canadian Food Inspection Agency, 2008, p 7).

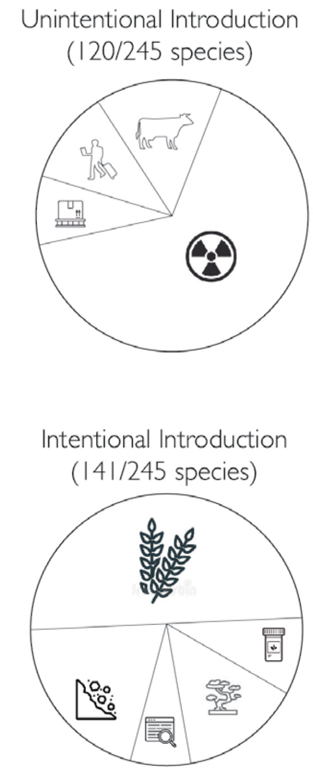
The pathways for 245 invasive species into Canada from overseas have been detected since the European settlement of North America in the 1600s. (Canadian Food Inspection Agency, 2008). It is estimated that 58% of these were introduced intentionally through "the introduction of specific crops, landscape plants, ornamentals, and plants targeted for medicinal and research purposes" (Ibid, p 7). By contrast, an estimated 120 (49%) of Canada's invasive species were unintentionally introduced, "through weed seeds mixed in with imported soil, or crop seeds, ship ballast, packing material, and through recreation and tourism" (Ibid, p7) (Figure 16).

Today, so-called invasive species continue to play an important role in the horticultural trade. For example, more than 65% of fruit trees including cherry, pear, and quince tree species are provided through international and regional trading for the purpose of consumption or ornamentation in North America (Government of Canada, 2020). This is one of the major pathways of intentional introduction of non-native species, even though importing them can be harmful to some non-human species due to their harboring and carrying of other invasive species (Ibid.). Moreover, invasive species are expected to be spread dramatically in the years ahead, based on future foreign trade patterns between established nations (Canadian Food Inspection Agency, 2008). For instance, the most important trading partner with Canada, the United States, provides an key source of plants and materials that some can become invasives. Its total imports serve 67%

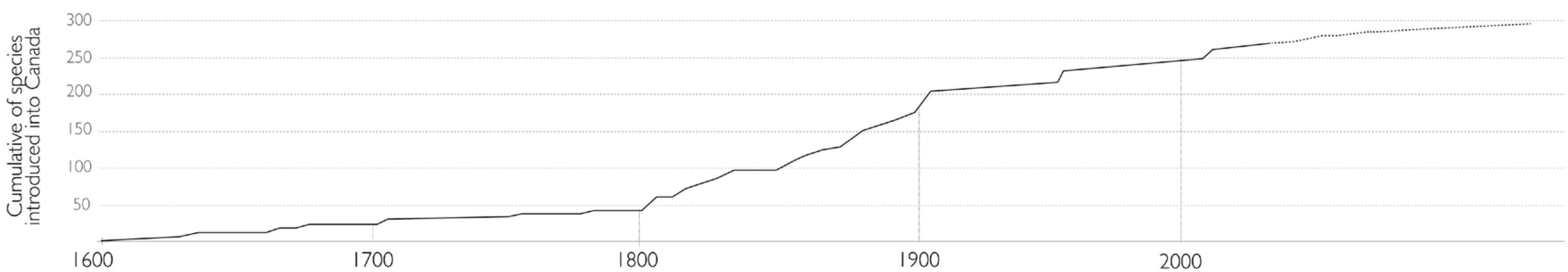
Figure 16 : Diagrams illustrating the introduction typologies of invasive species to Canada.



<120 Species
121-150 Species
>300 Species
China & Japan
South America & United states
Euroasia
Northern & Western Europe



Unintentional Introduction (120/245 species)
Intentional Introduction (141/245 species)



Cumulative of species introduced into Canada
300
250
200
150
100
50
1600
1700
1800
1900
2000

of the whole value of materials entering Canada with the possibility of invasive plant introduction (Canadian Food Inspection Agency, 2008). However, these trade patterns are changing quickly in recent years. Most particularly, imports from East Asia including China, Japan, and Korea, have increased rapidly. Thus, the future introduction of potentially invasive plants into Canada is estimated to likely come from East Asia, because of the climatic similarities to some parts of Canada, as well as, current Canadian trade patterns (Ibid.). It is also estimated that on average, over the next 10 years, about 5 species per year will be introduced to Canada, of which about 3 will become invasive (Ibid.). This means that there will be a period of constant accumulation of invasive species in the future of the Canadian environment which will tackle conventional conservation approaches and policies regarding vagabonds.

In this thesis, two most common vagabond plants, *Common Reed* and *Milkweed species*, will be investigated elaborately to set the stage for design interventions.

Phragmities or ***Common Reed*** are native species to Europe and Asia that were intentionally imported into Canada and the United States during the 1800s for the purpose of erosion control (Ontario Weeds: Common Reed, n.d.). Shortly thereafter, however, they outcompeted native plant species and spread rapidly through marshes, wetlands, and drainage areas. Since 2015, this species has been considered invasive and an ecological enemy to native ecosystems. It now falls under the *Invasive Species Act* which explicitly regulates the prevention of invasive species in Ontario (Ibid.). While recognizing invasive common reed species in their early arrival can increase the opportunity for successful removal, once spread, control treatments become increasingly expensive and less effective (Ontario Weeds: Common Reed, n.d.). For this reason, this thesis intends to explore how we may come to

Figure 17 : A view of the Common Reed's thriving habitat located in the fringe of Toronto's Rouge National Urban Park.

better live with their presence and even benefit from their unique characteristics.

Similarly, ***Milkweed*** was a species native to North America that was categorized by Ministry of Agriculture, Food, and Rural Affairs as a noxious weed due to its toxicity to agricultural crops and livestock (Asclepias Syriaca (Common Milkweed) | Native Plants of North America, n.d.). Plant culling led to a huge reduction in Milkweed populations which, in turn, affected monarch butterfly habitats (Ibid.). Although, in the last five years, the plant has been relisted as an endangered species since the monarch population has been threatened, there is still a question of how can these species coexist peacefully within urban and rural settings?

Conservation Against Vagabonds

There are several methods in conventional conservation that deal with invasive species. They are classified based on two stages: *'before'* (prevention methods) and *'after'* (control methods) the invasive spread (Invasive Species Strategy, 2020). In the stage of *'before the spread'*, the main action is detection and prevention, which happens before a species enters a new site. In this stage, it is important to evaluate the site properly in a long-term period which requires a comprehensive monitoring plan with high-level commitment. Once the species spread in the site, there are several control methods used including: mechanical control, such as mowing and removing and burning, biological control, and chemical control, such as using herbicides. While some of these control methods can be effective in the deconstruction of vagabond species, they are mostly cost-consuming, labour-intensive, and environmentally contaminating(Ibid.).

Moreover, it is important to know the costs related to nature conservation programs against invasive species are much lower when they are detected in the beginning stages. Once a species spreads, management and eradication are exponentially more expensive and less efficient, especially given the annual rates of newly arriving invasive species, which is approximately 3 out of 5 introduced species per year (Foster & Sandberg, 2004) (Canadian Food Inspection Agency, 2008). It is also harder to obtain resources to manage invasive species in the early stage of detection since early detection and rapid response can go with huge costs (Invasive Species Strategy, 2020) (Figure 18).

With vagabonds spreading rapidly at the local, regional, and global scale, as well as lowering the economic return of conservation management programs, we can ask if it is still reasonable to think about nature through the lens of the pristine, and as areas that need to be conserved, rather than accepting of change? We may also question the notion of conservation in a city with an ever-growing number of vagabonds. Could a costly and ecologically-sensitive restoration plan be reasonable in Canada's largest metropolis, such as the Greater Toronto Area, when the conservation methods have become less effective and sometimes harmful to the environment (Foster & Sandberg, 2004)? What might be an alternative paradigm for Rouge National Urban Park as Canada's first urban nature preserve?

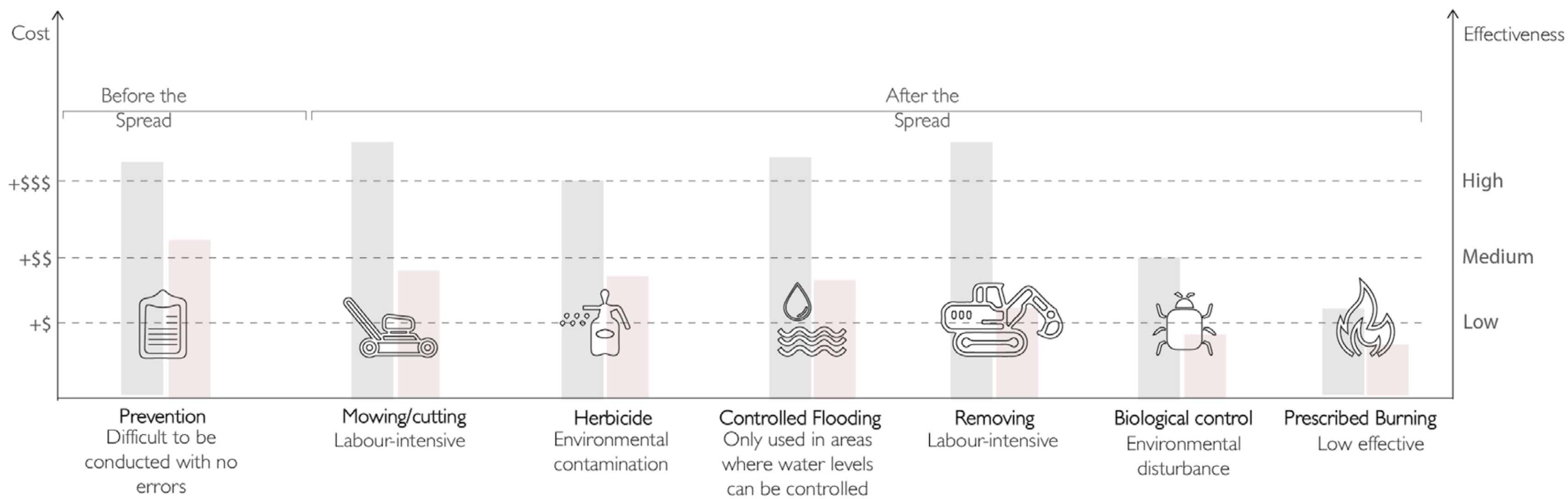


Figure 18 : Catalogue of conservation actions against vagabonds.

The Role of Vagabonds in Urban Contexts

Although the public widely views vagabonds as negative and damaging to ecosystems, a question that has been raised by the American botanist and author Peter Del Tredici is: “what constitutes these species in an urban context, where humans long ago destroyed most of the original vegetation?” (Del Tredici, 2010, p. 12). In his book *Wild Urban Plants of the Northeast,* Del Tredici makes the case that despite the negative impacts of vagabonds, they can still bring beneficial qualities to our urban life. He also defines the ecology of the city not by cultivated plants or native species, but crucially by plants that dominate the neglected sites of the urban environment (Del Tredici, 2010). As he describes vagabonds:

“Some of the plants are native to the region and were present before humans drastically altered the landscape; some were brought intentionally or unintentionally by people; and some arrived on their own, dispersed by wind, water, or wild animals. They grow and reproduce in the city without being planted or cared for by people. They are everywhere and yet they are invisible to most people.”(Peter Del Tredici, 2010, p. 1)

Del Tredici’s ideas are in keeping with Clément’s, who considers that urban nature resulted from natural evolution and crossbreeding between native and indigenous species, making them successful and strongly dynamic. Along similar lines, Clément also criticizes the concept of nature conservation as an anthropogenic definition of ideal territory, where vagabonds become invasions only when humans cannot find a use for them (Clément, 2011).

Figure 19 : A view of Common Reed community in the under-bridge site, close to Toronto’s Rouge National Urban Park.

Design Precedents

Recent theories in political ecology, geography, and landscape architecture have produced design projects, storylines, and speculative fabulations that reframe the notion of nature conservation through the role of vagabonds (Clément, 2011; Clément, 2017; Tommy Thompson Park on the Leslie Street Spit, 2015; Peter Del Tredici,2010, Marris, 2011; Pearce, 2015). Realized design projects also create an understanding of how vagabond can be viewed from different perspectives, responding to not only human but also non-human needs (Foster & Sandberg, 2004). This section provides a review of two significant landscape design projects that promote the role of vagabonds through the idea of cooperation with native and non-native actors.

Garden in Motion Project

The first project is the *Garden in Motion*, or *Jardin En Mouvement*, by Gilles Clément proposed as an experimental structure that respects natural and ecological processes. The 1977 project was the first time that such ideas were developed in Clément's own garden, La Vallée, in the Creuse, France. After decades of observation and experimentation of his work, Clément reapplied the same concept in a site within Parc André-Citroënin Paris, France in 1992. The moving garden is designed as an unmaintained mound in the park that is quickly colonized by many vagabond species while also promoting a permanent evolutionary space (figure 20). The most visible manifestation of this project is the physical movement of species in the field dispersed by water, wind, animals, and humans, as well as the expansion of their underground rhizomes, tubers, and bulbs (Clément, 2017). According to Clément, the garden in motion is a "state of mind" which "leads the gardener to observe more and to garden less" (Clément, 2017, p 3). His way of thinking about the natural world is grounded in patient and steady observation. Thus,

Figure 20 : Experimental structure of Jardin En Mouvement by Gilles Clement in France, Paris , 1992.

he redefines the role of gardener/landscape designer, by allocating a place to observation and cooperating with natural processes. (Skinner, 2011), To better understand the species and their behavior, he states: “This experience (in the garden of La Vallée) lasted eight years, at the end of which I realized that it was a new form of gardening but also a theory aimed at redefining the place of man [sic] in nature” (Clément, 2003, p2).

Leslie Street Spit Project

The second interesting project, with a similar concept to Clément’s Garden in Motion is the *Leslie Street Spit*, located in Tommy Thompson Park. As one of Toronto’s largest waterfront wilderness areas, the fully artificial island is constructed from landfill and lake dredged sand. It has become a new type of landscape in the service of non-human actors, which, in this case, is migrating birds (Foster & Sandberg, 2004) (Figure 21).

In 1959, Ports Toronto initiated the construction of the Leslie Street Spit for port facilities. From 1974 to 1983, the land was developed by around 6,000,000 cubic meters of lake sand and silt (Tommy Thompson Park on the Leslie Street Spit, 2015). This led to the formation of the island which is an important part of Tommy Thompson Park. In the early 1970s, when the site was not active anymore, the natural processes shaped the spit and created a truly *“accidental wilderness”* (About - Tommy Thompson Park | Leslie Street Spit, 2016). While The spit once used to be the site of an industrial by-product, it is now a thriving feature of the Toronto landscape. What is most interesting in the project is the role of vagabond species, serving a crucial position throughout the history of the site. The park was never imagined as a space of pristine nature having an indigenous ecosystem. Rather, it was known for its mostly invasive urban wilderness status, colonizing what may be

Figure 21 : “Accedential Wilderness”, Leslie Street Spit, Tommy Thompson Park, Toronto.

compared to a catastrophic landscape of artifacts from urban regeneration (Foster & Sandberg, 2004).

Learning from these two precedents, this thesis recognizes the important role of vagabond species in redefining our future landscapes. These precedents suggest that effective strategies in response to conservation can be oriented toward a cohabitation with vagabonds, respect for environmental processes, and service to non-human actors. This thesis aims to follow a similar methodology where designers experiment, observe, and learn from biophysical processes with minimal restoration.

PART 3:

Site Description

We often speak of pioneer individuals, beings come to conquer abandoned or exposed soil. The flora of slag heaps is no different from the vegetation of rocky slopes in the mountains. Whether the mountain is natural or artificial matters little to pioneer species.

(Clément, 2011, p. 279)

Figure 22 : A view from the Rouge National Urban Park to the counter conservation sites.

Rouge National Urban Park: Site Description

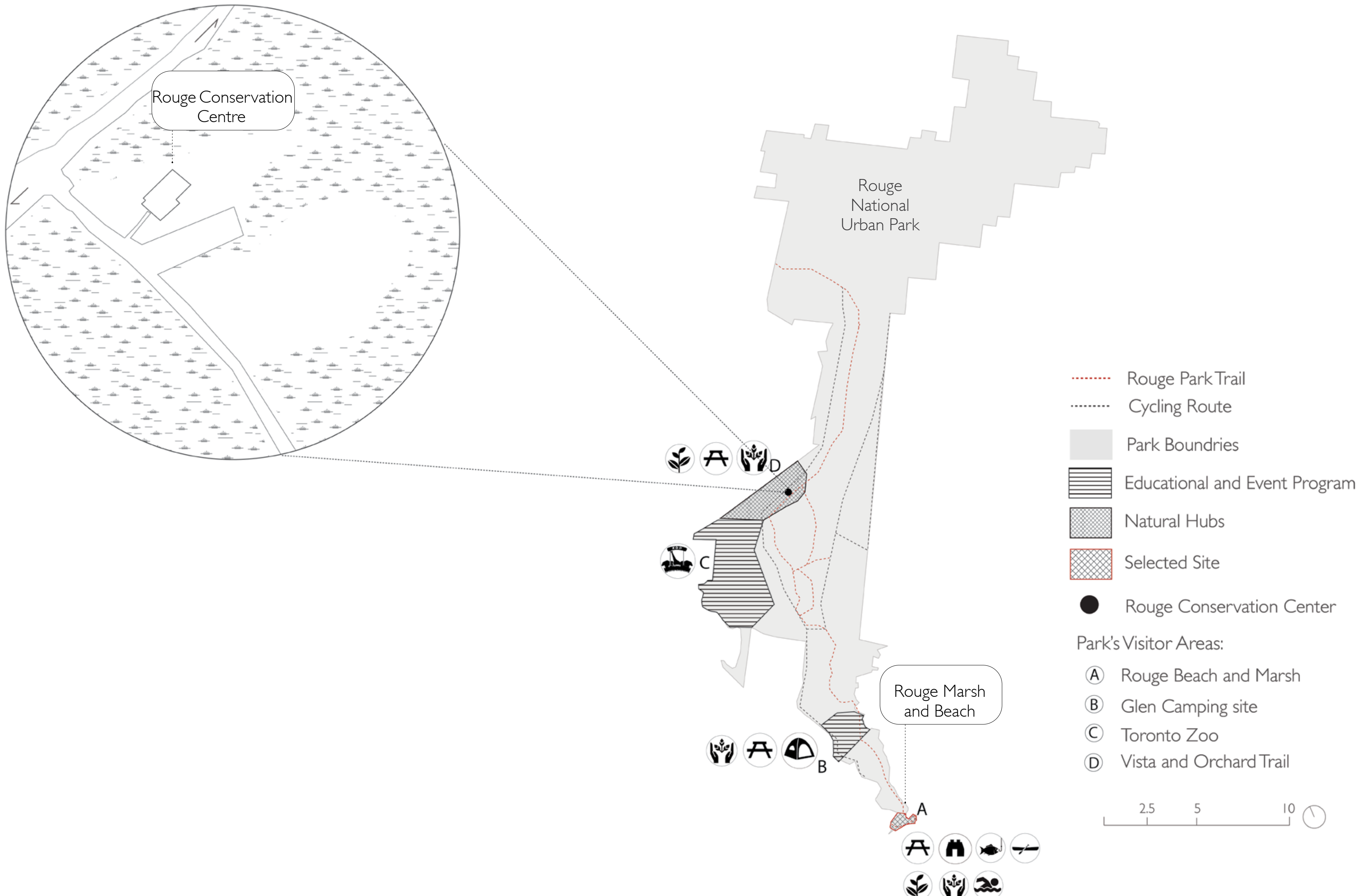
Rouge National Urban Park established in 2015 is located in a neighboring of downtown Toronto, Markham and Pickering. The 79-square kilometer park becomes one of the GTA's largest natural attraction that provides recreational services such as cycling, canoeing, fishing, lookout, camping, and swimming (Rouge National Urban Park | The Canadian Encyclopedia, n.d.).

The park consists of four main visitor areas for those in the City of Toronto, including Rouge Marsh and Beach, Glen Camping site, Toronto Zoo, and Vista and Orchard Trails (Figure 23). Located in the Vista and Orchard area, the *Rouge Valley Conservation Centre* is owned and operated by the Rouge Valley Foundation since 1984 (Rouge Valley Conservation Centre - The Wonder of Local Wetlands, n.d.). This non-profit conservation organization has dedicated efforts to protecting and restoring the natural heritage of the Rouge National Urban Park. The Centre's main focus is on environmental restoration, monitoring and research while also offering educational programs for the general public. The conservation office is also the home to local group of volunteer scientists and ecologists (Ibid.).

In this thesis, I chose Rouge Marsh and Beach located at the mount of Rouge River since it is one of the Rouge Park's main visitor hubs with significant ecological importance and on-going conservation projects. The Rouge Marsh trail located in Rouge Marsh and Beach area offers a 500-meter pedestrian hiking and cycling with access to the largest remaining wetland in the city of Toronto, Rouge Wetland (Parks Canada Agency, 2021b). This area also offers popular activities including paddling, fishing (with required license), swimming, and bird watching (Ibid.) (Figure 24).

My first trip to Rouge Beach and Marsh Area was conducted on September 6th, 2021, at 10:04 am. The weather forecasted a sunny day with above 17-degree

Figure 23 : A regional map of the Rouge National Urban Park illustrating visitor areas and Rouge Conservation Centre.


Rouge Conservation Centre
Rouge National Urban Park
D
C
B
A
Rouge Marsh and Beach
Rouge Park Trail
Cycling Route
Park Boundries
Educational and Event Program
Natural Hubs
Selected Site
Rouge Conservation Center
Park's Visitor Areas:
A Rouge Beach and Marsh
B Glen Camping site
C Toronto Zoo
D Vista and Orchard Trail
2.5
5
10

temperatures, 101 kpa wind pressure from the southwest, and a relative humidity of 80 %.

Rather than waiting for the demarcated official entry point, my site visit started from the parking lot in the southern section of the Rouge Marsh area. The first thing I observed was the billboard welcoming visitors, while advertising the creation of the park as the first Canadian National Urban Park. The next stop was an area on the fringes of the wetland. While it is one of the original ecosystems of the park that serves ecological benefits, such as a rich habitat for semi-aquatic organisms and a reduction in flood force, some parts were noticeably affected and changed by human activities. For example, I observed the dumping of plastic, food trash, road construction debris, and algae bloom (a rapid increase of algae's' population due to excessive fertilizer runoff and road salts in the water)—accumulated on residue spaces and the thresholds of the site.

My visit continued along the edges of Rouge Wetland. In some sections, the borders were shared with private houses located on the fringes of the park. Continuing the asphalt paths of pedestrian and bikes, I finally arrived at the elevated pathway crossing a part of Rouge Wetland and river (figure25). It was one of the recent added construction projects that provides an observatory stage for visitors to spot native aquatic species, such as *Blanding's Turtle*. Based on International Union of Conservation, this species has been listed as endangered (Parks Canada Agency, 2018). Thus, on June 21, 2018, the park restoration program decided to release 49-baby turtles into the wetland to help save them from extinction (Rouge National Urban Park | The Canadian Encyclopedia, n.d.). The second posted sign along the bridge also indicates the story and strong advocacy for this conservation program.

After passing the elevated pathway, the next stop

Figure 24 : A local map of Rouge Marsh and Beach Trail located in south of Toronto's Rouge National Urban Park.


Fishing Zone
Rouge River
Rouge River
Elevated View
Rouge River
Elevated Pathway
Rouge Wetland
Parking lot
Lake Ontario
Vista
Swimming
Sitting Area
Canoeing
Fishing
Rouge Park Trail
Typography
Park Boundries
Marshland
Fishing Zone
Canoeing Route
0
0.25
0.5

Figure 25 : A view of elevated pathway crossing Rouge Wetland in Toronto's Rouge Park.

was a permitted fishing area located in the mouth of the Rouge River and the surrounding marsh area (Figure 26). Fishing as one the featured activities in the park, is only permitted in the most regulated areas. A posted sign on the site explained the location of the permitted fishing zone, its safety and regulations, and illustrated various species inhabiting in the area. I noticed that some of the highlighted species are invasive, such as *Round Goby, Asian Carp, and Zebra Mussels*. The sign advised those fishing to report any existence of invasive species, in order to help with the prevention of their spread (Parks Canada Agency, 2021a).

Continuing on the Rouge Marsh trail, my next stop was Rouge River pedestrian bridge which connects the lower marshland to the upper observatory area and marsh land located on the other side of the river. At the time of my visit, the bridge was under rehabilitation work. While the inside of it remained open to pedestrian and bicycle traffic, there was minor construction underneath it. The farthest view provided from the bridge was the marshland areas on the river and lakeshore, while the closest view was a railway trestle occupied with passing Go Transit public trains every twenty minutes.

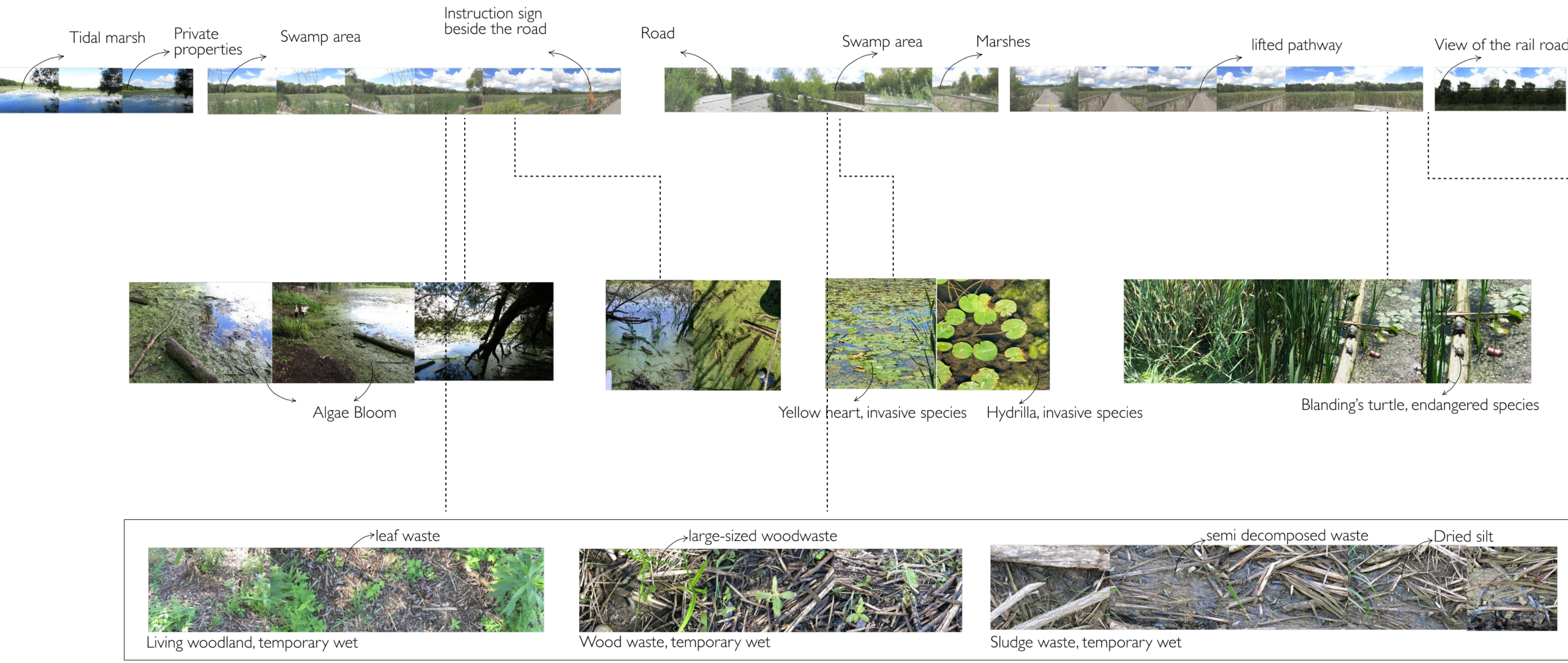
Figure 26 : A view of permitted fishing zone at the mount of Rouge River, Toronto's Rouge Park.

On the other side of the bridge, one of the interesting stopping sites was the shaded pathway passing under the railway trestle. While this area was one of the most-disturbed sites by human activities (considering the train movement and bridge maintenance), it still carried traces of biophysical life and inhabitation. The trail ended with a high elevated view to the Lake Ontario watershed, connecting the Rouge River to the lake.

During the first walk-through visit, I was intrigued by the presence of vagabond species in some parts of the park. It was interesting to know how vagabond habitation connected to the site conditions, which were mostly located in the human-disturbed spots with denigrated forms of nature, called *"subnatures"* by David Gissen (2009).

Since my first visit, I have conducted three more field visits, on September 12, October 18, and November 14, 2021. For each visit, I documented in the same way as the first one. The purpose of it is also to create a comprehensive, regular photo-archive providing a through experience and knowledge of the site context (Figure 28).

Figure 27 : A view of Rouge River's pedestrian bridge, in Toronto's Rouge Park.


Tidal marsh
Private properties
Swamp area
Instruction sign beside the road
Road
Swamp area
Marshes
lifted pathway
View of the rail road
Algae Bloom
Yellow heart, invasive species
Hydrilla, invasive species
Blanding's turtle, endangered species
leaf waste
large-sized woodwaste
semi decomposed waste
Dried silt
Living woodland, temporary wet
Wood waste, temporary wet
Sludge waste, temporary wet

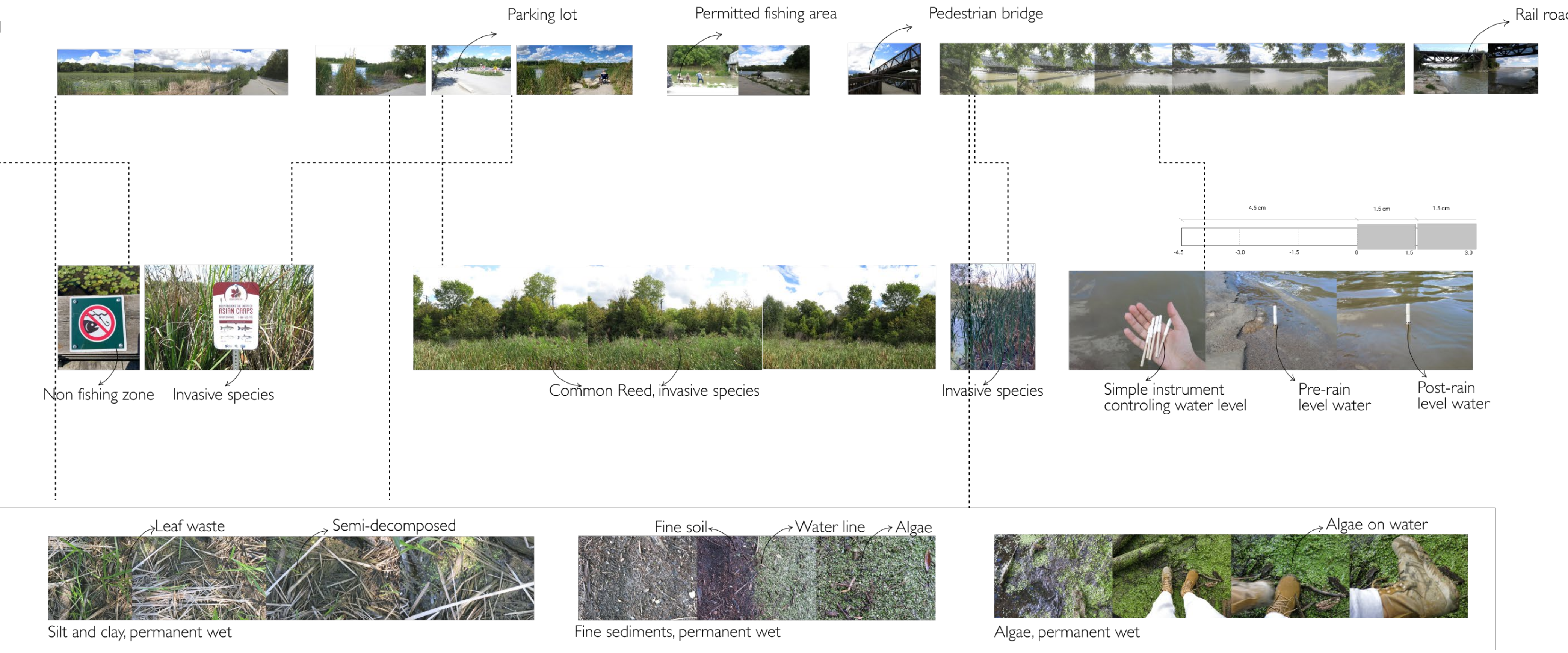


Figure 28 : A photo-archive of the first field trip to Rouge Park.

In Search of Vagabonds

After several visits to Rouge National Urban Park, I decided to continue my fieldwork in search of vagabonds' thriving habitats. To do so, I extended my exploration to new locations within a 5-km distance from the park's designated boundaries with the highest degree of disturbance from anthropogenic activities (Figure 29).

Inspired by Lopez Pinerio's notion of *"urban voids"* (Lopez-Pineiro, 2020), my visited sites were underused, abandoned, and in-between spaces that act as a "… welcoming surface for vagabonds" (Clément, 2011, p. 278). These are spaces opposite to what historically has been problematically classified as 'original nature,' unworthy of conservation and protection from a human perspective. They are also what Clement defines as "…. concrete, oceans of oil, fields of nitrates, and a whole series of nameless, biological interstices: the abandoned areas" (Clément, 2011, p. 278).

After a one-day visit of four such sites neighboring Rouge National Urban Park, I created a catalogue of

Figure 29 : A regional map illustrating the location of site visits.


Lake Ontario
Water Flow
Topography Lines
Wind Rose
Park Boundries
Beyond "Conservation"
Site Visits
2.5
5 km

vagabond seeds, which included various types of plant species, from invasive, ruderal, noxious weeds, to weed plants (Figure 30). The collection comprises: *Black Alder Tree* and *Common Groundsel* as ruderal species; *Common Reed* and *Purple Loosestrife* as invasive species; *Common Milkweed* as a noxious weed; and *Devil's Beggarticks* as a generic weed. Each species was studied and identified through Peter Del Tredici book, *Wild Urban Plants of the Northeast*, which catalogues more than 1,000 urban vagabond species. This further provided me with an opportunity to become familiarized with some of the existing vagabonds on the sites.

One of the important findings during my search on vagabonds was that they are ecological travelers that migrate mainly by wind and water. This way of thinking challenges how we observe conservation sites as constrained, separated areas from their urban context within designated boundaries. Instead, their thresholds can be vague, transient, and ever-changing, adapted easily to local environmental changes. This shift in mindset toward ecological networks began when I had my first site visit to one of the urban void sites on October 14, 2021. It was a transmission corridor three kilometers away from the park. It was a rainy day with 111kpa prevailing winds toward the southwest. I decided to trace the dispersal of vagabond seeds by prevailing winds through a mapping exercise (Figure 31). I then conducted the same exercise to discover their dispersal routes by water, considering all selected sites on the map (Figure 32). The result of my mapping exercise underscored how easily and unconstrained vagabond seeds can disperse, connecting invisibly with their surrounding sites through the small catalytical movements of wind and water.

Linking back to my research questions, the question initiated in my mind is: how can we redefine conservation site thresholds knowing that they are constantly shifting

Figure 30 : Catalogue of vagabond species collected through several fieldworks.


Black Alder
(Ruderal)
Common Reed
(Invasive)
Common Reed
(Invasive)
Common Groundsel
(Ruderal)
Devil's
Beggarticks
(Weed)
Purple Loosestrife
(Invasive)
Common Milkweed
(Noxious Weed)

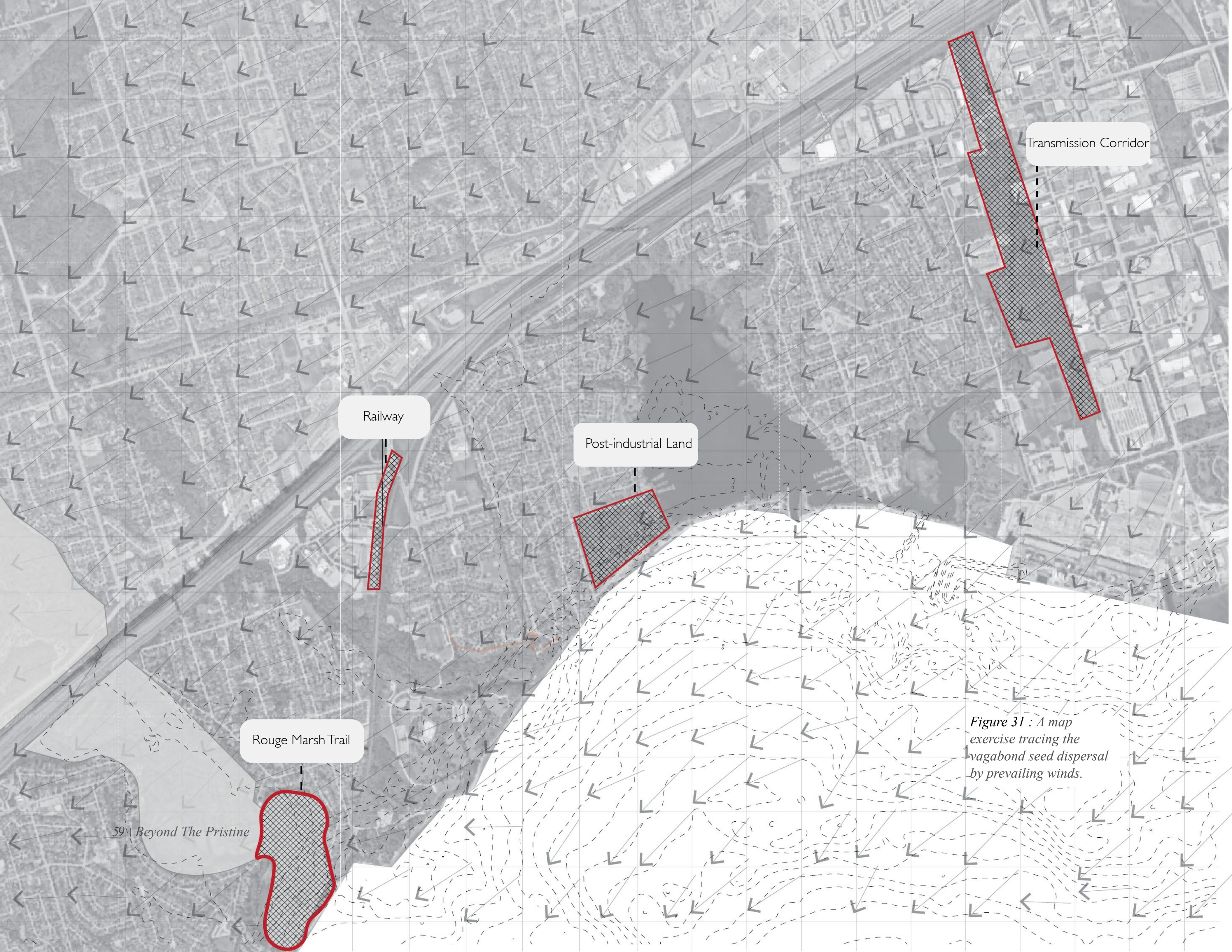


Figure 31 : A map exercise tracing the vagabond seed dispersal by prevailing winds.

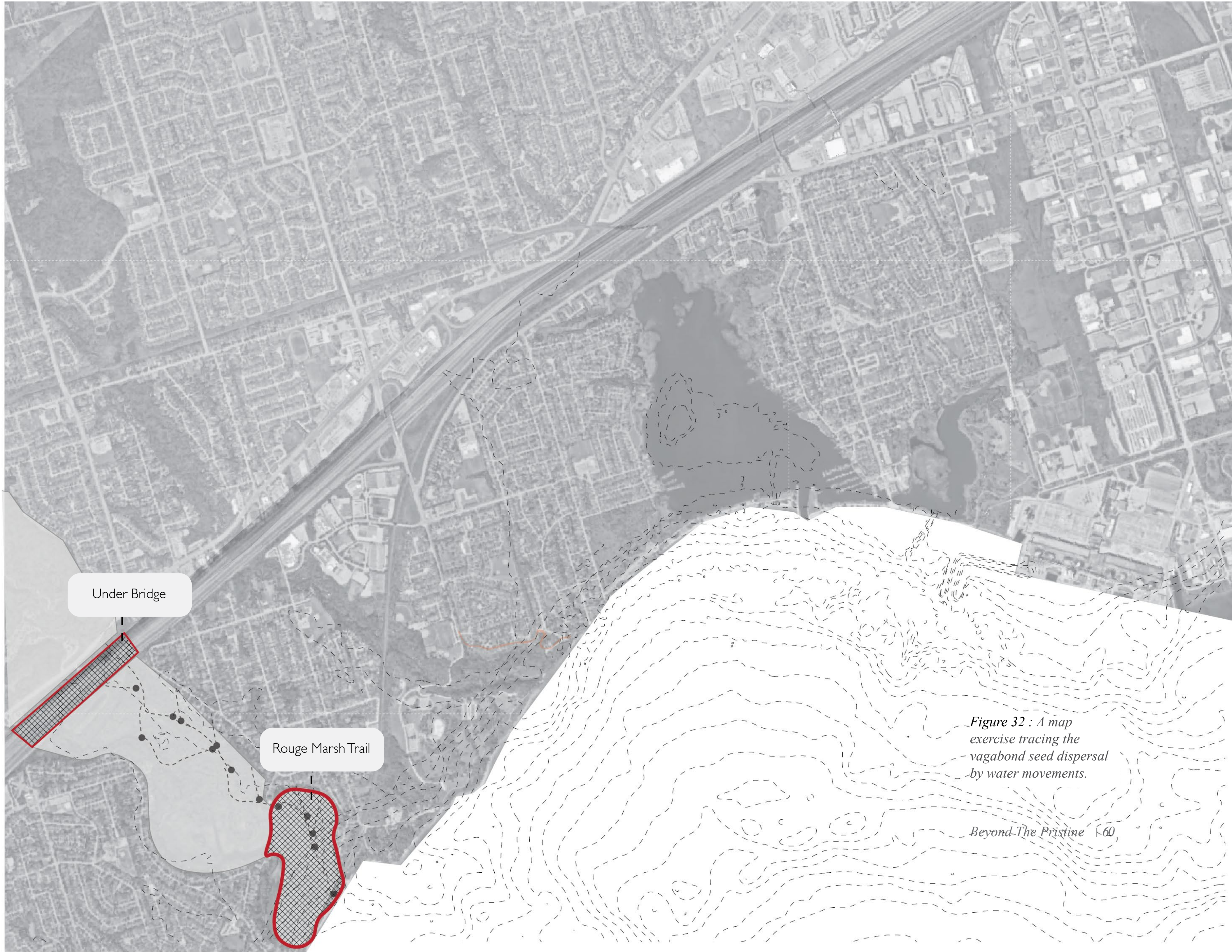


Figure 32 : *A map exercise tracing the vagabond seed dispersal by water movements.*

due to natural and accidental ecological movements? Based on a new imaginary of invisible boundaries, how can we reframe the notion of conservation?

One of the most common vagabond species found on my sites was the *Common Reed*, also known as *Phragmites*. These grass-like plants can grow over 15 feet while their roots and rhizomes can spread up to 10 feet in growing season. The plant comprises of hallow stem, long leaves, seeds, root, and rhizomes. Each one can produce 600-800 of seeds which look fluffy covered by silk hairs (Frelih et al.,2018 ;Common Reed (Phragmites Australis), 2010)) (Figure 33).

This species usually spreads by seed movement through wind and water dispersal. While their seed viability is low, they represent a great source of biomass (Ibid.). They can also distribute vastly through the growth of rhizome fragments in soil. Their lifecycle comprises of growing season which occurs in spring and summer, blooming and

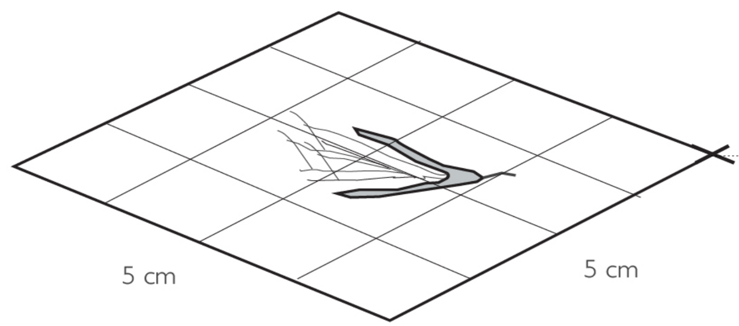


Figure 33 : The anatomy of Common Reed's seed

dispersing in late fall, and plant death in winter (Common Reed (Phragmites Australis, 2010)).

I found this species mostly under the bridge located on the North side of Rouge Marsh trail and under the 401-highway bridge, as well as various residential edges that include marshes and drainage ditches. While the under-bridge site is located outside of the Rouge National Urban Park conservation area, the residential edges are situated beyond the part within the Rouge Park's restoration zone. Similarly, both sites have experienced several significant flooding events. The latest flooding disaster happened on July 8, 2013, when a storm and flash flooding hit the park and its surroundings, resulting in a three-month park closure. Located on the floodplain, these sites create a suitable habitation for the dispersal of this aquatic species.

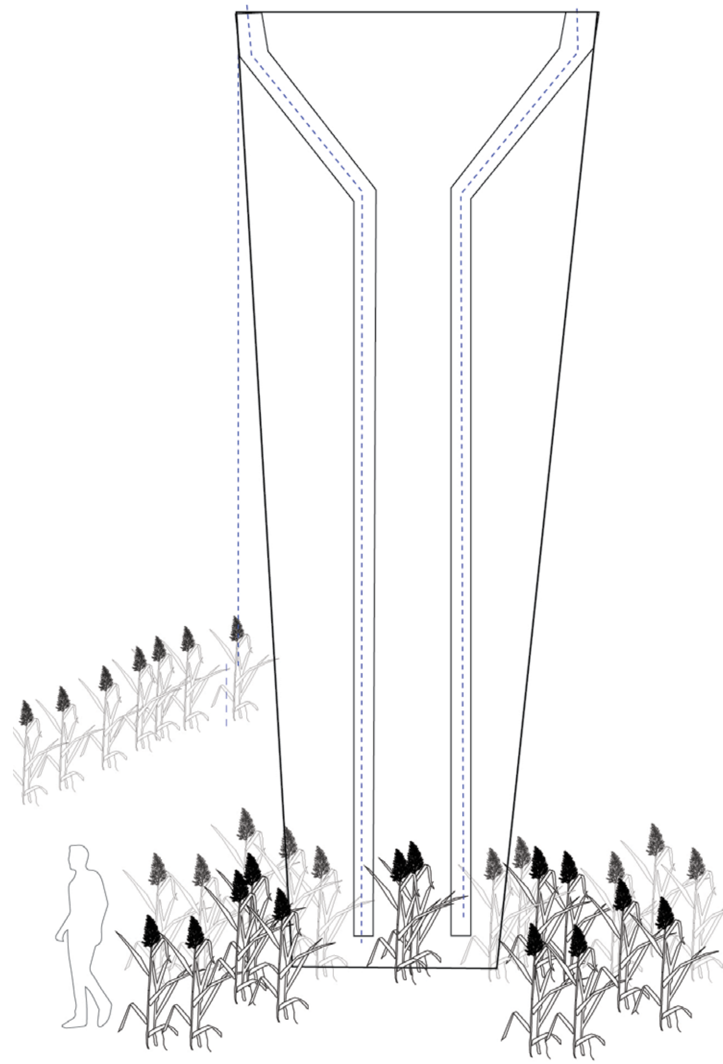
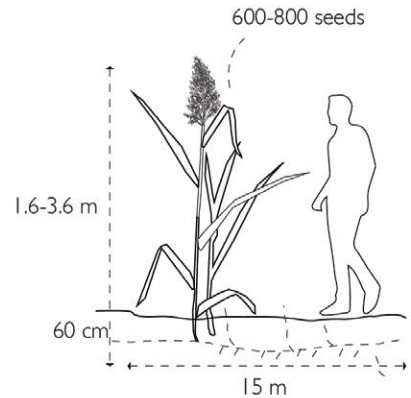
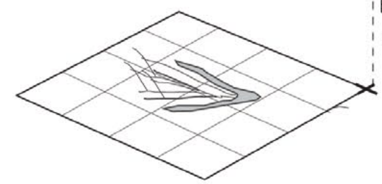


Figure 34 : Typologies of Common Reed habitats located under the bridge.

Figure 35: A photograph of the under-bridge site, located in vicinity of Toronto's Rouge National Urban Park.



Seed as
biomass
energy



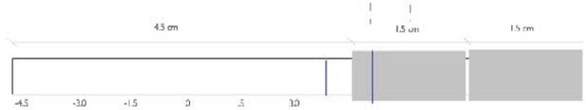
Actor:
Common reed

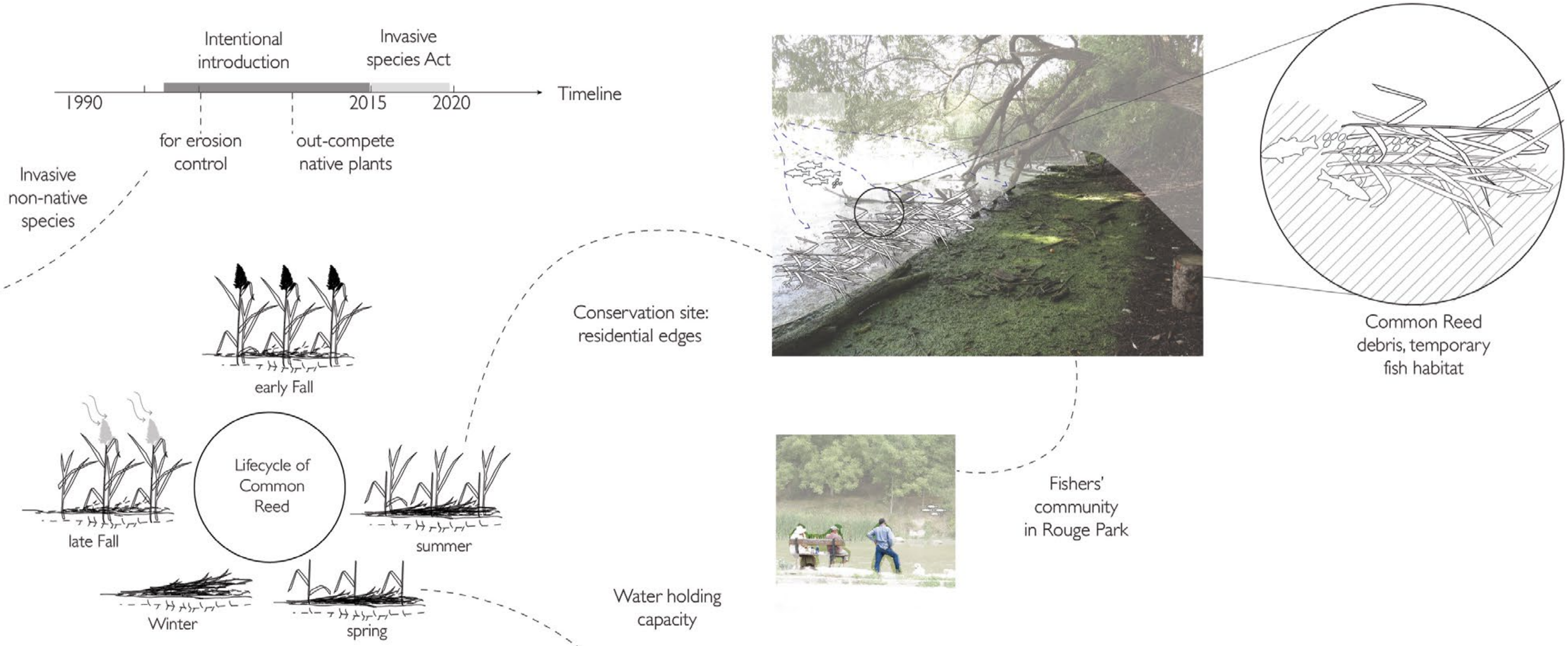
Water-level
experiment

Counter
conservation
site: under the
bridge

pre-rain

post-rain





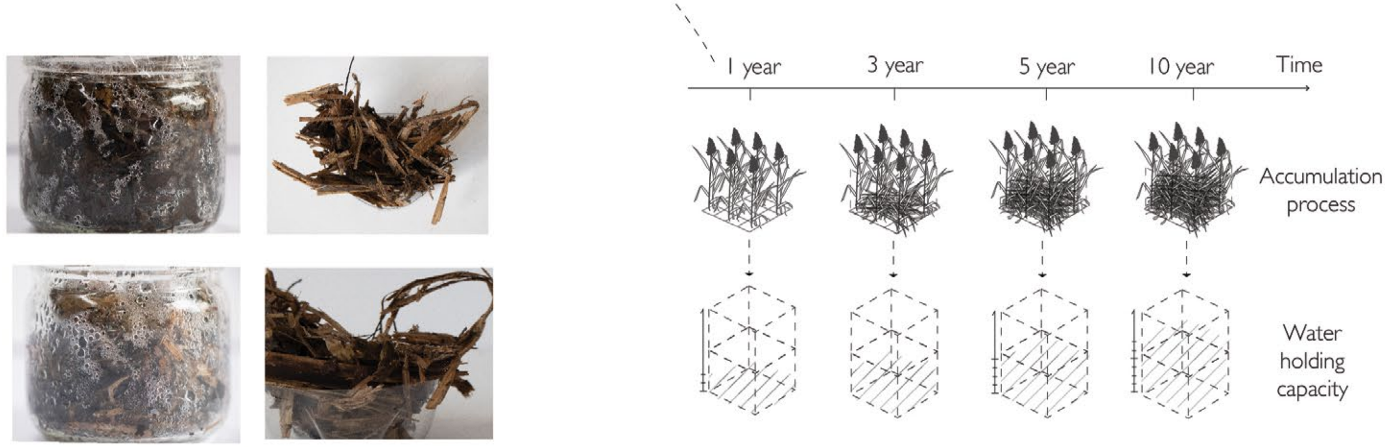


Figure 36 : A story board exploring Common Reed species and its habitat.

The other interesting vagabond species discovered on my sites was *Common Milkweed* which is known colloquially as *Butterfly Flower*. I found plenty of this species in the transmission corridors within three-kilometers of the park. The plant is comprised of a 94-121 cm tall stem, wide leaves, and teardrop shaped seed pods carrying hundreds of black seeds, topped with soft, silky fibers which are helpful for their wind dispersal (Figure 37). The milky juice within the stem of the plant and its fruit is toxic to cattle and other mammals. However, this plant is also the most important source of nectar for many insect pollinators, specifically the *Monarch Butterfly*, an iconic pollinator who migrates annually to US and Southern Canada from the forests in Central Mexico (Asclepias Syriaca (Common Milkweed) | Native Plants of North America, n.d.).

In relation to this thesis, this brings up my research question of: How can these vagabond actors support both human and non-human communities while challenging our existing conceptions of designated borders in conservation areas?

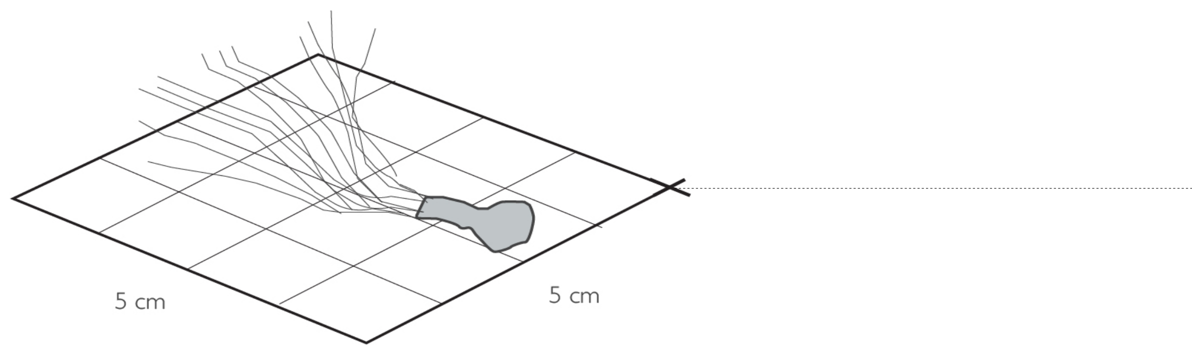
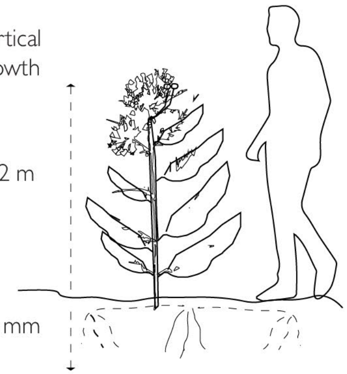


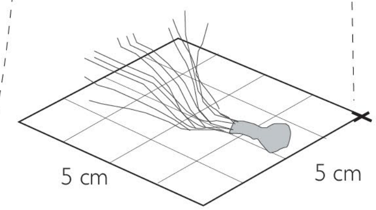
Figure 37 : The anatomy of Milkweed's seed.

Figure 38 : A photograph of Milkweed habitat in vicinity of Rouge National Urban Park.



Noxious
weed

Only habitat for
Monarch
Butterflies



Transmission
corridor

Milkweed

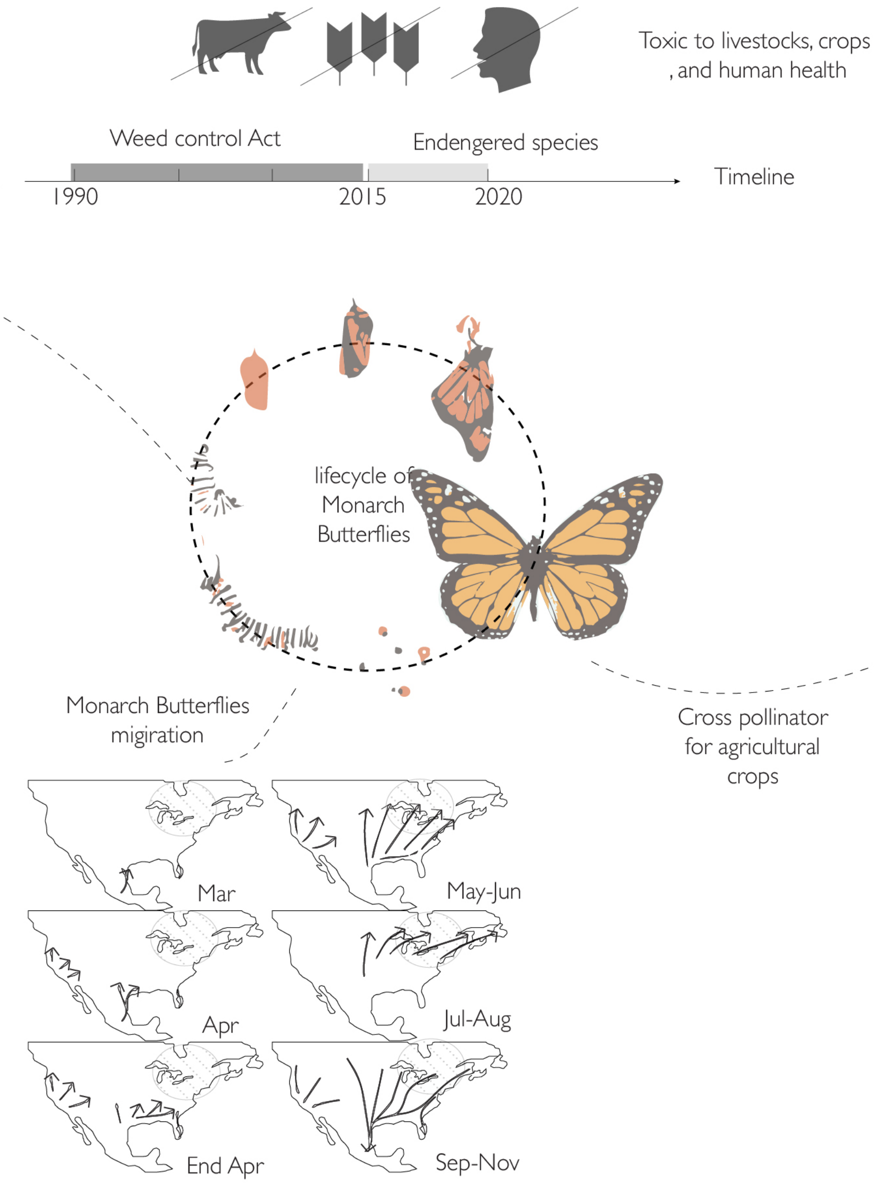


Figure 39 : A story board investigating Milkweed species and its habitats.

PART 4:

Design Research and Proposal

"If we really wanted to attack the problem, we would not initiate combat with invasives; we would set up a method that would allow the environment to progressively regain the characteristics from which diversity emerges: originality of soils, of the aquatic and atmospheric environment, originality of weather."

(Clément, 2011, p. 294)

Figure 40 : A close-up view of the model study from one of the design instruments.

Vagabond Living Laboratory

This chapter addresses the previous questions and provocations raised by my initial research and site visits. The work envisions a series of experimental design instruments positioned across the Rouge Marsh within Rouge National Urban Park. They convert the conservation area into a vagabond living laboratory managed and run by the conservation department of Rouge National Urban Park in partnership with local communities, volunteer scientists, environmentalists, biologists, and ecologists who are interested in exploring and learning a new type of urban wilderness. By engaging community stakeholders in the experimental process, the project intends to generate more public awareness to the vagabond's agency relative to Canada's future environmental changes.

The proposed set of exploratory instruments include vagabond experimental farms, seed collector/pollinator farms, biomass harvesters, and floating vagabond collectors. The design components passively explore the role of vagabond species in a performative, as well as experimental landscape by incorporating the site's natural processes into instrument systems. While each installation has public access through the existing park activities, there are a few ones including seed collectors that use the remote lands of the park to provide visitors with a new access to the most protected areas.

The static, grounded condition of instruments act as permanent frameworks for the transient and dynamic natural processes. While their material and tectonic systems are designed to accommodate a desirable habitat for vagabonds or other non-human actors overtime, they experience a gradual weathering or patina by long-time exposure to natural forces. The use of low-impact material systems also becomes an important design feature that is explored through a series of material explorations.

Overall, these new landscape registers become a testing ground for reframing the notion of nature conservation in the time of climate change uncertainty while also celebrating flux and temporality in the site's conditions.

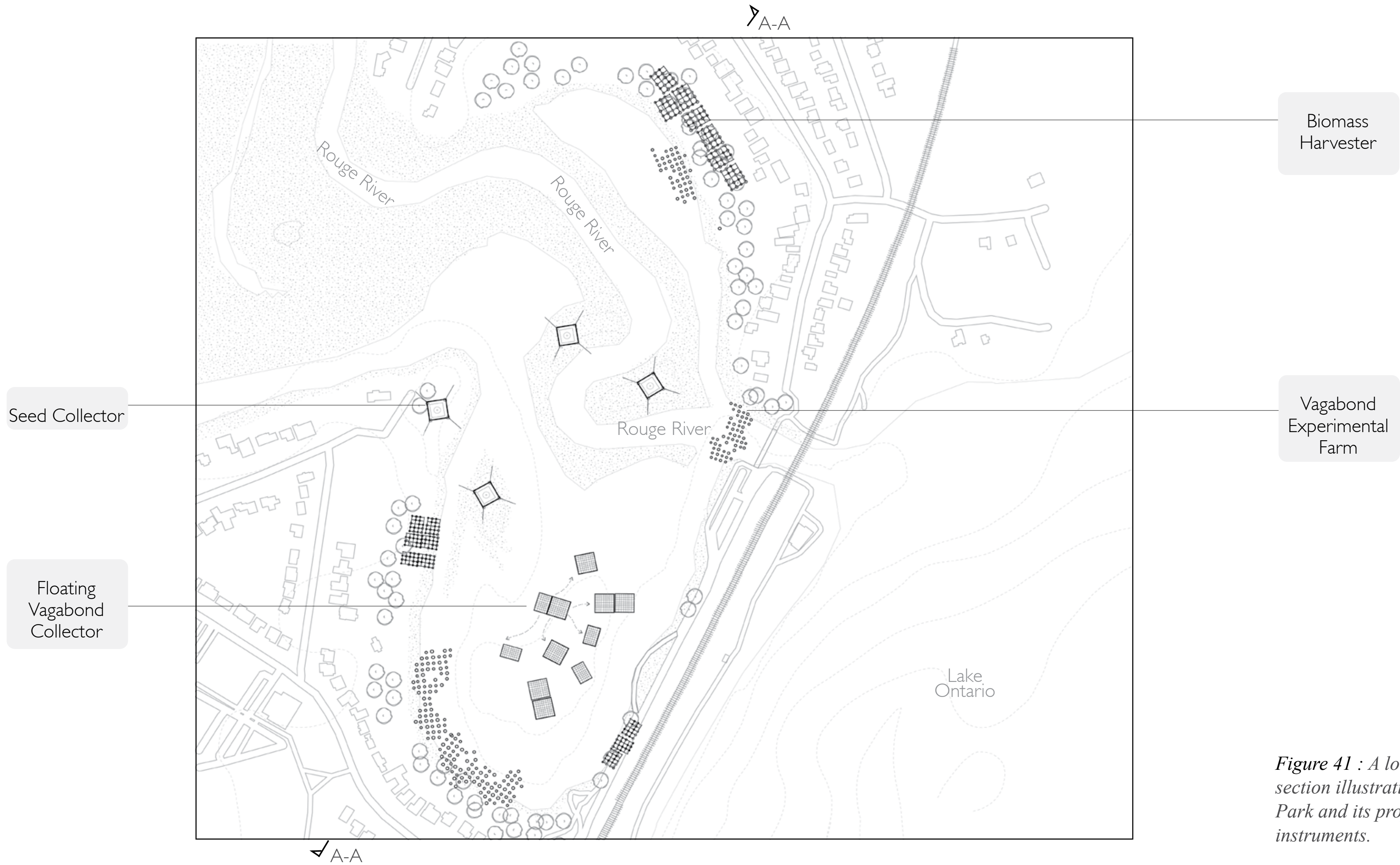
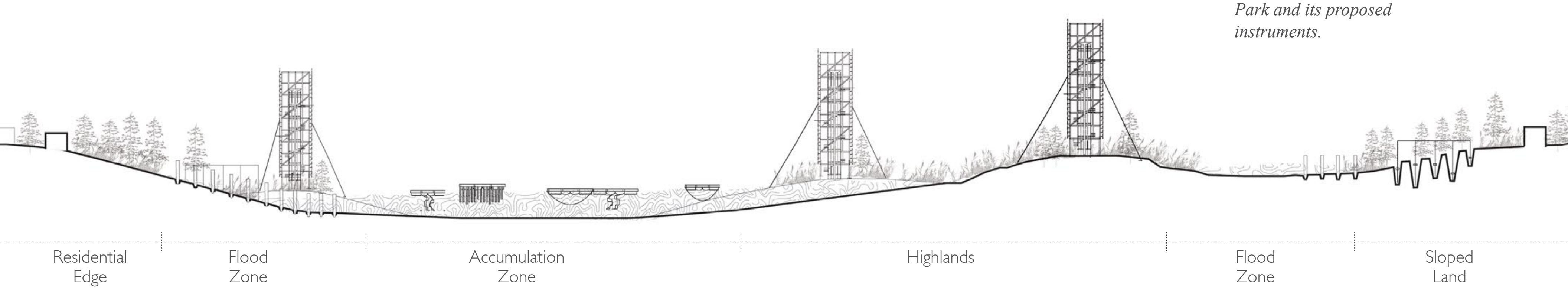


Figure 41 : A long section illustrating Rouge Park and its proposed instruments.

Figure 42 : A site plan illustrating Rouge Park and its proposed instruments.



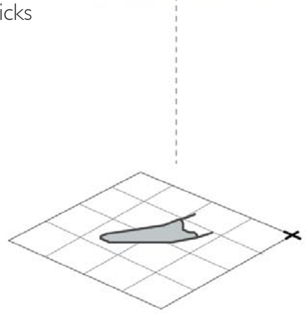
1. Seed Collector/Pollinator Farms

1.1. Observation and collection

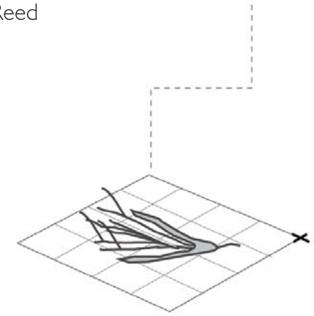
The idea for the first instrument was initiated when I was collecting vagabond samples referred to in Peter Del Tredici's book, *Wild Urban Plants of the Northeast* (Del Tredici, 2010), as *'wind dispersal species.'* I identified five such species' seeds, which include *Purple Loosestrife, Common Groundsel, Devil's Beggaticks, Common Reed, and Common Milkweed.*

Looking at different seed anatomies, I found it fascinating how each one has unique characteristics and scale. While some of them, such as Devil's Beggaticks, has tiny hooks that help the plant to attach to animal fur or feathers, others,such as Milkweed, has hairs that aid in wind dispersal. I then classified these species based on their seed structure and scale, which helped me to later design the seed collector's facades.

Devil's Beggarticks



Common Reed



Common Milkweed

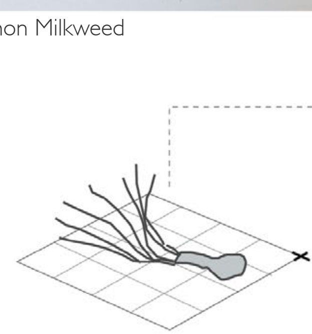


Figure 43 : Photo-drawings of five vagabond plants' seeds found in Toronto's Rouge Park.

1.2. Instrument description

Rising above the ground and towering over the nearby lake's surface, this installation serves as a vertical seed collector and pollinator farm. It is comprised of a growing core tower and outer screen layers for seed catching. Located on the highlands in the park, it takes advantage of the strong seasonal winds that blow seeds throughout this area.

The installation has two main components: a soil column for the pollinator farm and perforated screens for the seed catcher. The installation's facades are made of perforated screens with diverse opening patterns to explore vagabond seed capture, based on their scales and structures. Located at the center of the installation, a vertical pollinator farm includes a high-rise soil column which provides an on-site growing opportunity for vagabond seeds that pass through the screen and enter into the installation.

Figure 44 : A map of seed collectors' locations in Rouge Park.

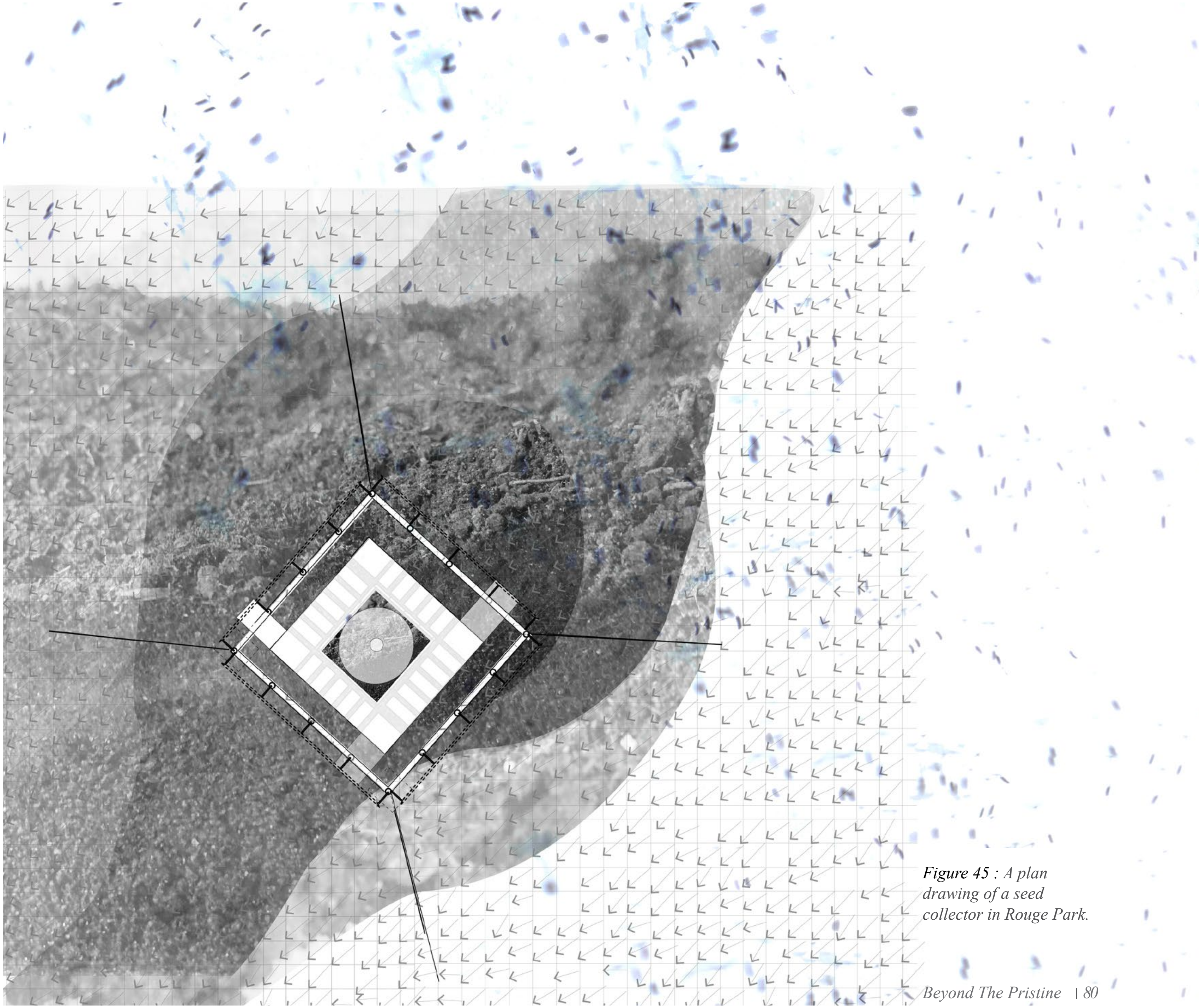


Figure 45 : *A plan drawing of a seed collector in Rouge Park.*

The soil column is made of stacked wirework containers filled with rock, gravel, and soil. While the large-sized sediments such as rocks are placed at the bottom of the column, the mix of soil and gravel are stacked on top to provide growing space for collected seeds. There is also a rainwater collection and irrigation system installed within the soil column that helps in retaining soil moisture. The staircase installed within the tower provides visitors with access to lookouts, where they have a panoramic view over the whole park.

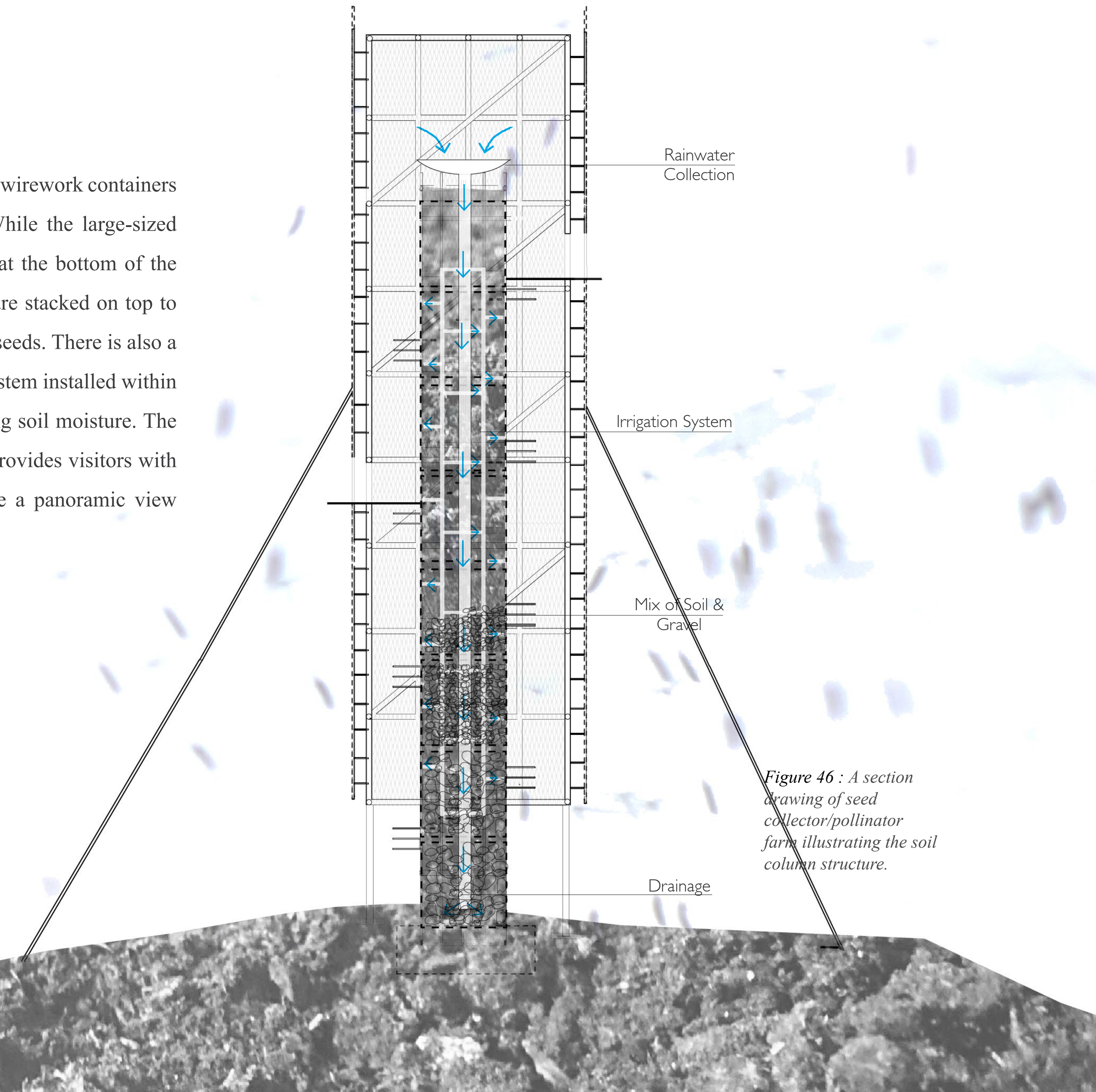


Figure 46 : A section drawing of seed collector/pollinator farm illustrating the soil column structure.

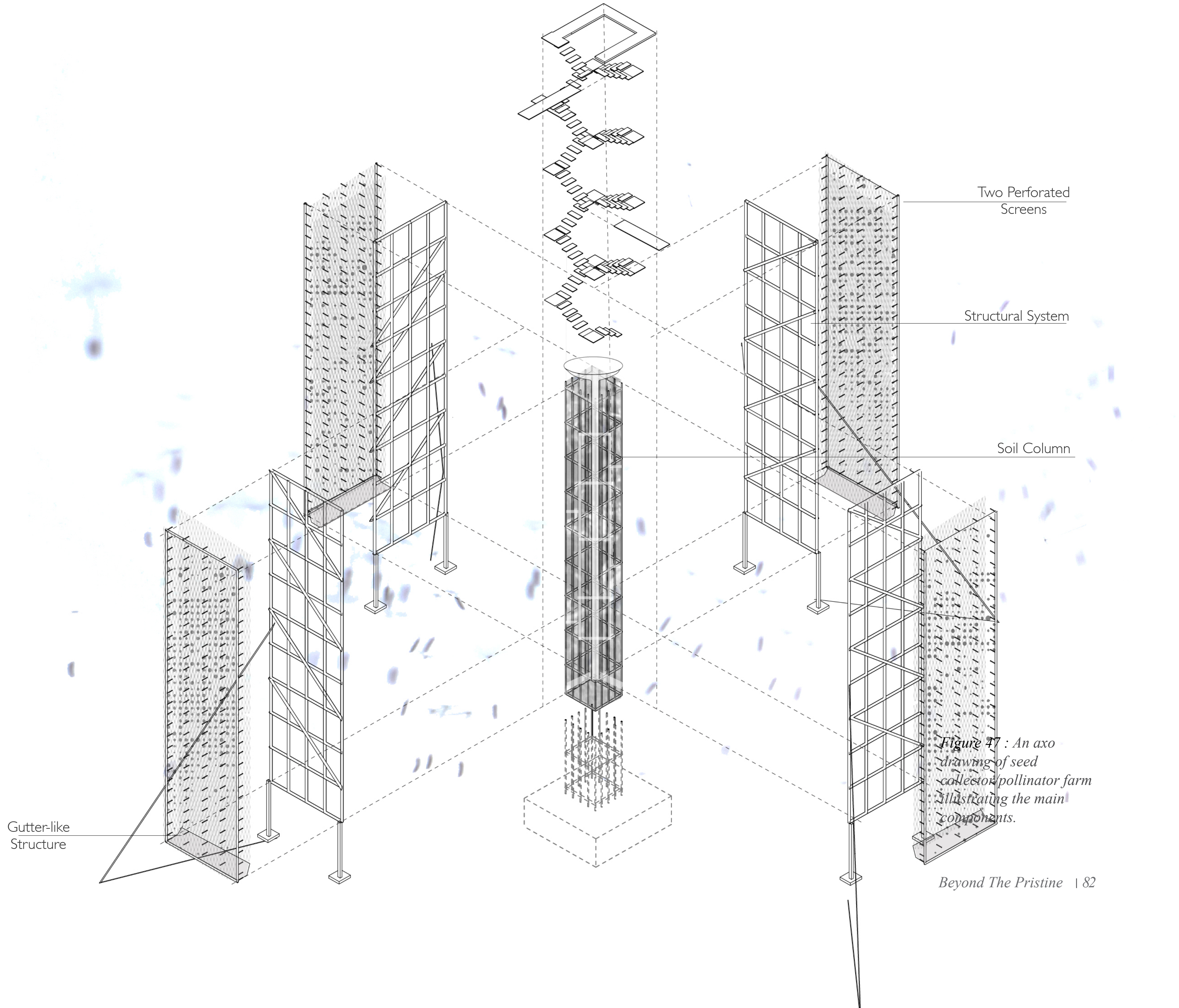


Figure 47 : An axo drawing of seed collector/pollinator farm illustrating the main components.

The installation's screen facades illustrate the temporality of vagabond habitation over seasons through changes in facades' color and translucency as more and more seed accumulate on the screen. Since spring and summer are periods for certain vagabonds flowering, including *Milkweed, Purple Loosestrife, and Common Groundsel,* during these periods the facades will turn into colorful surfaces displaying white, purple, and orange flowers. During these seasons, a variety of pollinators, such as *Monarch Butterflies* are also offered habitats in the debris and new breeding grounds. The fall is a time for vagabond seed dispersal when seeds travel from inside and outside the installation and are eventually captured by the perforated screens. Over time, the accumulation of white fluffy seeds create a hazy white layer of soft material on the screens. This is the ideal time for park officials to harvest the seeds, which are collected through gutter-like structures connected at the bottom of the screens. In winter, the installation turns into temporary food storage for birds and small animals by offering plants' seeds left in soil and screens from last seasons.

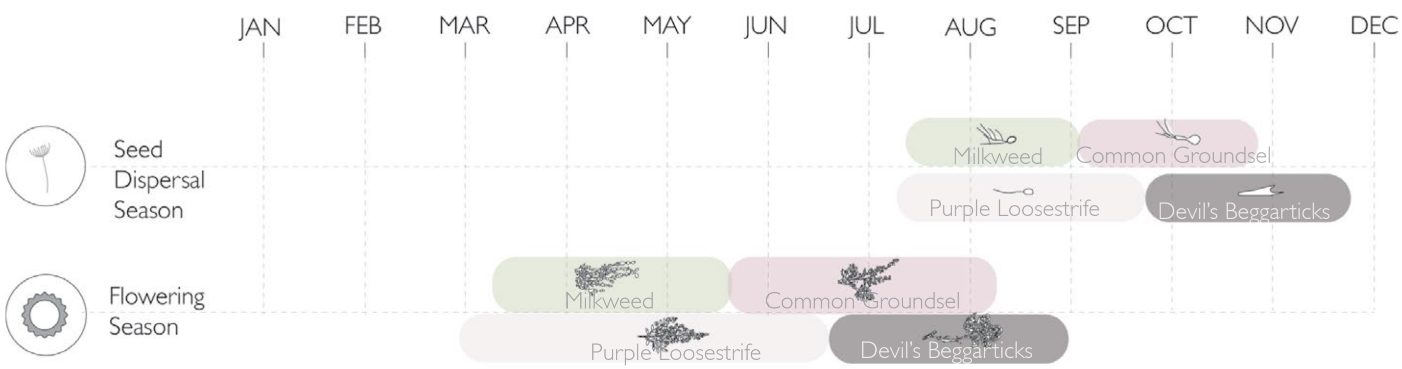


Figure 48 : Annual timeline illustrating the flowering and seed dispersal seasons of four vagabonds.

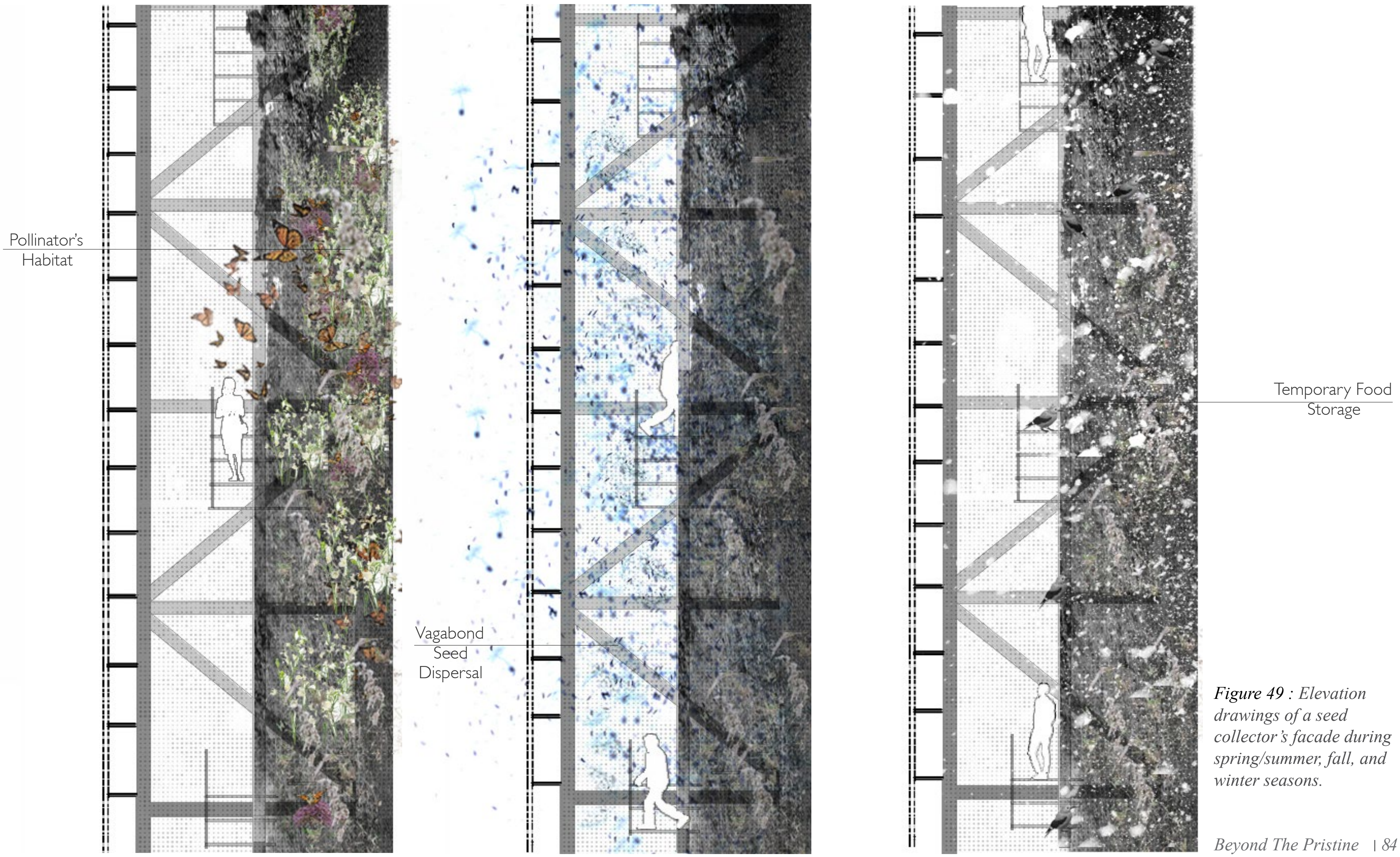


Figure 49 : Elevation drawings of a seed collector's facade during spring/summer, fall, and winter seasons.

Figure 50 : Perspective view of one of the seed collectors located in Rouge Park.

Figure 51 : Interior view of one of the seed collectors in harvesting season.

2. Floating Vagabond Collectors

2.1. Observation and collection

The idea to design floating vagabond collectors came from my on-site observations and collection of vagabond debris found in the Rouge River within the parameters of the site study. The first collection which is small-scale soft vagabond deposits, such as seeds and rhizomes were found frequently in both shoreline's and lake's sample collections. The second typology includes a medium-sized collection of hard and soft vagabond debris, such as leaves, roots, and stems, which was mainly noticed in areas along the shoreline. The third type is large-sized hard sediments, such as wood pieces. I found a large cluster of them accumulated and sank in the lake far from the shoreline. Identification of these water sediment types and locations led me to the design of instrument's various typologies.

Figure 52 : Typologies of vagabonds debris within Rouge River.

Figure 53 : A photograph of small-scaled soft vagabond debris found along Rouge River shoreline.

2.2 Instrument description

Floating vagabond catchers consist of small buoyant islands that have different underwater catching mechanisms for harvesting the vagabond fragments that freely drift due to water and boater movements. There are three types of filtration system designed for vagabond collectors: the first consists of underwater fine nets attached to the bottom of the islands, designed for best capturing small, soft vagabond fragments. The second type includes the underwater mesh screen that is structured to seize a medium-sized mix of hard and soft materials. Finally, the third type is designed to filter large and hard organic waste from the water using underwater steel rods that are used during dry seasons when islands touch the bottom of the lake. Each island acts as a unit that can be simply assembled by park researchers to create a larger island operating for multi users and purposes. At the end, the filters got emptied by researchers through an

Figure 54 : A map of floating vagabond collectors' locations in Rouge Park.

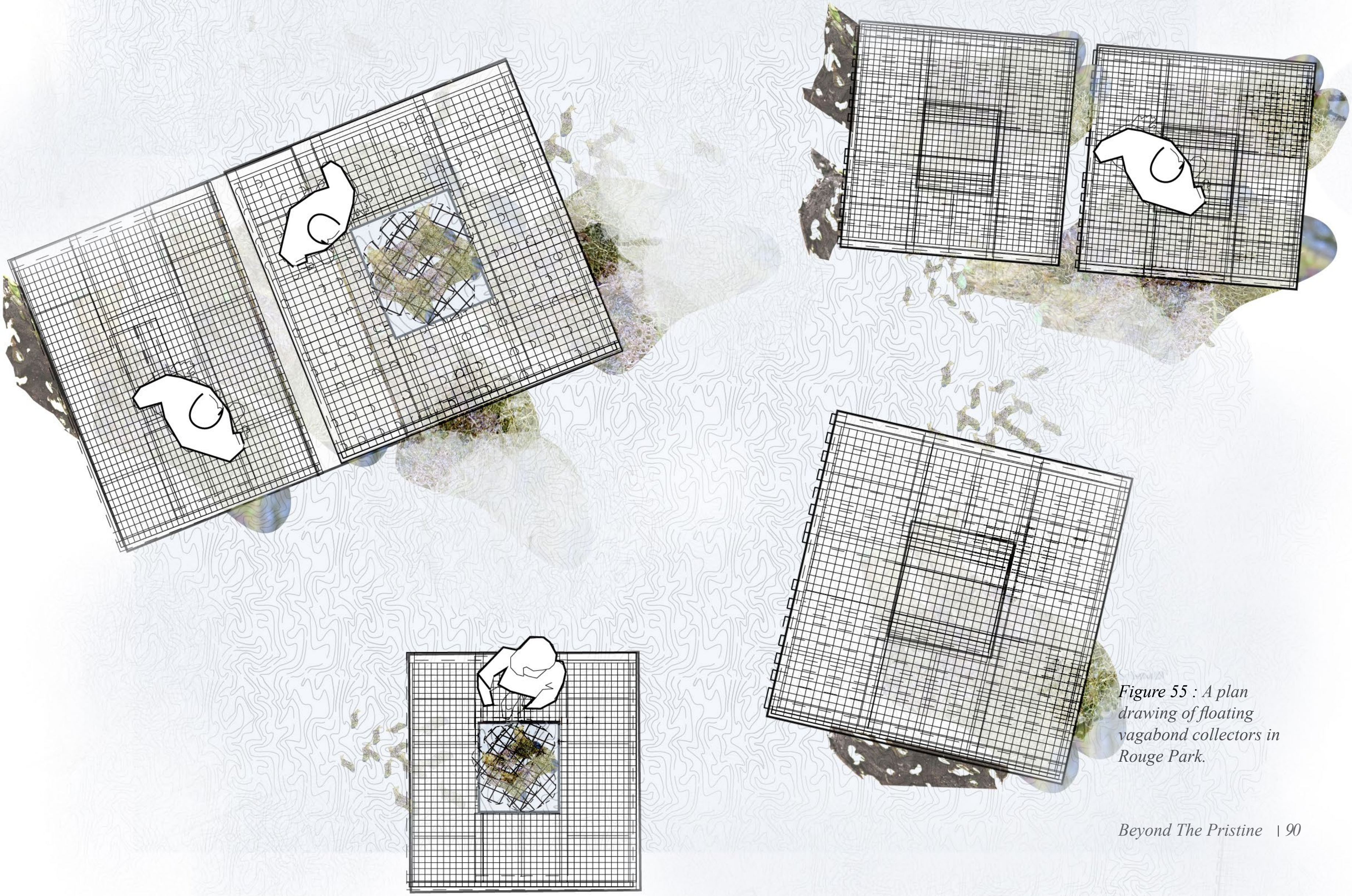
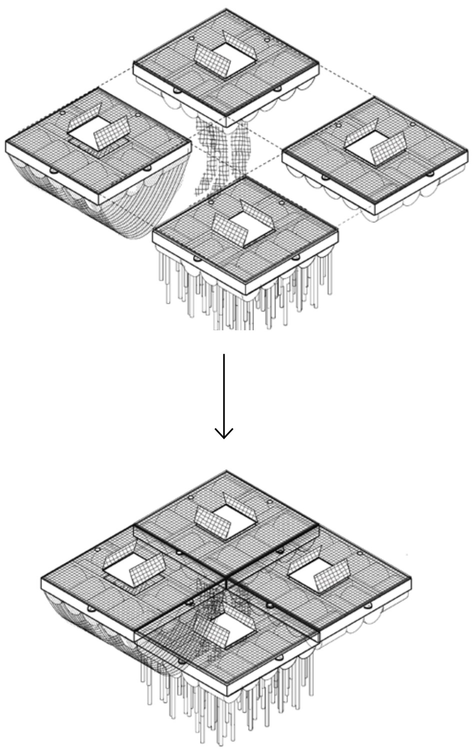
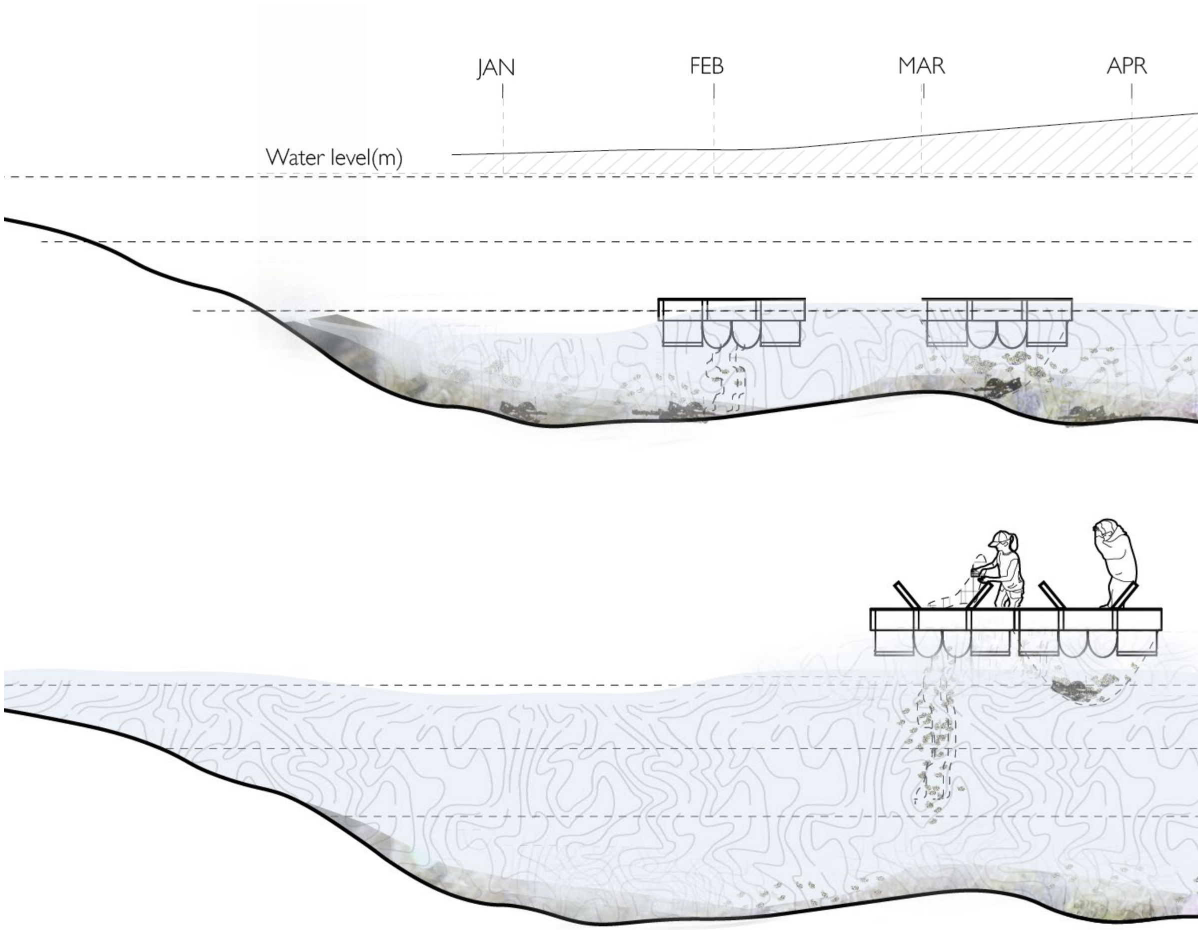


Figure 55 : A plan drawing of floating vagabond collectors in Rouge Park.

opening on the island's surface and transport to the off-site laboratory for the further study. Overall, this in-situ assembly serves visitors with a tour on the lake while also being used for experimental purpose for researchers.





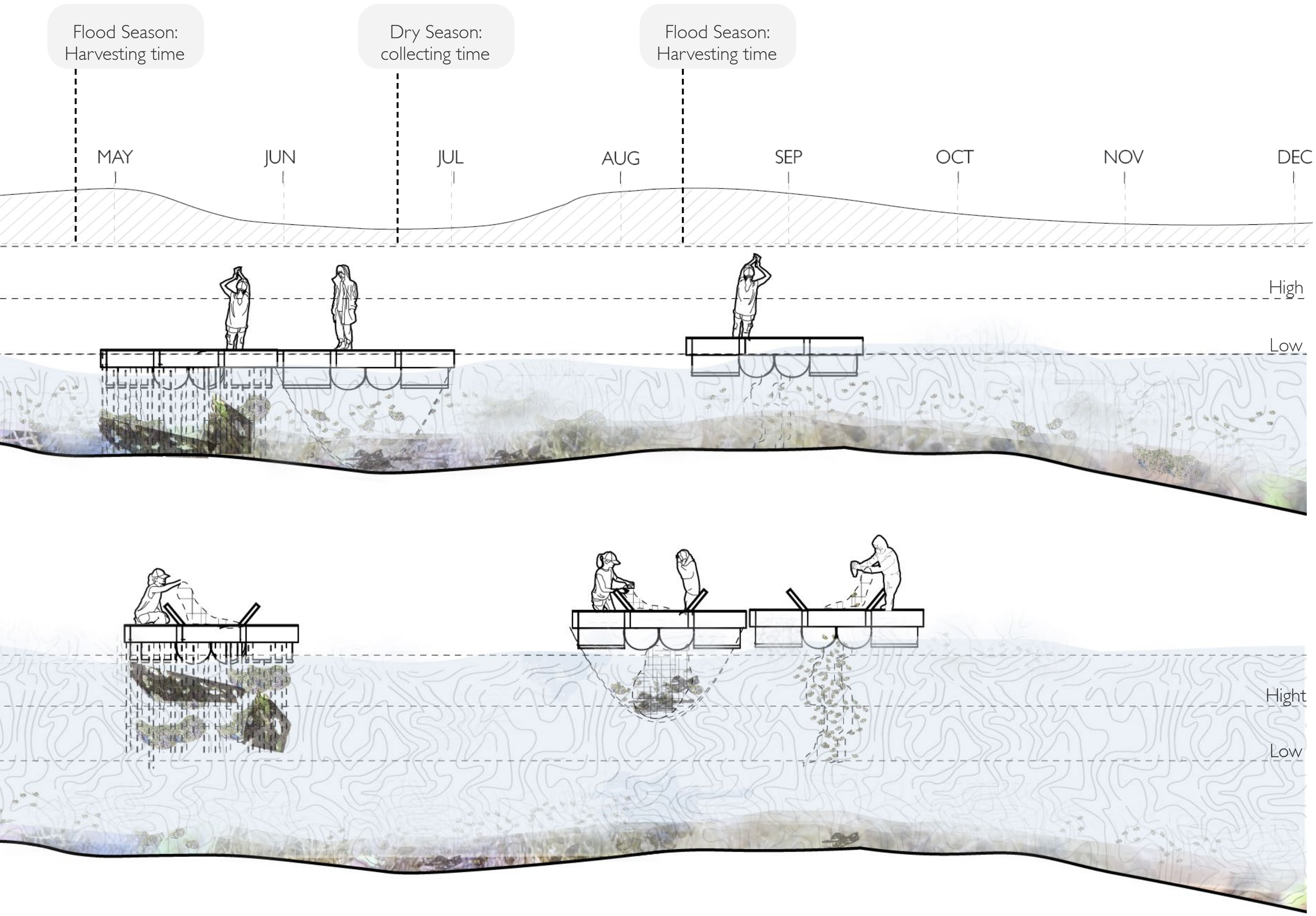


Figure 56 : Axo views illustrating the creation of large floating islands from the connection of small ones.

Figure 57 : Sections and the calendar describing the operation processes of floating vagabond collectors in flood and dry seasons.

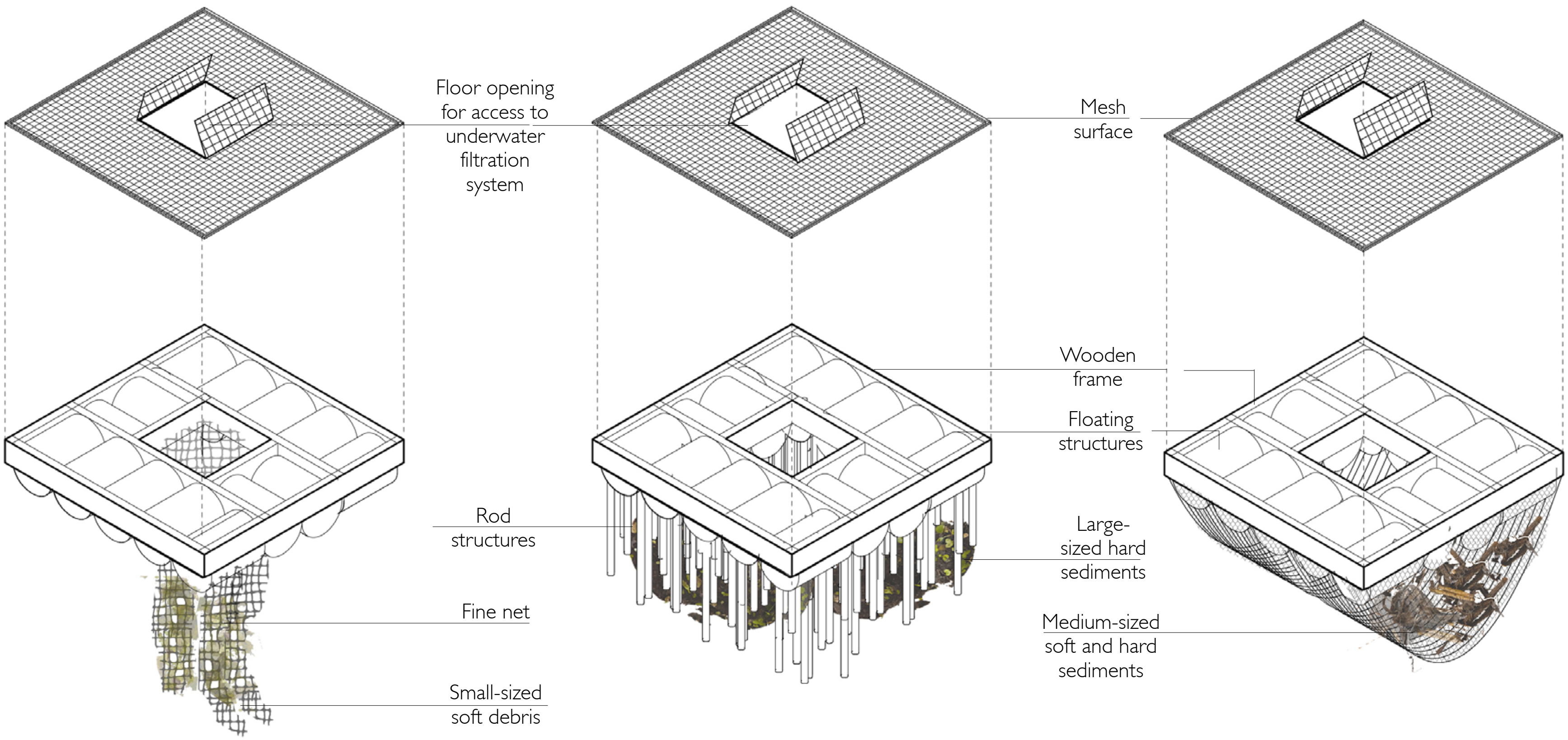


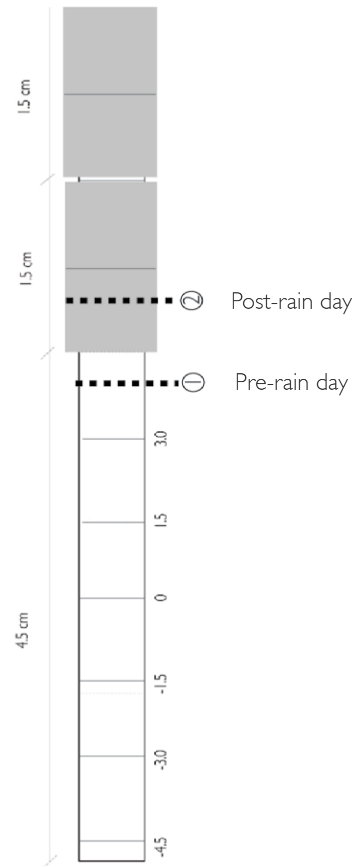
Figure 58 : Exploded axo views of floating vagabond collectors.

Figure 59 : A perspective view of floating vagabond collectors in Rouge River during harvesting season.

3. Vagabond Experimental Farm

3.1. Observation and collection

The initial idea of vagabond experimental farm began with a series of on-site documentation, observation, and collection. On September 14th, 2021, my first set of on-site experiments were started to investigate the water level rise of Rouge River within the boundaries of Rouge National Urban Park. The instruments include a series of small wooden sticks covered by masking tape pieces that have high water absorption capacities. I installed the instruments in five different parts of the park to capture water level changes in pre- and post-rain days. The results of each instrument showed the slight increase of water level. After research on the history of the park, I also realized the Rouge Marshland and its residential surrounding have experienced several significant flooding events including the latest one in 2013. This set of research and experiment provide me with idea of an installation that can investigate vagabond's role in flood mitigation of Rouge River National Urban Park.



Pre-rain day,
September 14th, 2021

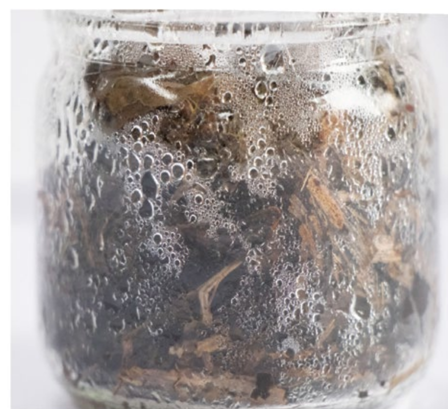
Post-rain day, September
16th, 2021

***Figure 60** : On-site experiment investigating water level changes in Rouge River shoreline during pre- and post-rain days.*

In order to explore the typologies of vagabond debris in response to Rouge River's flood mitigation, I conducted the second set of on-site observations and collections. In the beginning, I took a series of close-up photographs of Rouge River's shorelines, focusing on the ground materials. The main finding includes two typologies of soft vagabond debris, one is small-scale vagabond sediments and the living organisms inhabiting them, such as algae, mosses, and ferns. The other is medium to large scale soft vagabond materials.

After collecting one-gram samples of Common Reed debris from the Rouge River shoreline, I conducted an off-site experiment to investigate their water holding capacities. The experiment involved capturing the sample within an enclosed container for five consecutive days. The increased accumulation of water drops on the container's surface shows the ability of vagabonds in holding extra water. This experiment set the stage for proposing an instrument that would be able to test the role of vagabonds in flood mitigation on a larger scale.

Day 1



Day 5

Figure 61 : An off-site experiment of Common Reed's water holding capacity.

Figure 62 : Two photographs illustrating typologies of soft vagabond debris in Rouge River shorelines.

3.2. Instrument description

Located within the residential thresholds of Rouge National Urban Park, the Vagabond Experimental Farm explores the agency of vagabond debris in flood mitigation and habitat creation by offering a new soft, porous water edge produced by long-term vagabond debris accumulation.

The on-site farm includes a grid of pole-like structures positioned along the shoreline to capture the plant debris and sediments generated by seasonal plant death, and dispersed by wave action, wind, and boaters' movements. These structures become testing grounds for investigating the role of vagabond debris on another aquatic organism's habitation.

The pole surface is coated with fine gravel aggregate and coarse sands to investigate a growing space for moss, lichen, and algae. The small pockets created inside the pole surfaces also test temporary habitats for aquatic species in the spawning season.

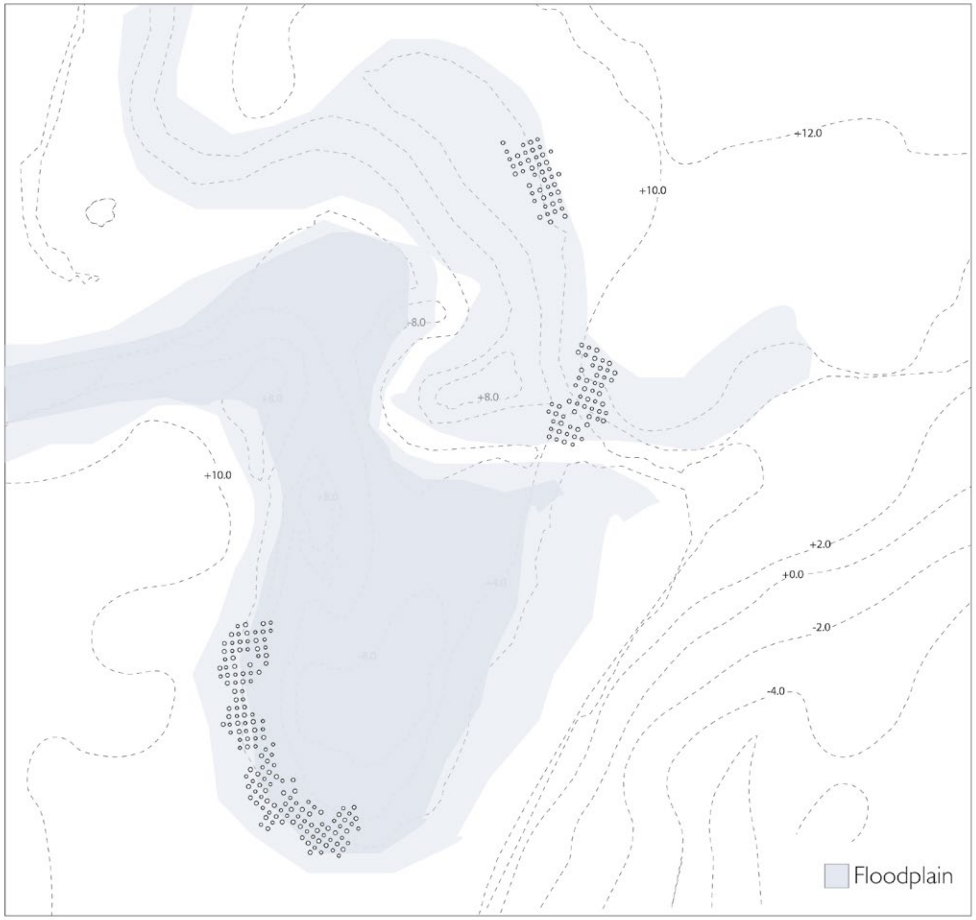


Figure 63 : A map of vagabond experimental farm's location in Rouge Park.

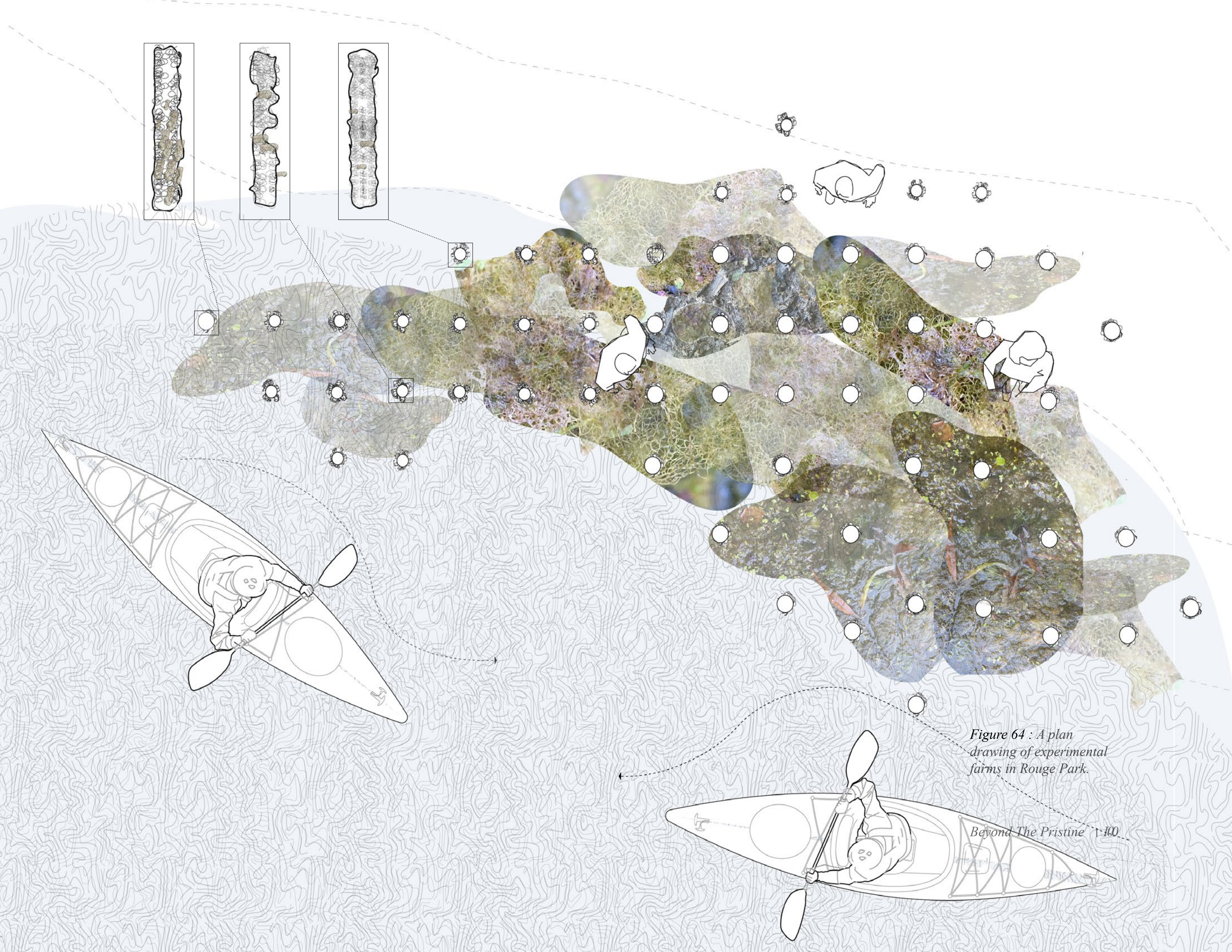


Figure 64 : A plan drawing of experimental farms in Rouge Park.

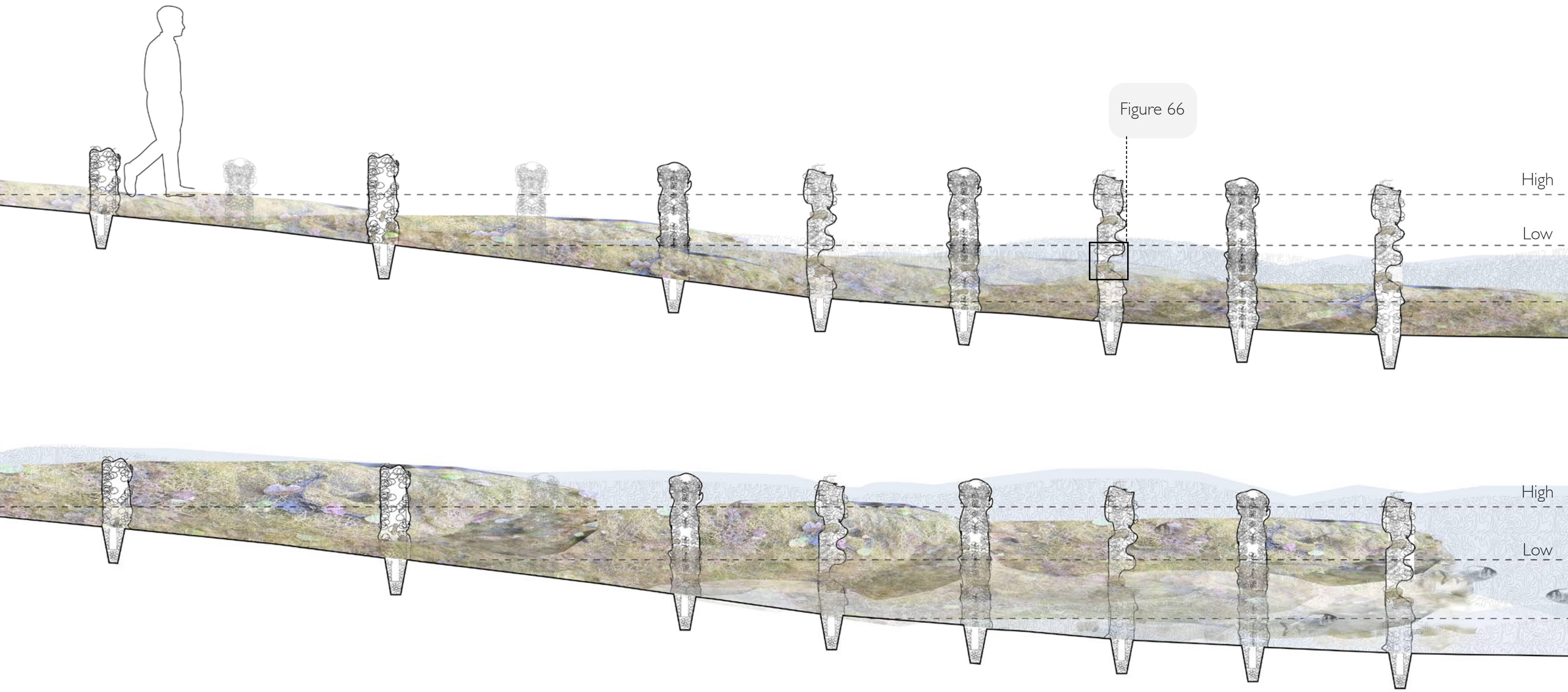


Figure 65 : Section drawings of vagabond experimental farms illustrating the shoreline condition in flood and dry seasons.

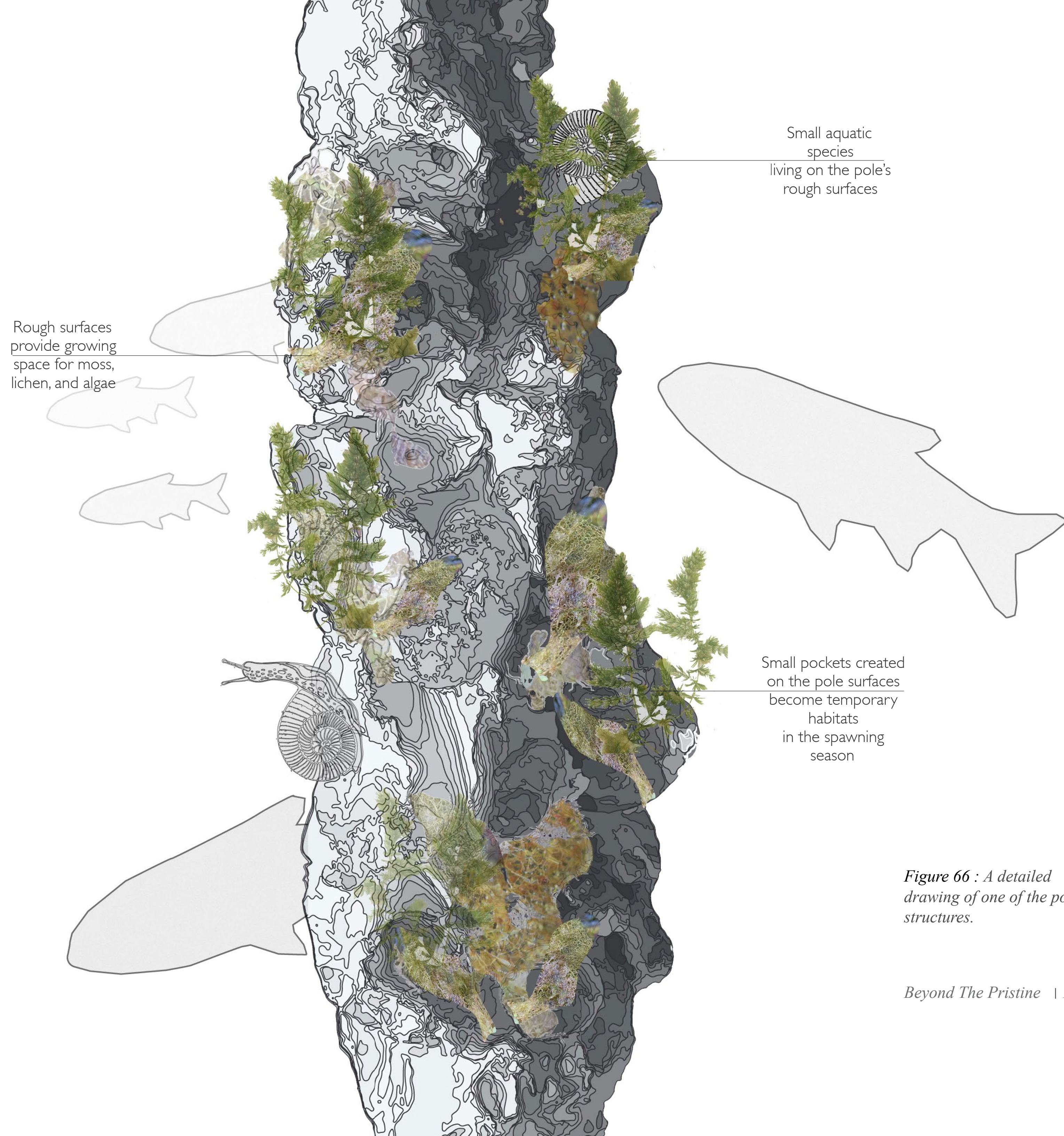


***Figure 66** : A detailed drawing of one of the pole structures.*

This in-situ assembly generates multiple experimental opportunities that explore the role of vagabonds' debris on small and large aquatic ecosystems, as well as flood mitigation. By varying the size of the material, the laboratory can test which conditions are optimal and most conductive to flood mitigation.

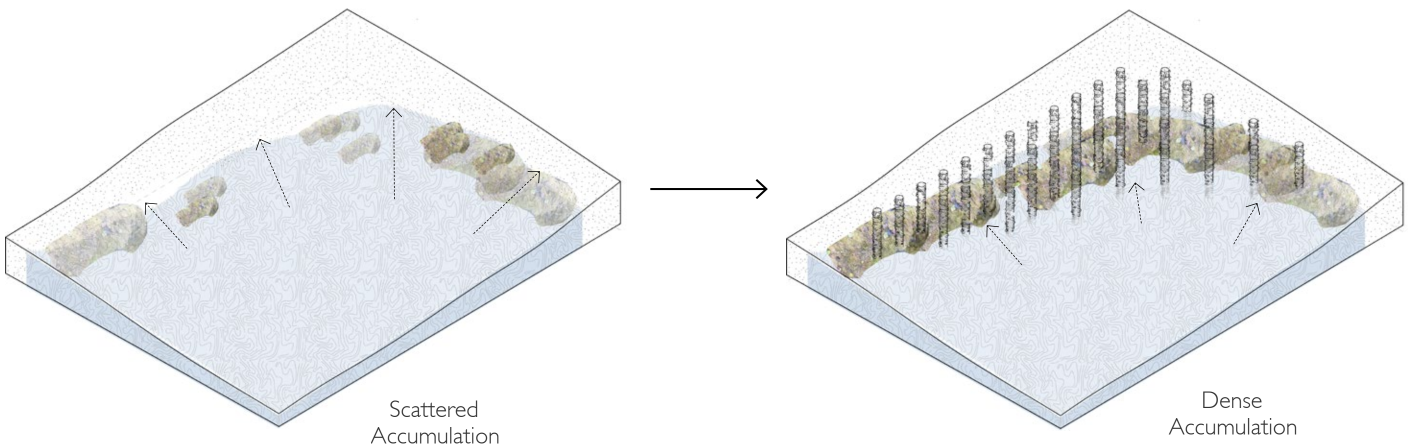


Figure 67 : Axo drawings of vagabond experimental farms illustrating the creation of a new soft edge through the accumulation of vagabonds over time.

Figure 68 : A perspective view of vagabond experimental farms within the Rouge River edges.

3.3. Material Experiment/Tank Model

A series of material explorations and the tank experiment were conducted as a catalyst or prelude to the design development of my vagabond experimental farm structures. The first set of experiments used gravel and plaster casting to create pole-like structures proposed for the instrument. This experiment has resulted in the production of unique forms of poles that can offer a diverse growth pattern for other aquatic organisms.

The next set of tests used the tank experiment to simulate the complex natural process of growth on a pole-structure, done in order to investigate the capacity of growth patterns on its surface. within thirty-day observation of the plaster structure within the algae water, the result suggests the increase of algae accumulation in the pocket structures. This study sets the stage for rethinking the material and tectonic systems of the built environment in relation to non-human habitation.

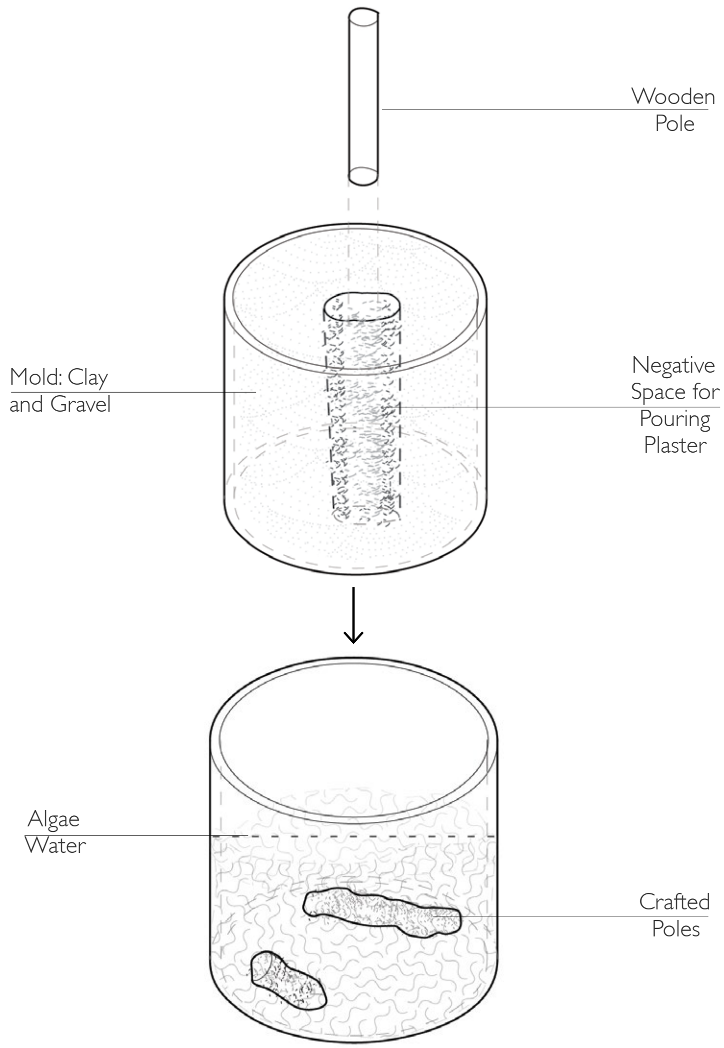


Figure 69 : An axo drawing of material exploration process.

Figure 70 : A series of photographs illustrating the creation of poles using gravel, plaster, and clay.

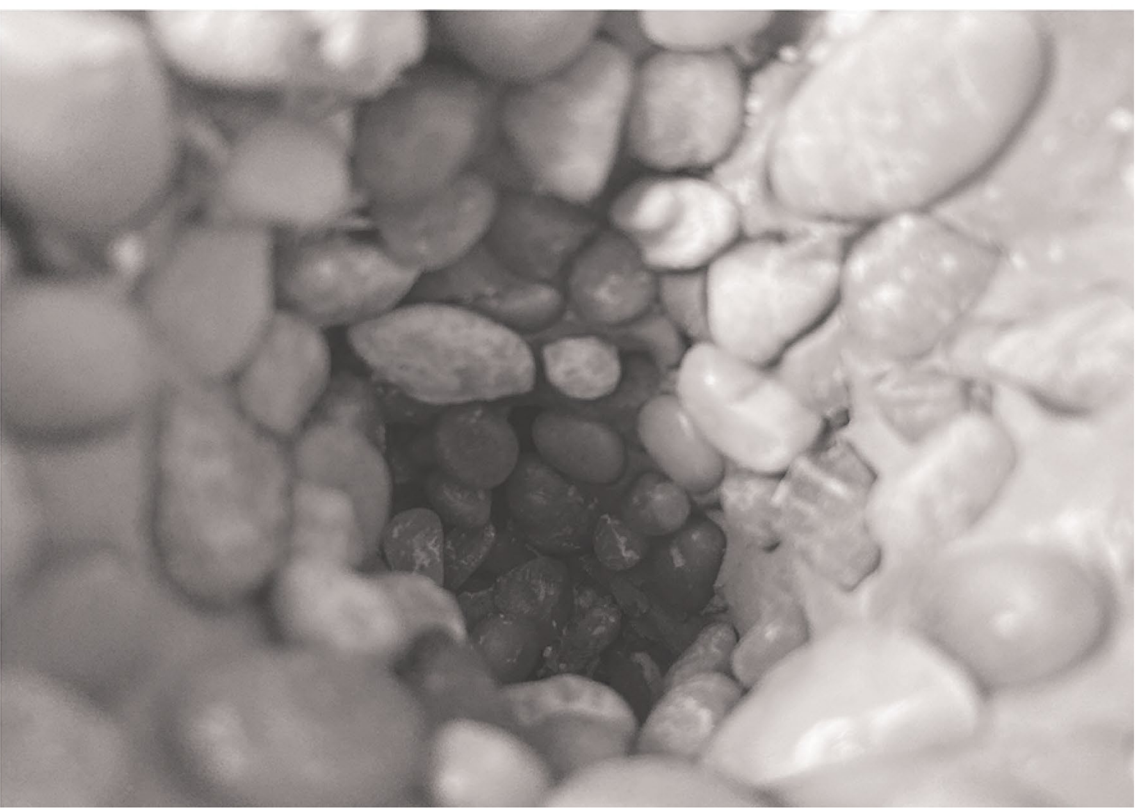
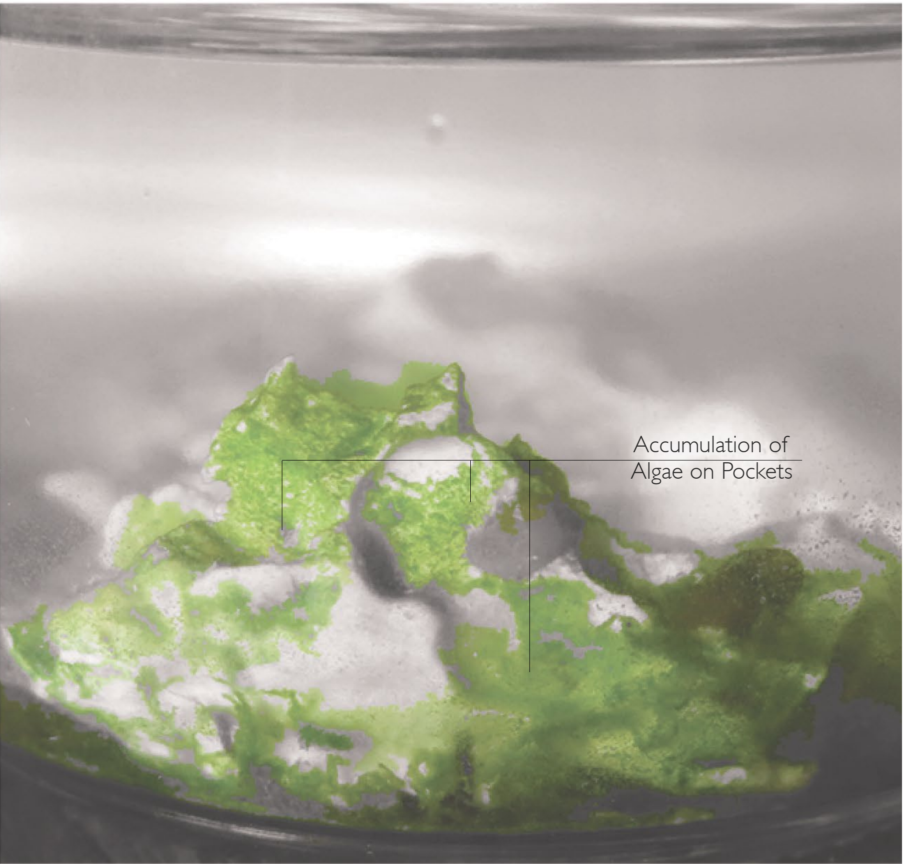


Figure 71 : A series of crafted poles.



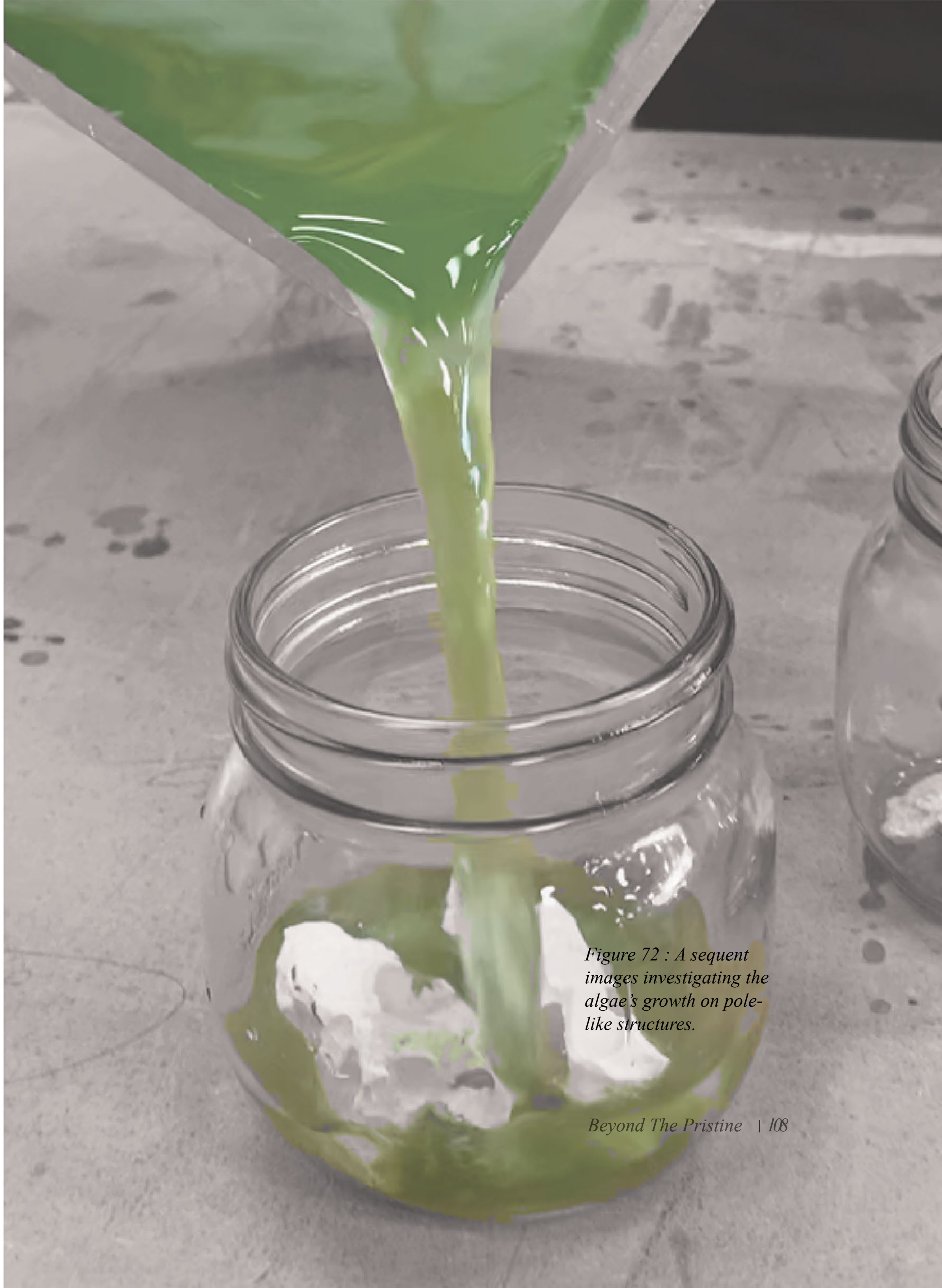


Figure 72 : A sequent images investigating the algae's growth on pole-like structures.

4. Biomass Harvesters

4.1. Instrument description

The biomass harvester is a series of vertical wells supported by an underground structure that channels the earth to collect and process vagabond waste produced on the site. The wells are structured in different depths and widths to help in establishing optimal conditions. They act as natural biomass digesters that are strategically located in landscape areas with slight depressions, helping in the accumulation of vagabond waste. A grid of deep underground wells include a complex community of microbial matter and fungi that breaks down organic waste over time. The soil acts as a natural repository for holding the decomposed material, including digestate, and fertilizer. In the end, the decomposed materials can be extracted and transported for use on local agricultural farms near to Rouge National Urban Park, or further off-site for additional experimentation. Taking advantage of the site's unique conditions, the installation offers

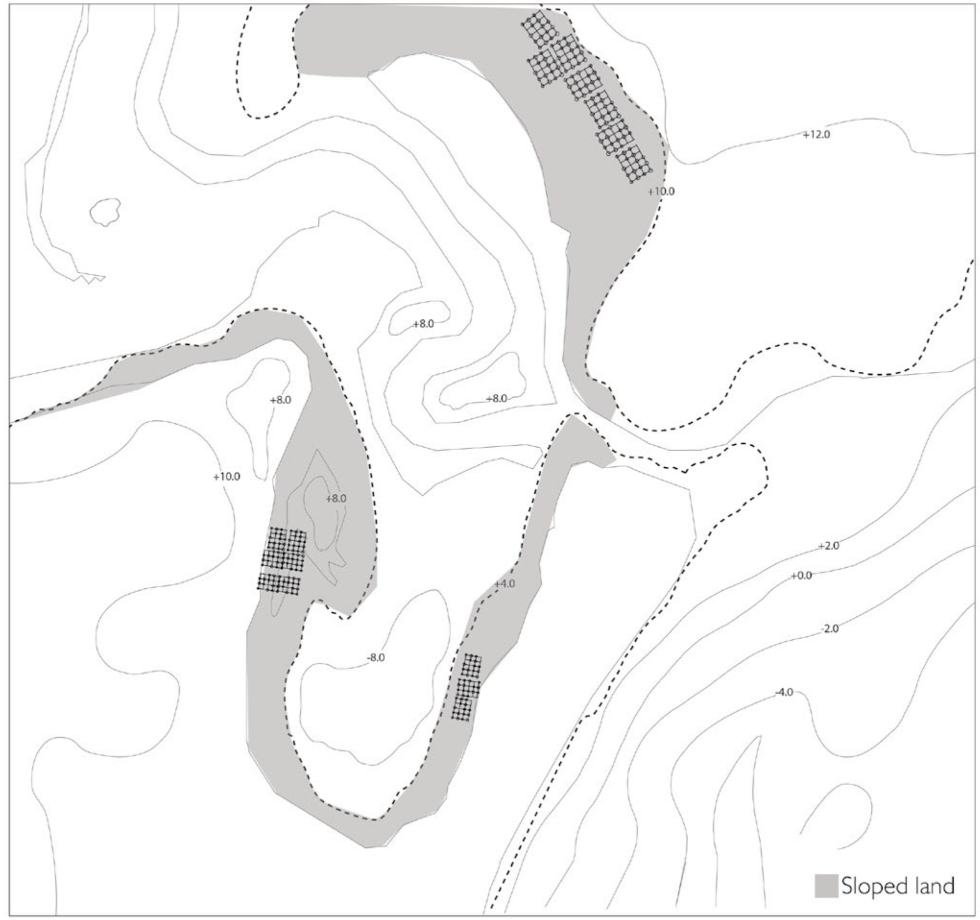


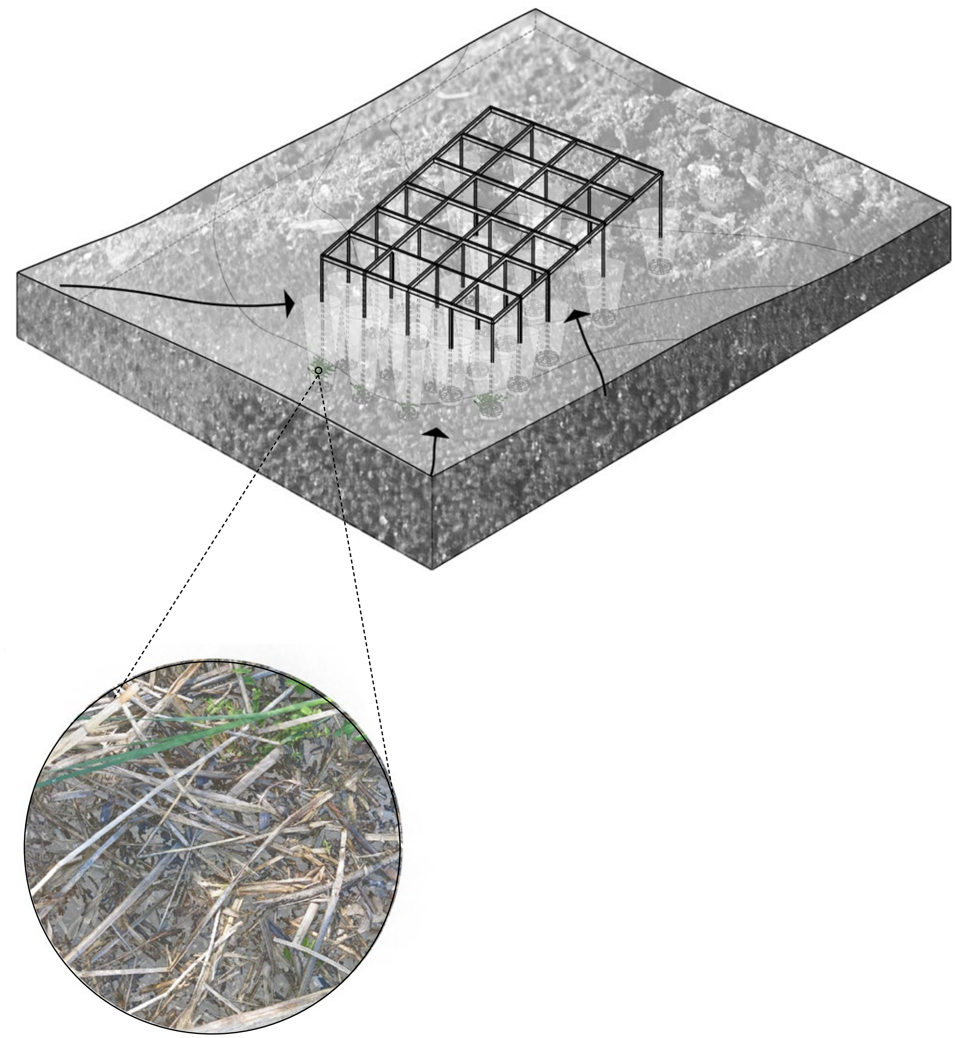
Figure 73 : A map of biomass harvesters' locations in Rouge Park.

Figure 74 : A plan drawing of biomass harvesters in Rouge Park.

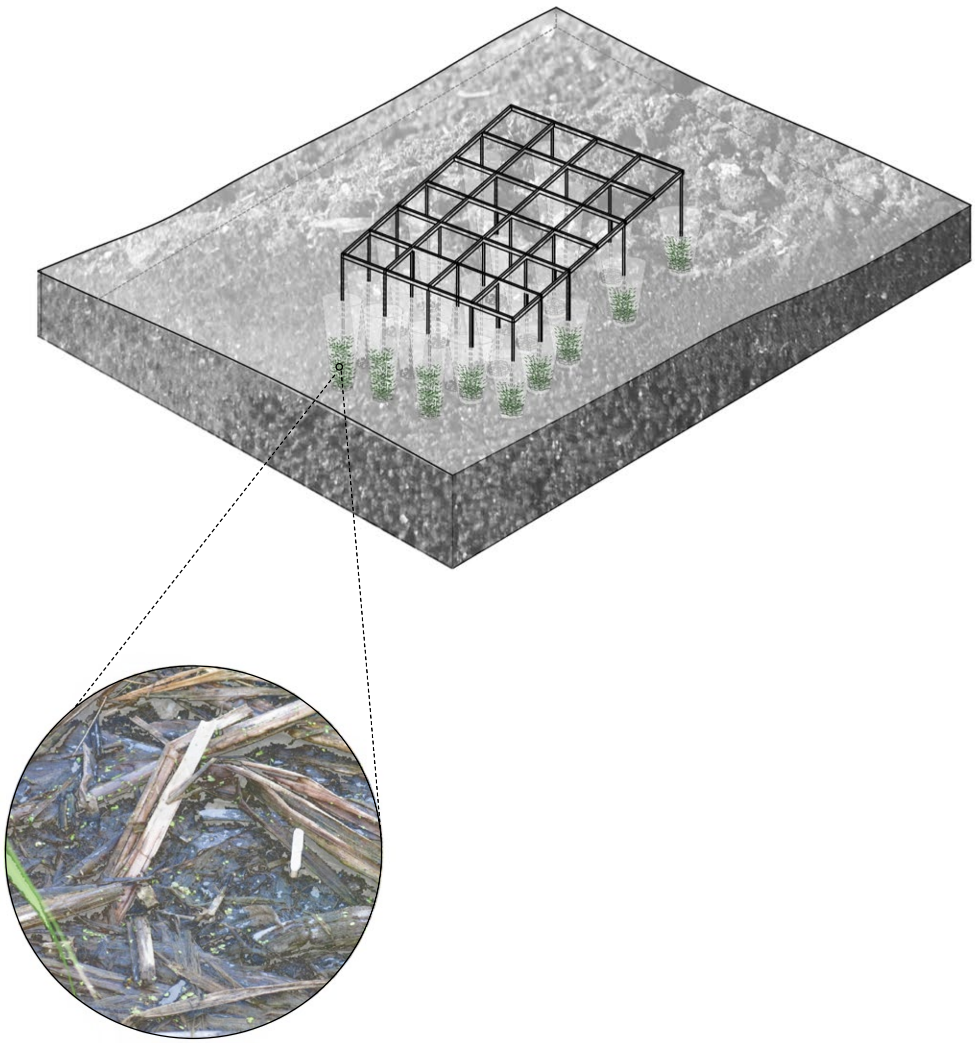
experimental, economic, and educational purposes by exploring vagabonds as a source of biomass production.

The biomass harvester operates in three main ways. The first step involves the natural accumulation of vagabond debris drifted by wind, water, or animal movements, and piled up into the underground wells over time. Depending on the environmental conditions, the first process can take days to months. The second step includes the complex natural process of composting. This step can take as little as six weeks to as long as a year, depending on the size and materiality of debris. Part of the purpose of the site is to test these durations. When the composting debris turns into a dark, earthy color, the instrument enters the third step which is digestate extraction. This step proceeds using portable mechanical devices installed into wells to help with removing bioproducts. Since the harvester's operations are completely caused by natural processes, there is no by-products in this biomass production and harvesting.

First Step:
Natural
Accumulation



Second Step:
Composting



Third Step:
Extraction

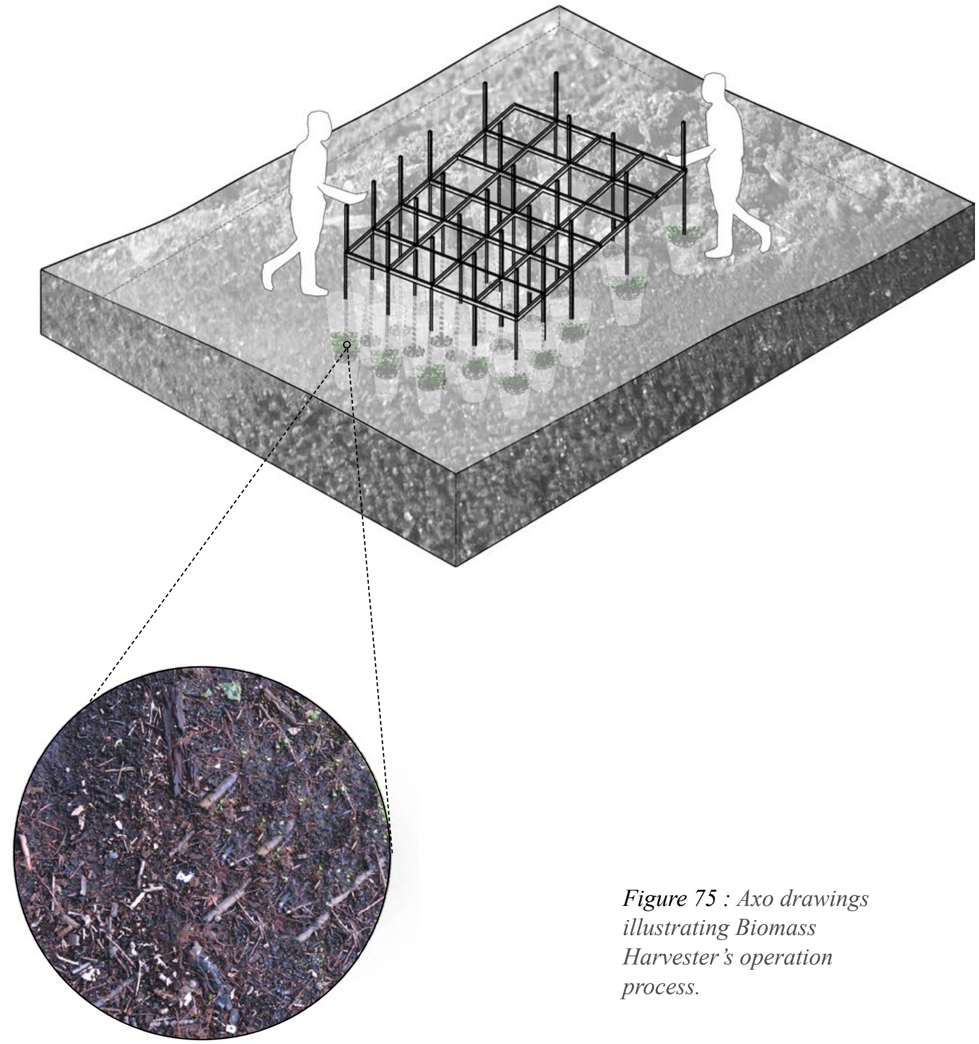


Figure 75 : Axo drawings illustrating Biomass Harvester's operation process.

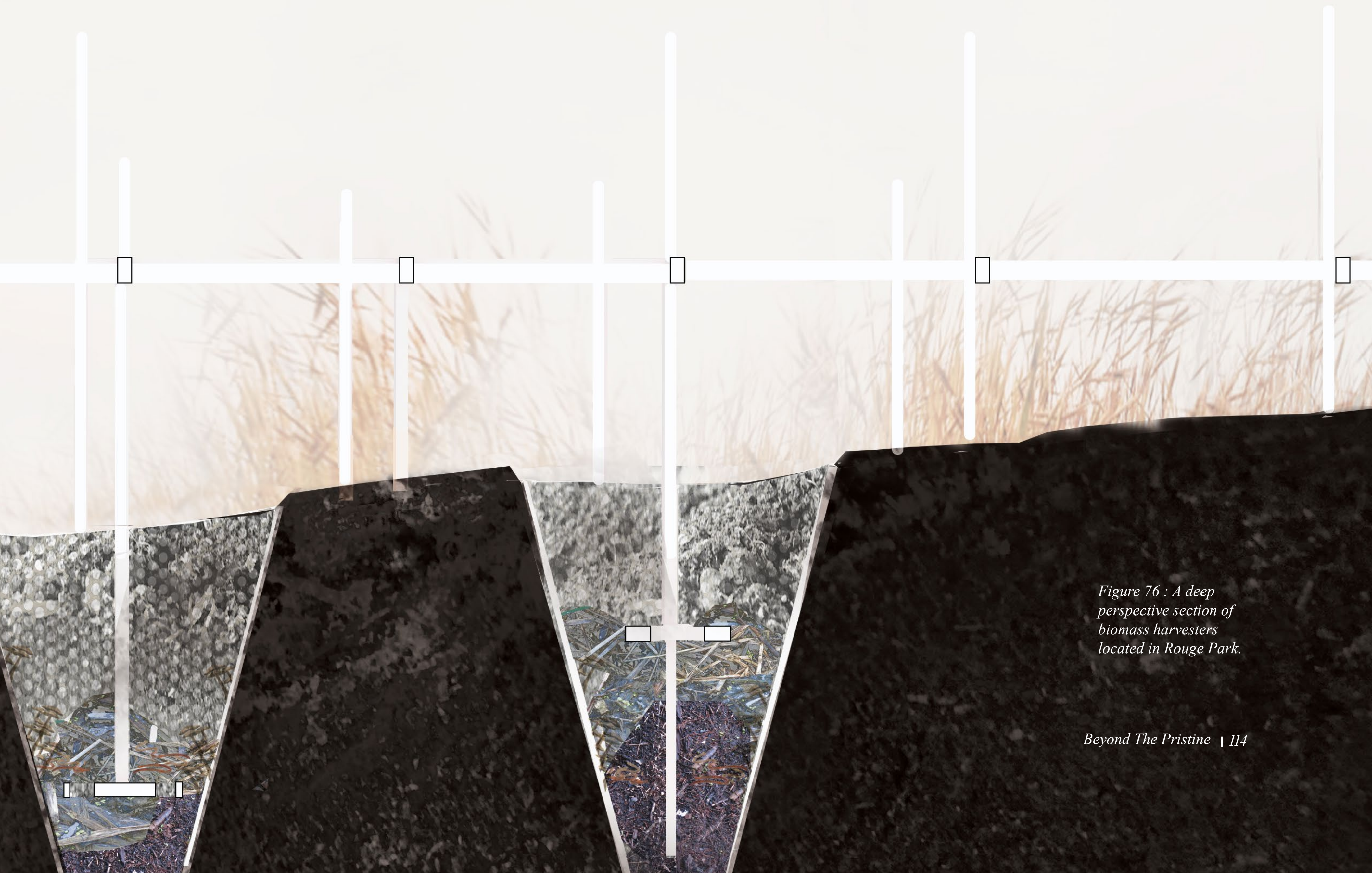


Figure 76 : A deep perspective section of biomass harvesters located in Rouge Park.

4.2. Material Experiment/Tank Model

A set of experiments for development and exploration of the biomass harvester design have also been conducted. The first one is a performance prototype using a tank of soil, vagabond debris, and a well structure to explore the instrument lifecycle. Diagrams of the instrument's operation process identifies the four main stages of excavation, installation, filling, and accumulation in its initial lifecycle.

The second experiment proposes a sectional model of a well structure. The model is designed to investigate the physical connections and structural systems of the well, while also exhibiting the composting process of vagabond debris. A daily recording of the tank's changes was conducted to help visualize the vagabond's various states through the composting process.

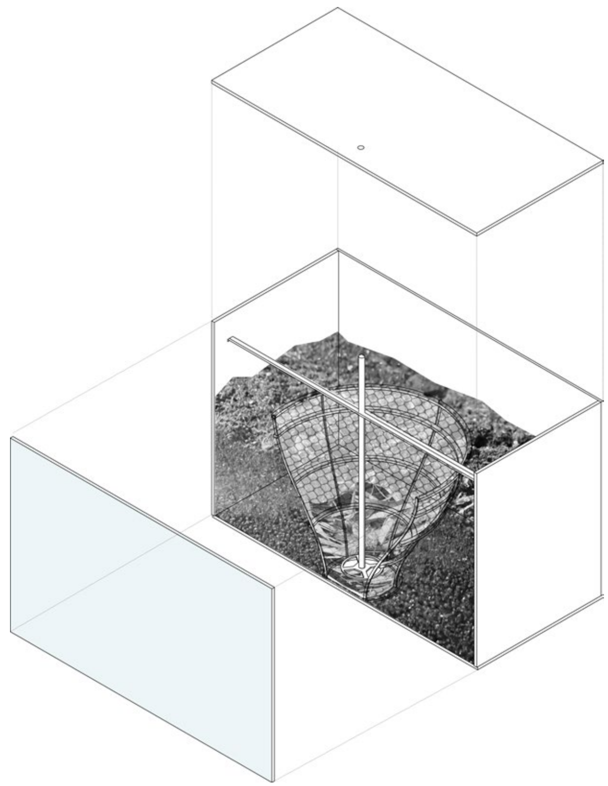
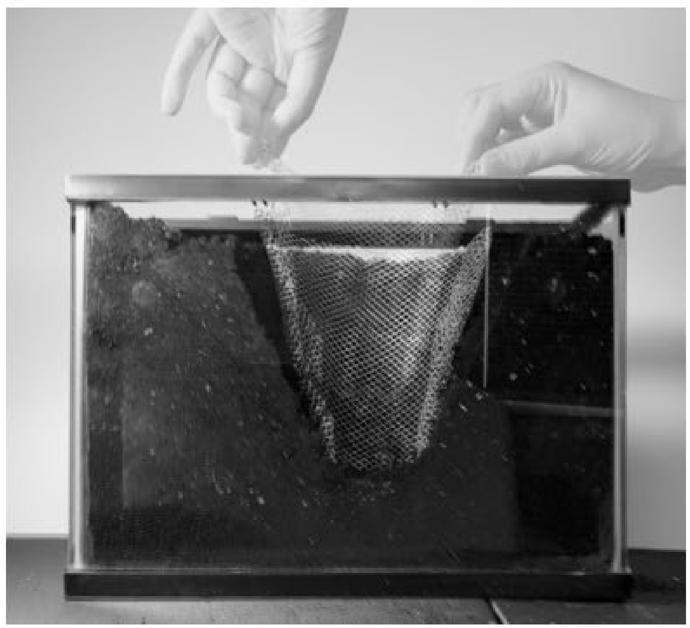


Figure 77 : An axo drawing of a well's prototype model.

Figure 78 : Photographs exploring the instrument's lifecycle which includes four stages of excavation, installation, filling, and accumulation process.








Conclusion

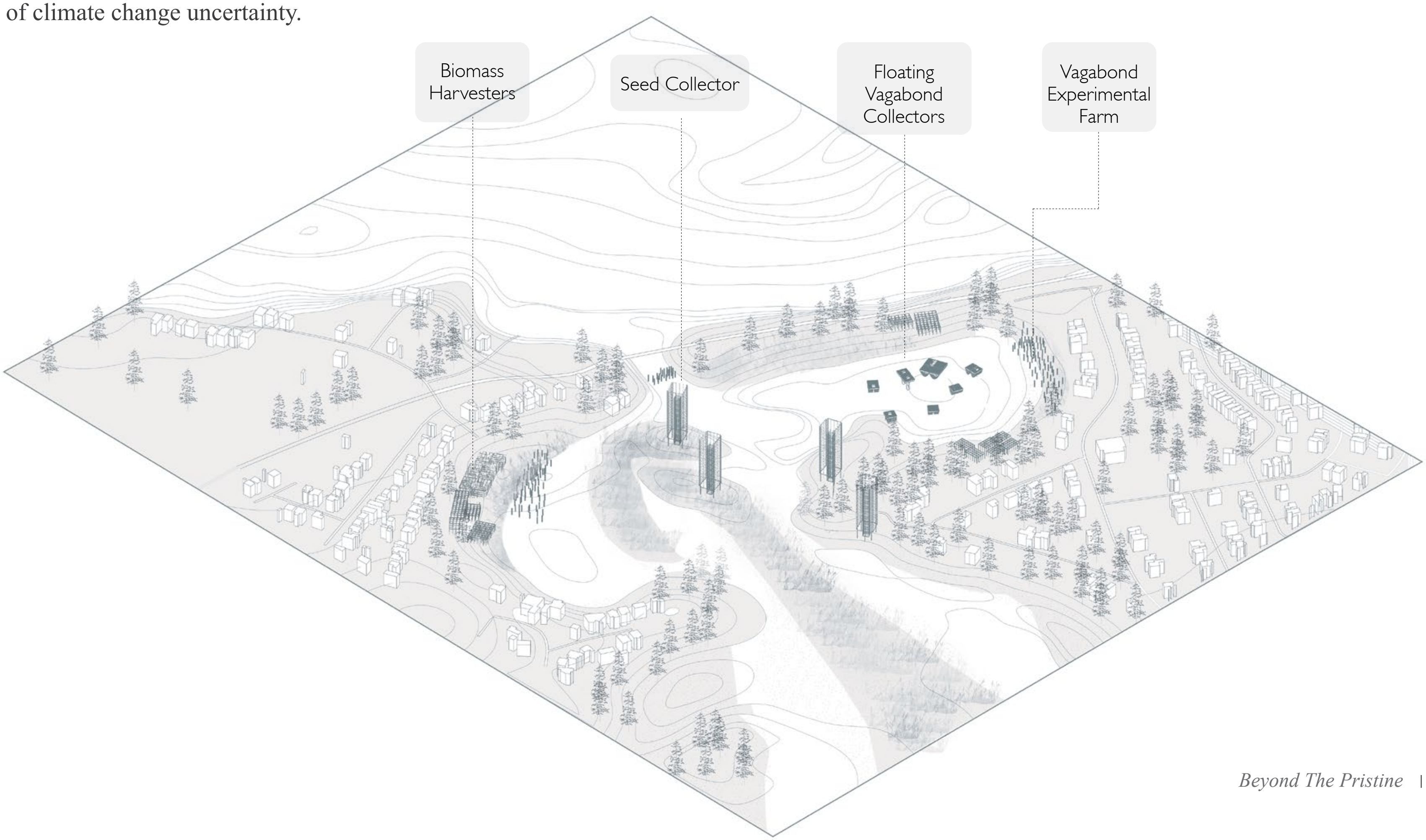
Reflecting on how the thesis has unfolded, my personal understanding of nature conservation has significantly changed since the beginning of this research. Building off existing scholarship in landscape and ecological urbanism by figures such as Peter Del Tredici and Gilles Clément, this thesis was driven to explore a new understanding of nature conservation in the context of today's environmental change and uncertainty by investigating the role of vagabonds. The frame of initial inquiries in relation to Clément's introduction of vagabonds as valuable, ecological passengers with design agency, was an opportunity for me to build a new conception of urban nature preserves considering environmental changes due to this species' constant movements and migration. To me, Looking at urban conservation sites as dynamic biophysical landscapes shifted the idea of national urban parks from only being recreational and protected places to, alternatively, live laboratories with exploratory potentials.

The work proposes a collection of landscape instruments as future typologies of national urban parks' infrastructures that helps in the creation of a new type of urban nature. While this project only focused on an area within Rouge National Urban Park, there is a possibility of expanding the design instruments to the scale of our cities which could be addressed in future research. One of the ways to grow and expand the project across Toronto's urban spaces could be incorporating the instruments' future designs into a broader existing network including the city's infrastructures.

Thinking of design scale can bring up new questions of what can be the instruments' future potentials, and how can they become a medium in reframing the notion of conservation in today's growing urban context? Can we imagine our cities as future living ecological laboratories testing a new understanding of humanity and our relationship with our biophysical context?

Figure 79 : An axo view of Rouge National Urban Park as Canada's first living vagabond laboratory.

The hope is that the project initiates more question of what our today's urban landscapes can be like in the time of climate change uncertainty.



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