

REGION 40 /
A NATIONAL PARK FOR THE
ANTHROPOCENE EPOCH

by Ryan Coates

A Practicum submitted to the Faculty of Graduate Studies of
The University of Manitoba
in partial fulfilment of the requirements of the degree of

MASTER OF LANDSCAPE ARCHITECTURE

Department of Landscape Architecture
University of Manitoba
Winnipeg

Copyright © 2017 by Ryan Coates

REGION 40 /

A NATIONAL PARK
FOR THE ANTHROPOCENE EPOCH

A Landscape Architecture Design Practicum
by Ryan Coates

these pages intentionally left blank.

ABSTRACT

As a unit of design, the national park remains one of the most ambitious ideas set forth by the early adopters of the title landscape architect. For over one hundred years, national parks have played a prominent role in defining Canada's relationship to its environment. In the Anthropocene, there is no greater crisis than that of awareness, of the possibility of bearing witness, yet the consequence of this new reality is not reflected in the landscapes Parks Canada curates to represent the quality of this relationship.

This practicum proposes through research and design, a prospective scenario for how Parks Canada could incorporate contemporary landscape architecture practices and aesthetics into the selection, development, and management strategies of future national parks.

*Landscape Architecture, National parks, Parks Canada,
Anthropocene, Wilderness, Aesthetics, Oil sands*

ACKNOWLEDGEMENTS

To my Committee Chair and Advisor Dr. Marcella Eaton, there is too much I would like to thank you for in so short a space, but no one has had a greater impact on my education, and my understanding and passion for landscape architecture. Thank you for everything.

To my Committee Examiners Alyssa Schwann and Dr. Douglas Olson, thank you for your wisdom, guidance, and care in the consideration and development of this work.

To the faculty of Landscape Architecture, your knowledge and generosity has been inspiring and

Thank you to Jim Thomas for your support through the James Thomas Fellowship in Landscape Planning.

And finally, to my friends and family, thank you for your unconditional love, support, and patience.

CONTENTS

<i>REGION 40 /</i>	<i>I</i>
<i>ABSTRACT</i>	<i>VII</i>
<i>ACKNOWLEDGEMENTS</i>	<i>VIII</i>
<i>INTRODUCTION</i>	<i>2</i>
<i>PART I / ANTHROPOCENE //</i>	<i>9</i>
<i>Encountering The Anthropocene</i>	<i>10</i>
<i>Solastalgia, Or What Is Being Lost?</i>	<i>21</i>
<i>Ecomodernism & The Good Anthropocene</i>	<i>22</i>
<i>After Nature</i>	<i>23</i>
<i>A National Park For The Anthropocene Epoch</i>	<i>26</i>
<i>PART II / NATIONAL PARKS //</i>	<i>31</i>
<i>Stories (Un)Told</i>	<i>34</i>
<i>Genesis: The National Park Idea / Wilderness Aesthetics</i>	<i>35</i>
<i>System Plan</i>	<i>42</i>
<i>Landscape Architecture</i>	<i>48</i>
<i>Forward Steps</i>	<i>52</i>
<i>SCALE I / SYSTEM PLAN //</i>	<i>55</i>
<i>On The Value Of A Region 40</i>	<i>58</i>
<i>Region 40 System Plan Documentation</i>	<i>66</i>

<i>ATHABASCA / BITUMEN / EXTRACTION /</i>	<i>69</i>
<i>The Athabasca Oil sands</i>	<i>76</i>
<i>Processing Value</i>	<i>78</i>
<i>Bitumen</i>	<i>86</i>
<i>Transect</i>	<i>92</i>
<i>Mapping</i>	<i>104</i>
<i>SCALE II / REGION //</i>	<i>123</i>
<i>Defining Boundaries</i>	<i>124</i>
<i>Zoning</i>	<i>132</i>
<i>Current Parks Canada Zoning Categories & Criteria</i>	<i>133</i>
<i>Representative Area Landscape Plan Implementation</i>	<i>152</i>
<i>SCALE III / SITES //</i>	<i>155</i>
<i>Future Forests</i>	<i>158</i>
<i>Forest Gardens</i>	<i>168</i>
<i>CONCLUDING THOUGHTS</i>	<i>192</i>
 <i>LIST OF FIGURES</i>	 <i>196</i>
<i>BIBLIOGRAPHY</i>	<i>200</i>

AS CANADIANS WE APPRECIATE THE BEAUTY OF THE NATURAL ENVIRONMENT AND THE RICHNESS OF OUR HISTORY. THESE ELEMENTS CONTRIBUTE TO AN UNDERSTANDING AND COLLECTIVE SENSE OF CANADA'S NATIONAL IDENTITY AS WELL AS A SHARED SENSE OF PRIDE. THEY UNIFY US AS A PEOPLE YET EXPRESS OUR NATIONAL DIVERSITY. CANADIANS SHARE THIS HERITAGE WITH EACH OTHER AND WELCOME OTHERS TO VALUE, RESPECT AND LEARN ABOUT IT. WE CELEBRATE THIS RICH HERITAGE THROUGH NATIONAL HISTORIC SITES, NATIONAL PARKS AND PARK RESERVES, HERITAGE RAILWAY STATIONS, HISTORIC CANALS, MARINE CONSERVATION AREAS, HERITAGE RIVERS, FEDERAL HERITAGE BUILDINGS AND HISTORICAL MARKERS.

THESE NATIONAL SYMBOLS CONTRIBUTE TO OUR CANADIAN IDENTITY IN MANY WAYS. THEY DEPICT A DIVERSITY OF CULTURES AND NATURAL ENVIRONMENTS. THEY ARE NATIONAL SYMBOLS, YET CAN BE LOCATED IN VIRTUALLY ANY PART OF THE COUNTRY - URBAN, RURAL AND REMOTE. THEY ARE ALSO TANGIBLE LINKS NOT ONLY WITH THE PAST AND THE PRESENT BUT WITH THE FUTURE. HERITAGE PLACES PROVIDE A WINDOW TO THE WORLD AND SHOWCASE OUR GLOBAL RESPONSIBILITIES IN ENSURING CONTINUED PROTECTION AND PRESENTATION OF A HERITAGE THAT HAS BOTH NATIONAL AND INTERNATIONAL SIGNIFICANCE.¹

"Parks Canada Guiding Principles and Operational Policies - Preface,"
Parks Canada.

INTRODUCTION

*Whatever its shape or size it is **never** simply a natural space, a feature of the natural environment; it is **always** artificial, always synthetic, always subject to sudden or unpredictable change. We create them and need them because every landscape is the place where we establish our own human organization of space and time.*

J. B. Jackson¹

Landscapes, whether safeguarded or squandered, reveal a society's values. Landscapes are always more than they appear to be, more than their form or content, they are also repositories of imagination, reflections of ethics, and representations of ideal relationships to the environment. Of the many types of transformation, the national park represents a format for creating landscape that is upheld as one of the greatest reflections of a society's values toward the environment. For over a century, Parks Canada has been a ubiquitous and important component of Canadian culture. The national parks are upheld as “tangible links not only with the past and the present but with the future,”² places we can go to for nourishment, respite and enjoyment of a natural bounty that spans the country and is upheld as a quintessential aspect of Canadiana.

Within the jurisdictional boundaries of the nation, a total of 10.57% of land and .98% of marine areas are protected in a relatively unmolested state.³ Of this, the federal government accounts for 3.37% of the total terrestrial area of Canada protected through the establishment of national parks and conservation

1 Jackson, *Discovering the Vernacular Landscape*, 156.

2 “Parks Canada Guiding Principles and Operational Policies - Preface.”

3 Canada. House of Commons. *Taking Action Today: Establishing Protected Areas for Canada's Future*, 20.

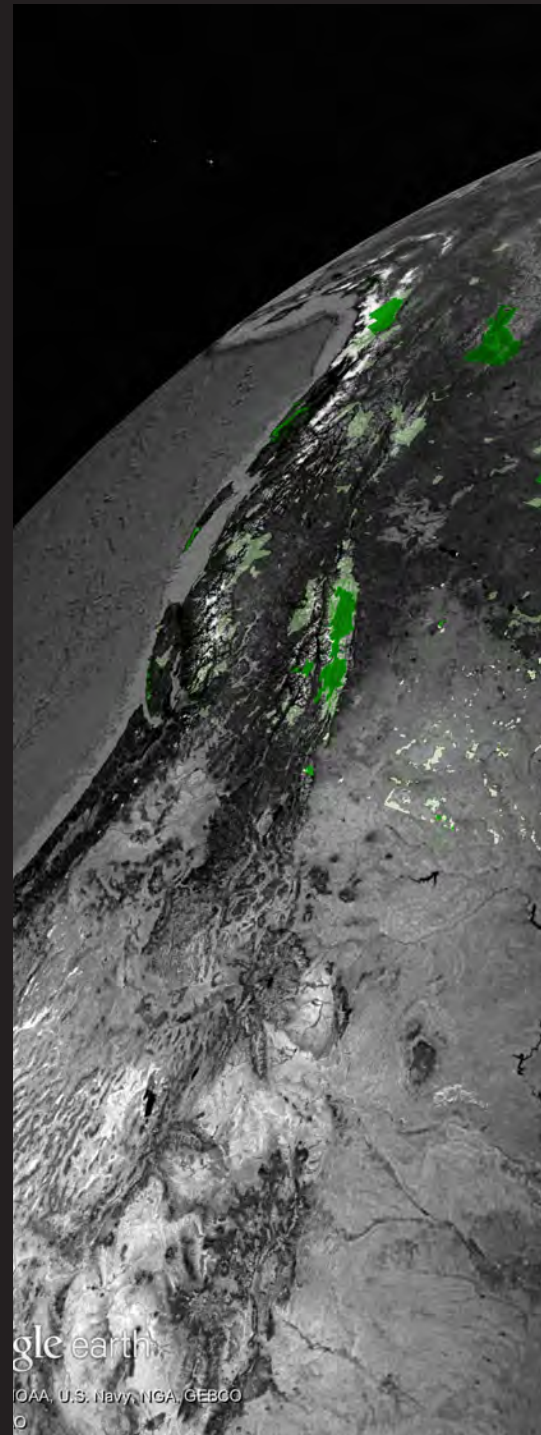
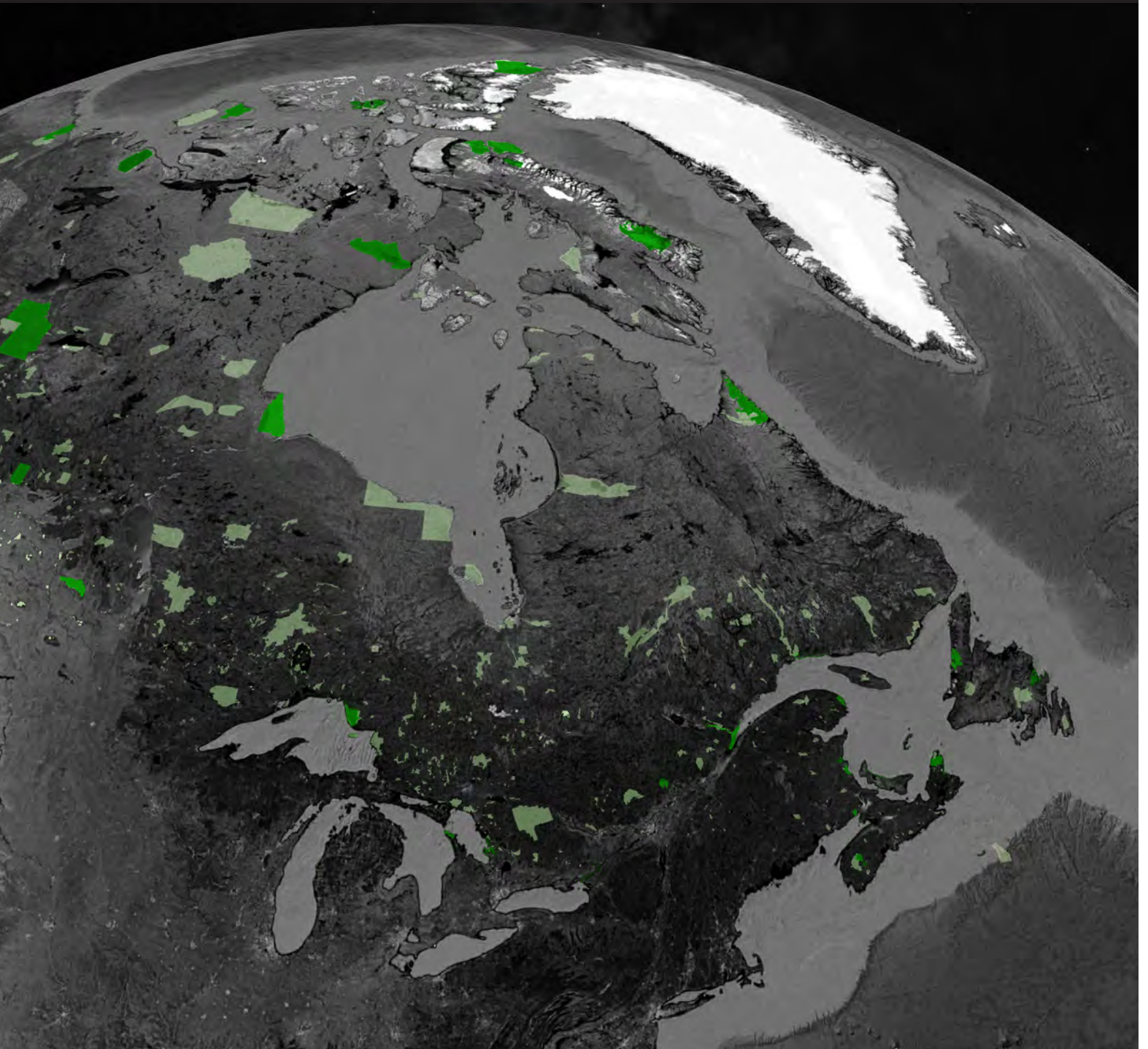


FIG. 01.
GOOGLE EARTH. THE NATIONAL PARKS
OF CANADA, A CRITICAL COMPONENT OF
CANADA'S PROTECTED AREAS.



areas, all overseen by the Parks Canada organization within the department of Environment and Climate Change.⁴ These 336,000 km² curate and project to the world an ideal relationship between Canadians and their environment, founded on respect for, and care of the natural world. Yet this is an incomplete picture; Canada's promotion to the world, and to its citizens of an identity invested in environmental stewardship and preservation exists alongside an identity as a resource-rich expanse open to development. Indeed, the current Liberal government's platform is centred around a duality that, "the environment and the economy, they go together like paddles and canoes. Unless you have both, you won't get to where you are going, because you can't have a strong economy without a healthy environment."⁵

While ecology and economy have historically remained ontologically distinct, in the Anthropocene these categories collapse entirely. Jedediah Purdy has reflected that "in this time, our economy makes our ecology. We shape the world just by the way we live ... Our energy economy, our transport economy, our food economy, these shape our ecology, in a sense they are our ecology just as much as rivers and forests are."⁶ However, Parks Canada remains subscribed to a conception of ecology that does not reflect the human interface with the landscape beyond basic historicism or preservation and limits the capacity for citizens to develop a more consequential understanding and relationship to the environment through the parks system.

This duality persists because Parks Canada remains captivated by aesthetic practices that regard untrammelled wilderness as natural, beautiful, and preeminent while anthropogenic, extractive

4 *Taking Action Today: Establishing Protected Areas for Canada's Future*, 21.

5 "Real Change: A new plan for Canada's environment and economy," Liberal Party of Canada.

6 Purdy, "After Nature," YouTube.

landscapes are not considered aesthetically consequential. If these landscapes are considered, their anthropogenic character devalues any sense of their accordance to Parks Canada's definition of wilderness, and so are not considered important to represent. On the contrary, economic value supersedes natural value when resources are considered. What is valuable within the framework of one concept is understood as an externality within the other. But in the Anthropocene, keeping these aspects of Canadian identity separate is not productive, and the persistence of this duality is a detriment to Canada's environment and to the development of a sense of responsibility to it. A sense of responsibility is what I define as the foundational characteristic of an environmental identity. For Parks Canada to maintain its prominent role in the development of that identity, it needs to ensure that the sense of responsibility it promotes is considerate of all aspects of a society's relationship to its environment, not just the positive ones.

What national parks represent is ultimately an ideal; vignettes which showcase the Canadian landscape, and our relationship to it as we would like it to be. But an environmental identity that does not consider the landscape as it is, fails to provide a complete understanding, and a complete sense of responsibility. For a comprehensive understanding of a national environmental identity to truly exist, Anthropocene landscapes require inclusion into our notions of what constitutes an acceptable representation of landscape in Canada.

Landscape architects played a historic role in the early development of the national park idea, and the skillset they provide is needed now to help advance the scope and scale of what national parks can represent to society about their relationship to the environment. In much the same way that the post-industrial landscape has become a fertile ground of operation for the discipline to explore the issues of post-industrial crisis and cultural

identity through landscape, I believe that the next step taken must be for landscape architects to recontextualize the issues of the environmental crisis as an integral aspect of environmental identity, through landscape. As humanity and the planet enter the Anthropocene Epoch, we have begun to understand that not only do the consequences of our history of industrial practices (and the resultant landscapes) not end at their respective property lines; they do not even end at the edges of their continents, or even the ends of centuries. The boundaries we created between culture and nature have dissolved in the face of human induced change to the Earth system; our industrial practices are not simply terrestrial, they are geologic. It is incumbent on both landscape architects and Parks Canada to consider their work creating landscapes within the context of the Anthropocene.

This practicum begins by developing an understanding of the Anthropocene and its effects regarding the scope and scale of the situation, and the attempts to reconcile with this new epoch. The history of the national park as a landscape type is then explored with particular attention to the Canadian context, with the purpose of addressing the current state of the system and the emerging conflict this one hundred year old institution will encounter in the Anthropocene. From here, this practicum explores the Athabasca oil sands region as a representative location for the implementation of a new type of national park region in Canada, Region 40.

I hope through this research and design to develop a prospective scenario for how Parks Canada could incorporate contemporary landscape architecture ethics and aesthetics into the selection, development, and management strategies of future national parks. I hope this can provide a vision of how progressive landscape architecture could re-engage with the important service national parks provide. Challenging the current framework is necessary for its overall health, and developing a scenario where the

national parks represent more than just the past and contribute to a communal ideal of an ecologically integral future is a worthwhile endeavour.



*'The beauty of it cannot be understood, either, and when you
see beauty in desolation it changes something inside you.
Desolation tries to colonise you.'*

VanderMeer, *Area X*, 4.

PART I /
ANTHROPOCENE //

ENCOUNTERING THE ANTHROPOCENE

The Holocene is ending. Along with it, the relative stability it has provided over a geologic period that lasted for the past 10,000 years, saw the rise of all human civilization, the domestication of wheat and cattle, the combustion of coal and the splitting of the atom. From the chaff, soot and fallout, a new epoch. It has always been upon us, for it is of our making. This new epoch has come to be known as the Anthropocene, and with each passing day of increased fire risk,¹ coral bleaching,² or airplanes grounded by sweltering heat³ it becomes clearer and clearer that an existential watershed approaches for the future of humanity. While the act of naming and classifying the crisis has proven challenging within the scientific community, the term has spilt out into the broader discourse and captured the imagination of many looking to engage with the increasingly volatile, changing Earth system in new ways. Accordingly, in a suddenly uncertain age, the question of relevance has increased scrutiny on paradigms of the past, including the assumed duality of culture and nature.

- 1 Canada and Natural Resources Canada, *Climate change and fire and insect disturbances in Canada's forest*.
- 2 The Nature Conservancy, "Coral Reefs: Coral Bleaching What You Need to Know."
- 3 Malo, "Climate Change May Ground a Third of Aircrafts in Coming Decades-Study."

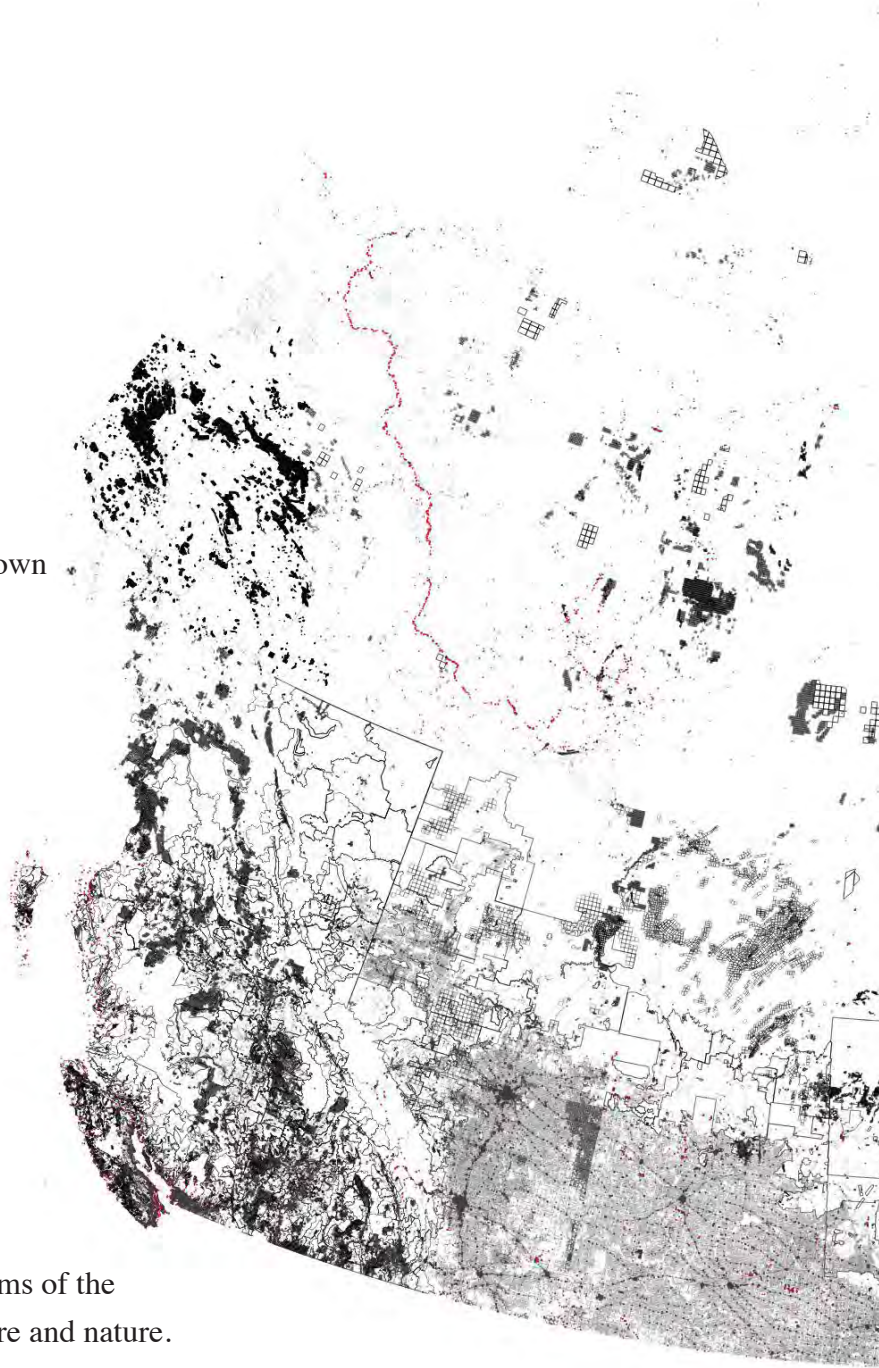
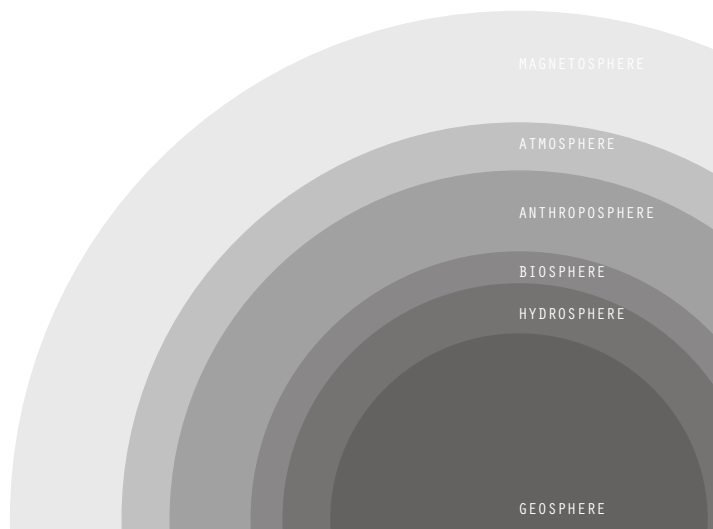




FIG. 02.
CANADA'S ANTHROPOSHERE, COMPOSED OF
TRANSPORTATION AND COMMUNICATIONS
NETWORKS, EXTRACTION AND FORESTRY
LEASES, AND FEDERAL CONTAMINATED
SITES INVENTORY.

The Anthropocene term has existed for only a short period, but it has proved to be quite disruptive. Atmospheric chemist Paul Crutzen and his colleague Eugene Stoermer proposed the term at the start of the first decade of the new millennium; in the journal *Nature*, stating, “For the past three centuries, the effects of humans on the global environment have escalated. Because of these anthropogenic emissions of carbon dioxide, global climate may depart significantly from natural behaviour for many millennia to come. It seems appropriate to assign the term ‘Anthropocene’ to the present, in many ways human-dominated, geological epoch, supplementing the Holocene,”⁴ while providing myriad examples,



both qualitative and quantitative to substantiate the legitimacy of this new nomenclature. Since this preliminary introduction, the Subcommittee on Quaternary Stratigraphy has convened an Anthropocene Working Group to consider incorporating this new epoch into the geologic record. And while establishing an official starting point has not yet occurred, the Working Group overwhelmingly agrees, “that humans have altered geologic processes across the Earth system sufficiently to cause a planetary transition to a new period of geological time – is clearly a real

4 Crutzen, “Geology of Mankind,” 23.

FIG. 03.
LEFT: REPRESENTATIVE DIAGRAM
OF SPHERES COMPRISING THE
EARTH SYSTEM.

ADAPTED FROM:
KLEIDON, “HOW DOES THE EARTH
SYSTEM GENERATE AND MAINTAIN
THERMODYNAMIC DISEQUILIBRIUM
AND WHAT DOES IT IMPLY FOR
THE FUTURE OF THE PLANET?”
FIG.2.

FIG. 04.
TOP RIGHT:
“EARTHRISE” 1969, APOLLO
MISSION 8.
COURTESY: NASA.



event within a deep-time context, and is producing geologic signatures.”⁵

Of equal consequence in the preceding quotation is the concept of Earth system, for it highlights that the Anthropocene is, in fact, a totality of effects on all spheres of the globe, not just the geologic. Indeed, the concept of the Earth system has come to prominence in the emerging Anthropocene era, following the trajectory of ever more global approaches to environmentalism. While early ecology studies contended almost exclusively with constellations of biospheric regions in the scientist’s purview and theories of steady-state systems,⁶ the past sixty years have rapidly expanded what constitutes the scope of ecology, regarding both the scale and number of systems considered. The ‘whole Earth’ photograph that Stewart Brand advocated for in 1966⁷ which NASA later produced awoke in many people a newfound concern for the effects human impact was having on the global environment. This photo ushered in a new era of ecology studies as a truly global, multi-spheric

5 “The Anthropocene: an update,” *GeoQ* 12: 22.

6 Ellison, “The Suffocating Embrace of Landscape and the Picturesque Conditioning of Ecology,” 82.

7 Brand, “Earth Monitoring: Whole Earth comes into focus,” 797.

phenomenon. Much has changed since 1966, and looking at the whole Earth shot today brings many different considerations of these spheres to mind. As the concept of climate change entered the global psyche, the atmosphere and hydrosphere became further implicated in the scope of human impact. While these spheres have often presented themselves to us through their effects (acid rain, ozone depletion, sea level rise), once elements of the biosphere and the geosphere became understood as the spheres of cause (or more accurately as the resource base of an exploding anthroposphere) the Anthropocene could come into focus.

In Canada, these effects have been studied and projected for decades, revealing the nature of the Anthropocene on the Earth system. In 1992, Brian Rizzo and Ed Wiken developed a projective scenario for Environment Canada, on how the global rise in carbon dioxide would affect the geographic locations of the ecoclimatic provinces, or Ecoprovinces within Canada.⁸ The authors developed the Ecoprovince classification for their study through a simplification of the Ecoclimatic Regions of Canada, and considered vegetation the primary informant of an Ecoprovincial climate type.⁹ The projected Ecoprovincial shift would occur when accounting for a global doubling from the 300ppm representing 1982 CO₂ levels to 600ppm, adapted from earlier research work developed by James Hansen.¹⁰ Today, a Keeling reading, which measures atmospheric carbon dioxide, climbs nearer to a 410 ppm yearly average.¹¹ That is an increase of nearly 100 ppm in 30 years. Extrapolating the Keeling data reveals an estimated arrival of 600 ppm atmospheric carbon dioxide in the 2080's, an overwhelmingly rapid doubling when considered in geologic time scales. Adding the Keeling data to other recordings of atmospheric carbon

FIG. 05.

TOP LEFT: KEELING DATA SINCE 1960.

FIG. 06.

BOTTOM LEFT: THE LONG VIEW. GLOBAL CARBON DATA SINCE THE INDUSTRIAL REVOLUTION.

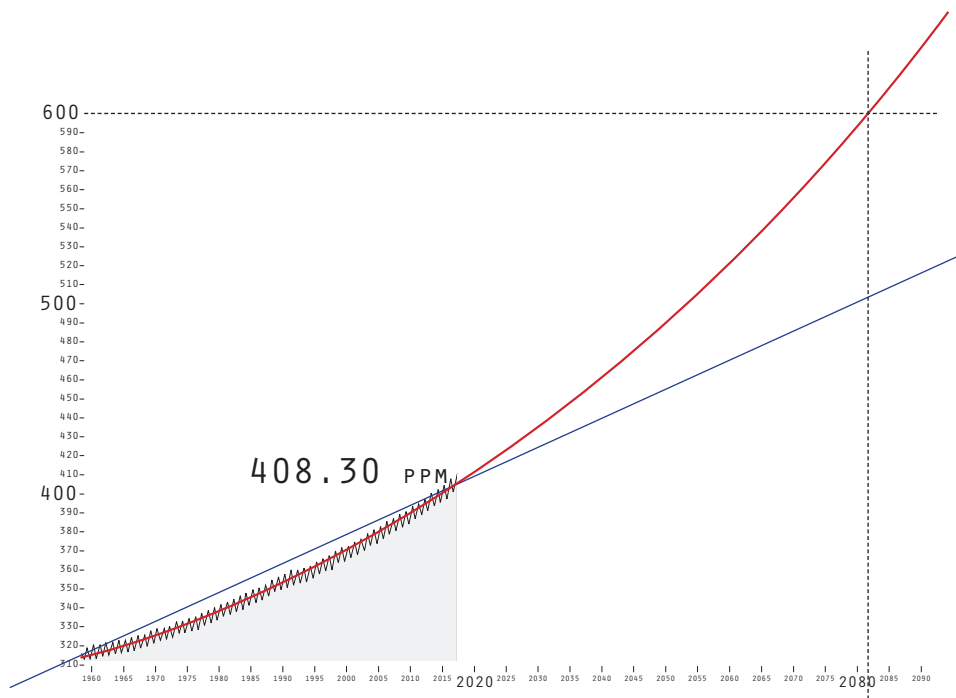
ADAPTED FROM:
"THE KEELING CURVE," SCRIPPS
INSTITUTION OF OCEANOGRAPHY.

8 Rizzo and Wiken, "Assessing the Sensitivity of Canada's Ecosystems to Climatic Change."

9 Rizzo and Wiken, 41.

10 Rizzo and Wiken, 37.

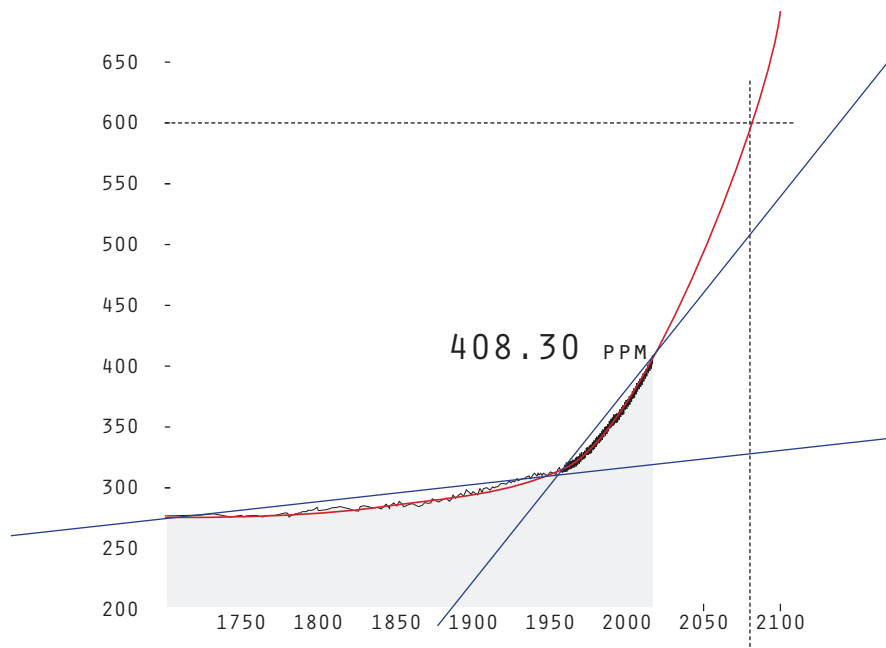
11 "The Keeling Curve," Scripps Institution of Oceanography.



LATEST CO₂ READING

JUNE 22, 2017

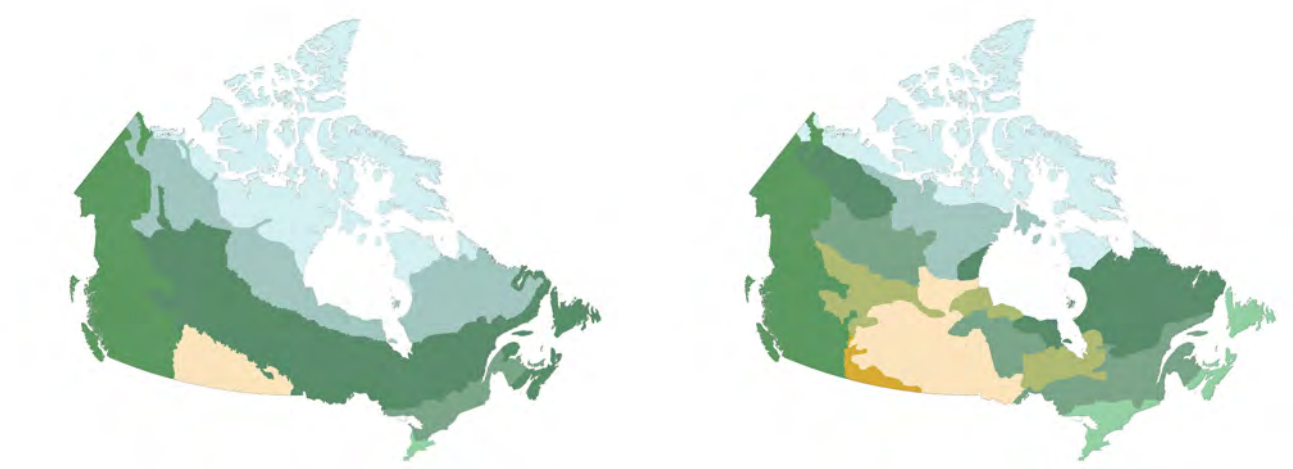
CARBON DIOXIDE CONCENTRATION AT MAUNA LOA OBSERVATORY



LATEST CO₂ READING

JUNE 22, 2017

ICE-CORE DATA BEFORE 1958, MAUNA LOA DATA AFTER 1958.



dioxide dating back to the Industrial Revolution reveals the stark, exponential rapidity of the problem.¹² The effects of this increase will be no less severe either.

Developing a classification model using the Goddard Institute for Space Studies projected temperature increase resulting from a doubling of global atmospheric carbon, and cross-referencing against environmental features such as geomorphology, physiology and general vegetative cover, Rizzo and Wiken's study reveals a dramatically altered Canadian ecoprovincial landscape in many parts of the country. The modelling returned results indicating decreases in the subarctic and boreal land areas of 60% and 50% respectively, while grasslands doubled in land area. New Ecoprovinces emerged, including transitional grasslands and semi-arid desert.¹³ The mapping representation¹⁴ of these shifts presents equally distressing information, including the fragmentation of the boreal Ecoprovince, no longer contiguous across the country, as well as the extreme northward movement of the grassland ecosystem as the permafrost melts allowing re-emergent soil



¹² "The Keeling Curve," *Scripps Institution of Oceanography*.

¹³ Rizzo and Wiken, "Assessing," 50.

¹⁴ Rizzo and Wiken, "Assessing," 50.



FIG. 07.
FAR RIGHT: CURRENT ECOREGIONS
OF CANADA

FIG. 08.
RIGHT: PROJECTED ECOREGIONS
OF CANADA

FIG. 09.
ABOVE: COMPOSITE OF ECOREGIONS
EXPLORING ANTICIPATED SHIFT

ADAPTED FROM:
RIZZO AND WIKEN, "ASSESSING
THE SENSITIVITY OF CANADA'S
ECOSYSTEMS TO CLIMATIC
CHANGE." 7.

formation processes to increase species migration.¹⁵ Rizzo and Wiken stress that while the results of their classification model do not indicate the speed at which this transition would take place, the rate of the ecosystemic transition will take place at a much slower rate than the climate will shift.¹⁶ However, the eventuality of this scenario is occurring, and the cascading environmental and social effects it would have should not be taken lightly, stating, "Changes in the setting of the natural environment render park reserves and other areas vulnerable to a wide range of disturbances. With the

15 Rizzo and Wiken, "Assessing," 53.

16 Rizzo and Wiken, "Assessing," 53.

magnitude of the change depicted, consideration should be given to the implications.”¹⁷ Earlier in the paper, they provide a reference to one of these high magnitude changes from paleoecologist Margaret Davis, who, “suggested that many tree species may not be able to disperse rapidly enough to track areas of suitable climate. A scenario such as this will certainly be disruptive to the existing ecological order and will likely result in a very different ecological scenario.”¹⁸

The effects of the Anthropocene are not only experienced at the broadest scale of human climactic actions disrupting the existing ecological order. At finer scales, the epoch presents itself through very specific human disturbances in regional and local ecological systems. This issue of scalar resolution has been a point of contention in the nomenclature of the Anthropocene, though in many ways it accentuates the all-encompassing nature of the crisis. At the broadest scale, the totality of humanity is understood as the issue in what Dipesh Chakrabarty describes as the species scale of the Anthropocene.¹⁹ At finer scales, issues of power relationships and the histories of colonialism and capitalism intersect with a reality in which the most severe environmental calamities are beset upon those of lowest means, informing the position of various scholars that the issue is better defined as a history of industrialization. Chakrabarty calls us to think, “simultaneously on both registers, to mix together the immiscible chronologies of capital and species history”²⁰ while highlighting the difficulty of the experience of scale in addressing the crisis.²¹ This problem of the experience of scale is best summarized by Timothy Morton’s concept of “hyperobject”, “things massively distributed in time

17 Rizzo and Wiken, “Assessing,” 53.

18 Rizzo and Wiken, “Assessing,” 38.

19 Chakrabarty, “The Climate of History: Four Theses,” 213.

20 Chakrabarty, 220.

21 Chakrabarty, 221.

and space relative to humans.”²² Species is a hyperobject, as is capital or global warming, or ecosystems. “You are a member of a massively distributed thing.”²³

The massiveness of the Anthropocene is the aspect of it that is hardest to access, this jump up from individual actions to a collective, species action. Fine-scale impacts are among the most recognizable to us, because they encompass our everyday landscapes, yet they conceal the massive nature of their contribution to the Anthropocene. Simple day-to-day actions would not be possible without the ever extending networks of communication that humanity has employed in its ongoing modernity project, from roads to telecommunications, to electrification, and the extraction, production and transmission of resources. Often the scales of these systems are only revealed by instances of their malfunctioning. These networks often take the form of linear impositions, fragmenting the various layers of the Earth system, while extractive actions disturb large, contiguous areas and leave behind myriad forms of degradation on the landscape including despoliation and contamination that is often at risk of cascading outwards through the natural processes of air and water systems. The totality of these human impositions defines the hyperobject nature of the anthroposphere.

But these systems can be made apparent. Through the use of Geographic Information Systems (GIS) software, it is possible to represent Canada’s anthroposphere in a graphic format by combining information relating to all the networks mentioned above, and including resource extraction leases and the Federal Contaminated Sites Inventory. Without including the traditional mapping conventions of geophysical features or administrative boundaries, the outline of the country and even the location

22 Morton, *Hyperobjects*, 1.

23 Morton, *Dark Ecology*, 8.

of some major watercourses reveal themselves; an unsettling interrelationship between human economy and ecology emerges.

RESPONSES

How should we feel about all of this? The challenge of the Anthropocene is not merely defining a start point for this new epoch or an exercise in mapping its footprint. It is not just a conversation about human practices; it is a conversation about how humanity situates itself in time - in deep time, in projective time. Much of western society has great difficulty with deep time, seeing the world in such a small frame of reference that it is difficult to fathom the actions in our lifetime affecting future millennia, yet that is the world we have created; are continually creating. In many ways, the Anthropocene is a referendum concerning the future we want to create. This invitation to consider our collective deep future has elicited responses from all degrees of the political spectrum, ranging from ignorance to sorrow, to various technocratic ideations and new philosophical insights. These manifest as denialism, solastalgia, ecomodernism, and the end of Nature.

SOLASTALGIA, OR WHAT IS BEING LOST?

If a person lacks solace then they are distressed without the possibility of consolation. If a person seeks solace or solitude in a much loved place that is being desolated, then they will also suffer distress. In both contexts there is anguish or pain (algia).

...

Therefore, I suggest 'solastalgia' to describe the pain or sickness caused by the loss of, or inability to derive, solace connected to the present state of one's home environment. Solastalgia exists when there is recognition that the place where one resides and that one loves is under assault (physical desolation).

Glenn Albrecht²⁴

Perhaps the most common refrain to the Anthropocene epoch is one of lament. It is not difficult to feel overwhelmed by the news that confronts us each passing day: deforestation, coral bleaching, desertification, record-breaking temperatures and polar ice melting. In many respects, Albrecht's coinage reflects a typically Romantic ideal about the sorrow for the Earth dominated by humanity, reflected in the poetry of Wordsworth or the paintings of Turner that grappled with this transition from idyll to calamity. The despoliation has just increased by orders of magnitude since the steam engine. In likening the Anthropocene to a type of rapture, solastalgia reflects through anguish and pain a sense of condemnation, and assumes guilt as the appropriate response to the crisis, for we have emerged the destroyers of our garden. With this group, resolution comes through an increased moral piety of thought and action; a strict conservationist approach as humanity moves forward into its uncertain future. Ulrich Beck identifies this as reflexive modernity wherein a society is "increasingly

24 Albrecht, "Psychoterratica: Solastalgia."

preoccupied with identifying and managing the many risks that those societies themselves have manufactured.”²⁵ This reflexivity has manifested in Canada over decades as an existential crisis regarding the quality of Canada’s wilderness broadly in Litteljohn and Pimlott’s *Why Wilderness*,²⁶ and the state of the national parks specifically in Searle’s *Phantom Parks*.²⁷ These responses are summarized in the Panel on the Ecological Integrity of Canada’s National Parks: “Should national parks become degraded to the point of being indistinguishable from the developed landscapes around them, parks will lose their significance to Canadians. These changes would threaten the very spirit of Canada.”²⁸ In this regard a return to Nature, necessitating a turn away from further development is the preferred answer to reclaiming solace.

ECOMODERNISM & THE GOOD ANTHROPOCENE

If the solastalgists believe that the problem of the Anthropocene is the abundance of inputs, advocates of the so-called ‘good Anthropocene’ offer a solution *through* inputs to address the issue, using the language of ecomodernism. By fully embracing the anthropogenic nature of the crisis, they offer entirely anthropogenic solutions to tackling the problems of human habitation in a rapidly changing Earth system with the stated goal of decoupling humans from the environment to save it.²⁹ Through processes of geoengineering, these solutions have included proposals to replicate volcanic effects in the atmosphere through injecting

25 Hargens & Zimmerman, *Integral Ecology: uniting multiple perspectives on the natural world*, 143.

26 Litteljohn & Pimlott, *Why Wilderness*.

27 Searle, *Phantom Parks: The struggle to save Canada’s National Parks*.

28 Panel on the Ecological Integrity of Canada’s National Parks, “*Unimpaired For Future Generations*”? *Protecting Ecological Integrity with Canada’s National Parks Vol I*, 5.

29 Asafu-Adjaye et al., *An Ecomodernist Manifesto*, 25.

stratospheric sulfate aerosols³⁰ in attempts to reflect more energy out into space, to de-acidifying the ocean through massive scale mineral injections³¹ to burying carbon dioxide deep underground,³² and even the full-scale conversions of energy economies to renewables. Efficiency is the name of the game. These approaches are almost entirely based on the existing consumptive model of society and rely on some form of an addition to geological processes instead of tackling the fundamental problem of overconsumption. This is what Janicke describes as the dilemma of the n-curve.³³ These solutions disregard questions of demand in favour of solutions of supply. The n-curve states that as these new technological solutions become viable, their net benefit will be offset by the rapidity of their adoption. Because the increased efficiency of so-called green industrial techniques still exists within a consumptive model of global capitalism, the fact that they are “greener” technology does not address the real issue of lifestyle and how that determines our energy consumption and pollution output. Proposals for cleaner extraction processes or increasing the capacity of passive energy production are all issues of supply, ignorant to the questions that need asking regarding how societies consume energy.

AFTER NATURE

The problem with these two modes of response, according to the last group of thinkers, is their reliance on the very concept of Nature itself. Many of these thinkers would put forward the argument that these two previous responses are doomed to inadequacy precisely because they maintain the paradigm of a

30 “Stratospheric Aerosol Injection (Climate Engineering),” Wikipedia.

31 Klein, “Adding Rocks to Oceans Could De-Acidify Water and Save Coral.”

32 Schlesinger, “Carbon Capture and Storage (CCS).”

33 Janicke, “Ecological modernisation: new perspectives,” 563.

bifurcation between culture and Nature at their foundation at a time when “the wall between human and natural history has been breached.”³⁴ If the Anthropocene has exposed the extraneity of the duality through the total collapse of the paradigm, others would argue that it should never have existed in the first place, and that its continuation is detrimental to our ability to address the Anthropocene issues. The environment and society co-produce each other and infinitely overlap and collide. This co-productivity reflects the increasing importance of thinking of the world as the Earth system, as an ecological mesh³⁵ in which we are connected to everything and everything connects. While the mesh is not a new idea by any means, and can be traced back to Aldo Leopold, the application of it has increased in scope to encompass not only ecology, but economy and society. Jedediah Purdy explains this as Anthropocene thinking :“the next generation of ecological thinking: all the systems at once, and seeing the links everywhere between their human and natural aspects.”³⁶ Anthropocene thinking is analogous to Timothy Morton’s “ecological thought”, which operates along similar lines as, “thinking that is ecological, a contemplating that is doing.”³⁷ Both of these types of thought are prefaced on the end of the hegemony of “the aesthetics of Nature impeding ecology.”³⁸

However, organizations like Parks Canada have maintained through parks, Nature as “the unconscious of modern society, places we can go to keep our dreams undisturbed.”³⁹ Reviewing Parks Canada documentation, the organization’s response to the Anthropocene is limited to a mere acknowledgement of the reality of climate change producing potentially traumatic effects on many

34 Chakrabarty, “Climate of History,” 221.

35 Morton, *The Ecological Thought*, 30.

36 Andersen, “Nature Has Lost Its Meaning.”

37 Morton, *Ecological Thought*, 9.

38 Morton, *Ecological Thought*, 9.

39 Morton, *Ecological Thought*, 9.

of the existing parks within the system. Often these documents refrain from reconsidering how the role of the system as a mediator of the environmental imagination will be fundamentally altered by climate change as well. A report titled *Climate Change and Canada's National Park System*⁴⁰ serves as an accounting of the potential impacts on each park by regions, supplemented by the scenarios developed in Rizzo and Wiken's study as mentioned earlier. However, it provides little detail as to how to approach this encroaching reality beyond the familiar refrain of maintaining the parks in a state "unimpaired for the enjoyment of future generations."⁴¹ A contemporaneous document titled "*Unimpaired for Future Generations?*"⁴² provides an enticing title, alongside a series of Calls to Action for maintaining the ecological integrity of the Parks Canada system. This document comes tantalizingly close to defining the crisis facing the parks as an Anthropocene crisis, stating in the same year of the term's first appearance that, "Humans are now such dominant force that most world ecosystems are greatly stressed by human activities... the human footprint is everywhere."⁴³ It even provides a number of recommendations that reveal a consideration of entirely anthropogenic responses within park spaces, defined as "active management"⁴⁴ and proposes establishing guidelines regarding ecological design,⁴⁵ and expanding the scope of interpretation efforts to include more direct relation to these responses.⁴⁶ Overall, the document remains apprehensive to addressing the crisis in more radical ways, looking mostly at methods to improve the functioning of the system within the established utilitarian paradigm.

40 Scott et al., *Climate Change and Canada's National Park System*.

41 "Canada National Parks Act," (Ottawa, 2000), 4 (1).

42 Panel on the Ecological Integrity of Canada's National Parks, "*Unimpaired For Future Generations?*" *Protecting Ecological Integrity with Canada's National Parks Vol I*, chapter 5.

43 Panel on the Ecological Integrity of Canada's National Parks, chapter 5.

44 Panel on the Ecological Integrity of Canada's National Parks, chapter 5.

45 Panel on the Ecological Integrity of Canada's National Parks, chapter 12-2.

46 Panel on the Ecological Integrity of Canada's National Parks, chapter 10.

A NATIONAL PARK FOR THE ANTHROPOCENE EPOCH

Perhaps in the Anthropocene, there is no greater crisis than that of awareness, of the possibility of bearing witness. Industrialized and degraded landscapes lack representation in the body politic of the Canadian environmental story. Where should we look for that representation in physical space? How could the Anthropocene be accessed to draw out a consideration of an ethical way forward? How do we as a society form a response to the crisis without some tactile connection to its forms and formation? And how can the regional and global nature be effectively communicated through space?

In this instance, the wheel does not require reinvention, but through reinterpretation, a new category of space, and a new language of interaction can emerge. We should look again to one of the most ambitious ideas set forth by the early adopters of the title landscape architect - the national park. The framework provided by national parks is purpose built to address the dual stories of Earth systems and identity as it was constructed precisely for this purpose and needs only be reexamined with these intentions in mind to reveal new interpretations.

While much of the discourse surrounding the Anthropocene in landscape architecture revolves around developing new methods of inquiry and modes of action, the scope of these investigations has not often included architectural proposals regarding regional systems. The Anthropocene has been used to buttress the existing paradigm of landscape urbanism and post-industrial urbanism and turned away from broader scales of landscape architecture. This has left the critical skills of the landscape architect absent from discussions that take place regarding ecology and preservation at regional scales. In doing so, the challenge has not been put to

those in the national parks community to reconsider their role as manufacturers of a type of landscape system that is inherently anthropogenic. This is incredibly limiting to the organization's ability to adequately respond to the Anthropocene as a twin crisis of ecology and as a cultural artifact that exists at the same scales (continental, global) as the national park idea. This has not been pursued because in many ways it requires a radical shift in understanding the production of park spaces and what it is they are representing to us.

Landscape architecture has re-imagined the post-industrial through amalgamating the three responses to the Anthropocene together in a generative process that views *dross*⁴⁷ as an artifact necessary to preserve and remember, but also to remediate and re-imagine. This is achieved through the understanding that Nature as a concept is anti-entropic and attempts to recreate Arcadia is folly and in many respects reflect an attempt to erase the violent ecological history of industrialization. Landscape architecture in the Anthropocene will need to continue employing understandings and imaginations that are equal parts solastalgic and ecomodernist, as the combination of both tempers the two.

While the work of landscape architecture has considered the consequence of industrial landscapes at fine scale sites, the broader regional and systems scales of the Anthropocene require this type of consideration and representation as well. In re-framing the Anthropocene lands of Canada as national landscapes through the vehicle of national parks, a meaningful connection between our society and the sources of this new epoch could be established. Making these landscapes publicly accessible and reconsidered as

47 Berger, *Drosscape: wasting land in urban America*.

part of our national heritage would allow for a re-evaluation of Canada's environmental ethic beyond the idealized version of a nation devoted to stewardship and conservation.⁴⁸

This requires that Parks Canada moves beyond the technical considerations the Anthropocene demands towards a reconsideration of the aesthetic principles that give purpose to the system itself. The mission of Parks Canada is to provide a connection to the environment through a number of historical, aesthetic signifiers that ascribe value to both the spaces chosen and the idea of the environment as intrinsically valuable. Addressing the Anthropocene will require reconsidering aspects of the history of the Parks Canada system that are taken for granted, and bound to a history of wilderness aesthetics. It will require Parks Canada to pursue a similar path as landscape architecture— towards a new language of environmental aesthetics.

48 Levin, "Canada Legal Fight May 'Destroy the Faith' in First Nations Treaties."



“What in the world are national parks?” Williams asked.

“Blessed if I know,” Harkin replied, “but it sounds easy.”

MacEachern, “M.B. Williams and the Early Years of Parks
Canada,” in *A Century of Parks Canada, 1911-2011*, 22.

PART II /
NATIONAL PARKS //



BANFF
1885



GLACIER
1886



YHOH
1886



WATERTON LAKES
1895



POINT PELEE
1918



KOOTENAY
1920



WOOD BUFFALO
1922



PRINCE ALBERT
1927



FUNDY
1948



TERRA NOVA
1957



KEJIMKUJIK
1968



KOUCHIBOUGUAC
1969



GROS MORNE
1973



NAHANNI
1976



PUKASKWA
1978



GRASSLANDS
1981



AULAVIK
1992



VUNTUT
1995



TUKTUT NOGAI
1996



WAPUSK
1996



UKKUSIKSALIK
2003



TORNGAT MOUNTAINS
2005



SABLE ISLAND
2011



NÁÁTS'IHCH'OH
2014



STORIES (UN)TOLD

Since their inception in 1885, the national parks of Canada have played a critical role in connecting Canadians to a variety of landscapes across the country, and to the mythologies the country tells about itself through those landscapes. The qualities of landscape society deems important enough to retain as national parks mediate many of our conversations regarding the development of a Canadian environmental ethic. As such, the landscapes that are chosen to represent the environment of Canada inevitably determine which values are given prominence, and shape the way we engage in conversations about them.

The *Canada National Parks Act* states the mandate of this system as follows:

The national parks of Canada are hereby dedicated to the people of Canada for their benefit, education and enjoyment, subject to this Act and the regulations, and the parks shall be maintained and made use of so as to leave them unimpaired for the enjoyment of future generations.¹

Within this innocuous opening statement arise historical and ongoing conflicts regarding ownership, procurement and curation— compounded by the shifting meanings of aestheticized wilderness, nature and frontier— as they relate to the global situations Canada faces today, and in the future.² This is important because the extents of an expressly Canadian ecognosis remain bounded by these foundational aesthetic properties that instigated the national parks project, aesthetic properties that were used to control narrative and lay claim to contested space. Understanding the central role Parks Canada plays in defining the Canadian ecognosis necessitates a deconstruction of the value system

1 *Canada National Parks Act*, 4.1.

2 Campbell, “Governing a Kingdom,” in *A Century of Parks Canada*, 15.

inherent to the national park idea, alongside its applied history.

GENESIS: THE NATIONAL PARK IDEA / WILDERNESS AESTHETICS

Merriam-Webster defines wilderness:

(1) : a tract or region uncultivated and uninhabited by human beings

(2) : an area essentially undisturbed by human activity together with its naturally developed life community.³

In the national parks, we are told, exists the truest remaining wilderness in our society. In places that are abundant with natural flora, fauna and geology that provide access to the spirit of Canada itself. The problem with this narrative, as William Cronon exposed in “The Trouble With Wilderness; or, Getting Back to the Wrong Nature”, is that it is based entirely on a construct, and replete with a bias towards imagining wilderness as a, “pristine sanctuary where the last remnant of an untouched, endangered, but still transcendent nature”⁴ can exist. These biases are rooted in historical practices of aesthetics and ethics, and influence the societal image of wilderness. This image has gone on to influence many of the value systems inherent to ecology, and this lineage finds its most faithful representation in the creation and perseverance of the national park idea.

Cronon reflects that the pervasiveness of this image is tied to its idealism; that the sensation of encountering the sacred would remain even as the wild-sublime landscapes became domesticated

3 “Wilderness | Definition of Wilderness.” Merriam-Webster.

4 Cronon, “The Trouble with Wilderness; or, Getting Back to the Wrong Nature,” in *Uncommon Ground: Rethinking the Human Place in Nature*, 69.

through the act of their consumption.⁵ David Hume describes the process of such an image generation, stating, “Ideas are not purer forms of sensations, but on the contrary, merely the fainter replica of these impressions.”⁶ Indeed, as the faint replicas are identified and aggregated, an abstracted version— or idealization of that interaction can contribute to the development of an aesthetic category or framework for how to appreciate that interaction in the future. When reprojected into the world, these categories become important vehicles in how we define, navigate and ascribe value to the environment. It is this re-projective act that has an incredible impact on how new landscapes are constructed or repurposed, how systems are described, and even how ecological science developed. In North America and Canada, it is no coincidence that the reappraisal of value ascribed to certain landscapes at the closing of the frontier would culminate the aesthetic theories of the preceding century, especially of the sublime.

Natural objects affect us, by the laws of that connection, which Providence has established between certain motions and configurations of bodies, and certain consequent feelings in our minds.

- Edmund Burke⁷

In *Philosophical Enquiry Into The Origin Of Our Ideas Of The Sublime and Beautiful*, Edmund Burke outlined two of the foundational aesthetic responses to environments built and natural that have come to define primary categories of landscapes since the nineteenth century. These responses were the sublime and beautiful. The sublime incited a sense of astonishment, reverence and respect in a person,⁸ while the beautiful incited a sense of care

5 Cronon, “The Trouble with Wilderness,” 75.

6 Herrington, *On landscapes*, 114.

7 Burke, *A Philosophical Inquiry Into The Origin Of Our Ideas Of The Sublime And Beautiful*, Part V Section I, 311.

8 Burke, Part II Sect I, 96

and compassion.⁹

While these qualities could be found in the designs of society, the recurrence of the term “Natural objects” throughout the text suggests that the truest source of access was through the fullness of a natural setting. Here especially the divide between the sublime and beautiful becomes the most stark when considered in the context of a re-projective act. Cronon argues that the qualities Burke outlines as beautiful vary from the qualities of the sublime in ways that begin to classify certain landscapes into each category. In this regard the sublime becomes especially connected to a certain type of wilderness: the mountainous regions of the West where the dramatics endemic to that environment - abrupt changes of material and form, stark angles and incredible scales - provide the purest representation of Burke’s ideas.¹⁰

Burke’s elucidations were essential to John Muir’s early preservationists attempts to save the ancient landscapes of California. Versed in the moral language of the Transcendentalists Emerson and Thoreau, and enraptured by the heroic scale of the Yosemite Valley, Muir and the nascent Sierra Club set about codifying the experience of that wilderness as a revelatory location providing access to humanity’s true potential.¹¹ Muir’s work completed the transformation of wilderness from its past, common understanding as a field of experience (often terror) and converted it to an object of contemplation. Cronon opines that Muir is, “The writer who best captures this late romantic sense of a domesticated sublime.”¹² The Transcendentalists themselves found in nature a “mirror of the mind. We should feel and trust that the natural world, despite all its manifest diversity, arose from a single

9 Burke, Part III Sect X, 205.

10 Cronon, “The Trouble with Wilderness,” 73.

11 Purdy, *After Nature A Politics for the Anthropocene*, 125.

12 Cronon, “The Trouble with Wilderness,” 75.

underlying principle, and that our minds had the same source.”¹³

Purdy notes, “Muir had conceded that Thoreau was not really a wilderness man, but insisted that most people, lacking his subtlety, could get at Thoreau’s ideal only through literal wilderness.”¹⁴

By inserting an element of distancing, wilderness was converted into an aesthetic object, and the sublime response became a requirement to define the best, truest wilderness. The signing of the Yosemite Grant Act (1864)¹⁵ which presaged the establishment of Yellowstone eight years later as the first national park in America (and the world) reified decades of Transcendentalist thought in its initial forty-six square kilometres, including the Sierra Club’s aesthetic vision of wilderness as a cathedral of enlightenment.

By fusing the transcendental egotistical¹⁶ morality of Thoreau’s *wildness* to the aesthetic sublime through these historic environments, Muir and the preservationists created a new form of *wilderness*, imbued it with extrinsic value, qualifying the necessity of their protection and established the framework that would define how national parks system would come to view and operationalize wilderness in the proceeding decades.

In Canada this conception of wilderness was projected onto many of the natural conditions endemic to the newly opened west that contained the potential to illicit a sublime response, namely vastness, roughness and infinity.¹⁷ What resulted was the privileging of the mountainous, boreal characteristics of the North West Territory in the selection of national park lands. As the North West Territory was remote and thinly populated in 1885, this had the knock on effect of enshrining the characteristics of otherness

13 Purdy, *After Nature*, 126.

14 Purdy, *After Nature*, 124.

15 *Yosemite Grant Act*.

16 Purdy, *After Nature*, 126.

17 Burke, *Philosophical Enquiry*, Part II, Sects. VII & VIII, 127-131.

and awayness in the wilderness aesthetic that the federal legislation affirmed. In locating the parks away from urban Canada, distance was subsequently entrenched as a defining characteristic of Canadian wilderness and of the sublime quality of these places.

Proceeding from Banff, many of the early national parks were legislated into existence in locations throughout the North West Territory, and this trend continued as the territory was reorganised into the young provinces of Alberta, Saskatchewan and a larger Manitoba. In the twenty years preceding the founding of the Parks agency in 1930, five of the six protected spaces of Canada were located in the Rocky Mountains, while in the proceeding twenty years five of the next seven protected spaces were legislated throughout the former Territory.

This new wilderness was re-projected further through various artistic responses to these new cathedrals of nature. The importance of these media - painting and photography especially - on the way wilderness is perceived even today cannot be understated. Yellowstone was held in reserve in part by the production of photographs by William Henry Jackson and paintings by Thomas Moran.¹⁸ Landscape painting and photography played an essential role in converting land into landscape,¹⁹ reconstituting it as an aesthetic object. In Canada, “The Parks Branch formed a Publicity Division, which quickly became the foremost government body for promoting Canada through guidebooks, public lectures and slide presentations, and motion pictures ... its success helped lead to the establishment of ... the Canadian Government Travel Bureau and the National Film Board.”²⁰ These techniques remain major components of the broader wilderness preservation movement today.

18 “Yellowstone National Park,” Wikipedia.

19 Berger, *Ways of Seeing*, 11.

20 MacEachern, “M.B. Williams and the Early Years,” in *A Century of Parks Canada*, 37.

The recursive effect of art on the production of national park spaces even began to influence their appearance and maintenance. Fredrick Law Olmsted, an early advocate of the values of landscape preservation, was incredibly influential in the development of the movement to protect America's remaining wildness; his work with the early national parks should be considered as foundational to the development of the landscape architecture profession as Central Park. As superintendent of the Yosemite Valley Grant he applied his landscape architectural responses that had been so integral to the new paradigm of public park space in cities to these new, vast park lands. He emphasized "the preservation and maintenance as exactly as is possible of the natural scenery; the restriction, that is to say, within the narrowest limits consistent with the necessary accommodations of visitors, of all artificial construction and the prevention of all constructions . . . which would unnecessarily obscure, distort or detract from the dignity of the scenery."²¹ Through the advocacy of people like Muir and Olmsted, what John Berger has described as, "images of reality"²² were to become part of the collective ownership of the country. Yellowstone's designation as the first national park in the world created a new discourse of the value of wilderness and how it could be used to represent the nation state. These same ideas found their way to Canada very shortly afterwards with the establishment of Banff twenty years later. The park systems created in Canada and the United States became a method of claiming the Earth system histories of the continent as a foundational component of the society; natural history became fused to cultural heritage. As Canada opened up its West, the sublime landscapes it contained provided ample opportunity to fuse the state to its landscape. These methods became entrenched in the genesis and structure of the national park idea - reflecting society's

21 Keiter, *To Conserve Unimpaired: The Evolution of the National Park Idea*, 42.

22 Berger, *Ways of Seeing*, 16.

environmental morality through enclosing and maintaining an aestheticized wilderness.

As the century progressed, this preservation and maintenance did not pertain only to the literal environmental wilderness, but to the figurative concept of the National Parks Idea itself. This aestheticized wilderness had to be protected within the vision of what a national park should contain, even as the program began turning towards a more ecologically focused agenda. As a result, aestheticized wilderness has become a subliminal determinant of much of the ecological language of Parks Canada. The effect of maintaining this dichotomous wilderness has resulted in lasting conflicts within the mandate of Parks Canada as it evolved from the initial, subjective methodology of selecting land based on scenic value into a more objective, ecologically rigorous selection system. Environments considered ecologically significant that do not meet the standards of the aesthetic framework are more difficult to legislate into existence, or the ecological objectives fall to the wayside in favour of the provision of the hegemonic aesthetic experience.²³ Consequently, the sublime visual aesthetic was exported into areas of the country that did not contain those characteristics, which meant ‘improving’ park lands to create the sublime, picturesque qualities of boreal, alpine environments, often to the detriment of the local environment.

The relationship between these characteristics established the tension of what Parks Canada’s mandate would become through the passing of the Rocky Mountains Park Act (1887) which became the generative document for the Canada National Parks Act (1930). Privileging, “benefit, advantage and enjoyment of the people of Canada”²⁴ showed that “National parks were not imagined as a way to preserve nature, but to reserve nature for

23 Cronon, “The Trouble with Wilderness,” 73.

24 *Rocky Mountains Park Act*.

people's use.”²⁵ This conflict between aesthetic use and ecology continues today as what is considered the foundational conflict between the necessity of tourism and the necessity of preservation central to many of the contributors work in the revealing history of *A Century of Parks Canada 1911-2011*.

SYSTEM PLAN

If this conflict between literal and figurative wilderness was once ephemeral, in the 1970's the development of a national strategy for the implementation and facilitation of national parks in Canada would embed the conflict in to legislation. The development of the National Parks System Plan created a cohesive selection methodology for the Parks branch, and remains the document of record to this day. While the System Plan attempts to systematize ecology as the definitive selection criteria, this ecology is one affected by the foundational wilderness aesthetics of the national park idea. The effect of this has been to further exacerbate the foundational divide of the national parks idea between cultural tourism and environmental preservation.

The objective of the System Plan was to develop through assessment and legislation²⁶ a collection of spaces within Canada that contain the best examples of all of Canada's natural splendour. The methodology of the System Plan is predicated on the principle of representativeness,²⁷ which has been defined elsewhere as the objective of defining, “a range of species and habitats which represent the range of variation found within a defined land class or region and can be considered on different scales.”²⁸

25 Campbell, “The Wisdom of our National Parks.”

26 Parks Canada, *National Parks System Plan*, 8.

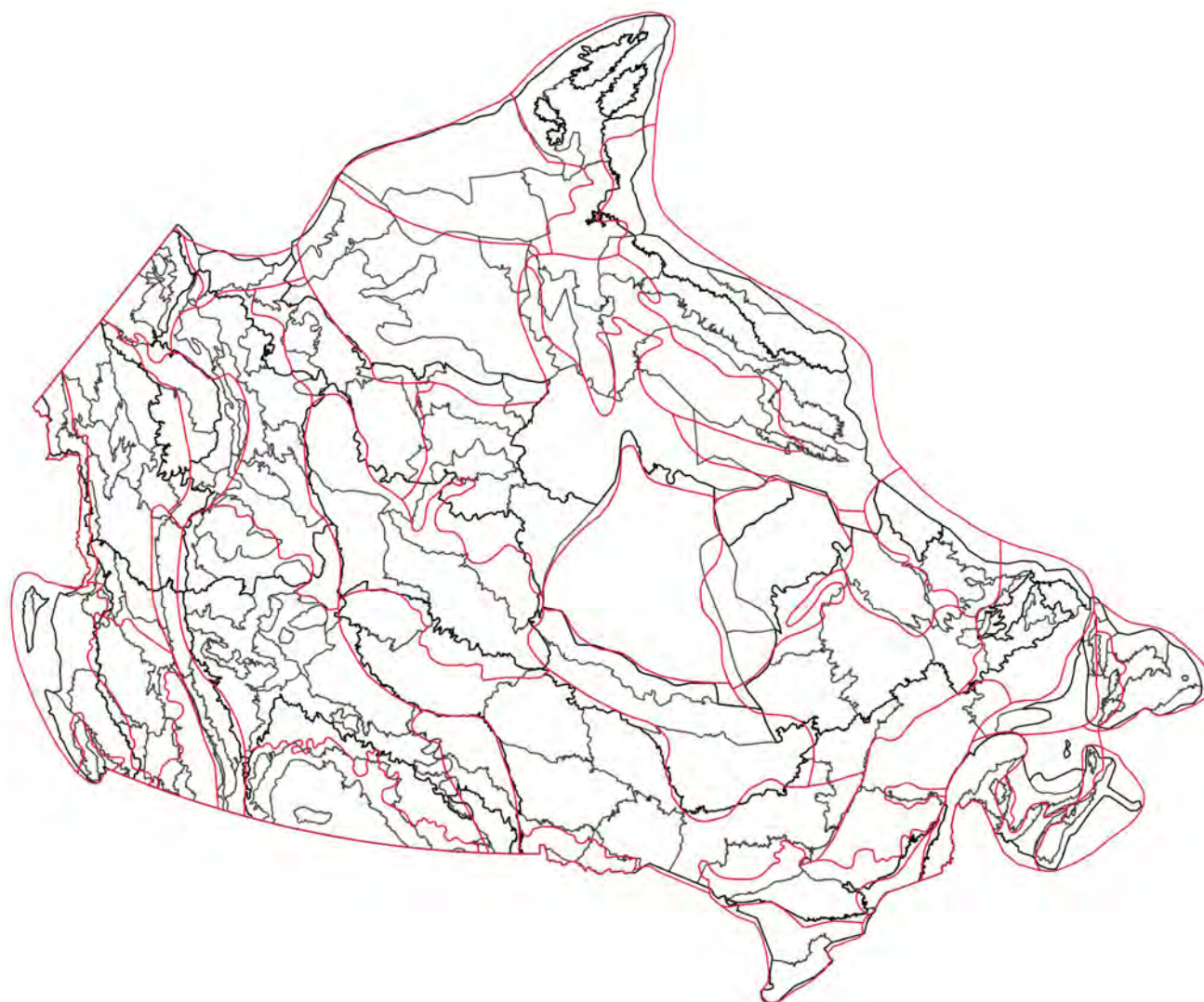
27 Parks Canada, *System Plan*, 3.

28 Kuo and Yu, “An Evaluation System for National Park Selection in Taiwan.”, 738.



FIG. 11.
TOP TO BOTTOM: SYSTEM PLAN
NATURAL REGIONS, ECOZONES,
ECOREGIONS.

FIG. 12.
RIGHT: COMPOSITE OF
INTERRELATIONSHIP BETWEEN
THESE CLASSIFICATIONS.



Through operationalizing representativeness, the country's natural systems were distilled into thirty-nine Natural Regions, by selecting for "physiography (the appearance of the land) and vegetation,"²⁹ including basic characteristics of which "wildlife, vegetation, geology and landforms ... should be in a natural state."³⁰ The stated goal of this plan would be having each Natural Region contain a national park to achieve full representation of the country's ecology. The parks established before the development

29 Parks Canada, *System Plan*, 4.

30 Parks Canada, *System Plan*, 7.

of the plan would account for the representation of twelve of the thirty-nine regions, while the parks established since have brought the total number of Natural Regions represented up to twenty-nine, leaving ten unrepresented as of the writing of this document.

Examining the resulting reclassification of Canadian land the System Plan uses against the established ecologically derived classifications of the land, an observable correlation arises between the Natural Regions map and a combination of the established ecozones and some ecoregions of Canada. The fact that these 39 regions exist as an amalgamation between the two scales of ecological classifications of zones and regions exposes this process as not merely scientific or ecological, but also political and aesthetic.

Indeed, a federal document is by definition a political one.

Swiss sociologist Lucius Burckhardt challenged the dichotomy of ecology and aesthetics through the position that ecology is affected by aesthetics and therefore, not a purely empirical science.³¹ As Arron Ellison exposes, the history of the emergence of ecology as a distinct science occurred around the same time as the national park idea and so was as influenced by the aesthetic practices informing broader society.³² Quoting the biologist Daniel Botkin, he argues that the early concepts of ecology were in fact complimentary to Muir's wilderness. "The idea of nature being located somewhere else—a refuge and somehow different from the chaos in which people lived—was encapsulated in ecological science as the "balance of nature." The idea of nature in balance also entered ecological science through early 19th century theoretical models

31 Fezer and Schmitz, *Lucius Burckhardt Writings. Rethinking Man-made Environments*, 215.

32 Ellison, "The Suffocating Embrace of Landscape and the Picturesque Conditioning of Ecology.", 82.

of physical systems based on idealized assumptions.”³³ This unrecognized aestheticism meant that as the discipline developed greater significance as an area of natural science studies, claims to objectivity became more fraught. In landscape architecture this aesthetic dimension has been recognized as the true starting point of operationalizing ecology, “never ideologically (or imaginatively) neutral, despite claims of objectivity. It is not without values, images, and effects. Instead, ecology is a social construction, one that can initiate, inform, and lend legitimacy to particular viewpoints.”³⁴ In the case of La Mauricie National Park, the principles of ecology were in fact used as a way to *create* the wilderness aesthetic in what had historically been a socio-natural environment. The principles of the System Plan were used as a methodology to recreate a “wilderness” environment on this anthropological landscape by forcing an understanding of the landscape exclusively through the natural sciences while suppressing social history.³⁵

This is corroborated in “*Unimpaired for Future Generations?*” which outlines principles for ‘ecological design’ stating simultaneously that, “ecological integrity should take precedence over aesthetics”, and “...ecological design solutions may be less costly than conventional designs and have considerable interpretation and aesthetic value.”³⁶ This concealed aesthetic dimension within ecology is apparent even in the Canada National Parks Act, ironically in the very definition of ecological integrity. The qualitative value of these landscapes (the pesky ‘natural region’ concept) is sewn into the scientific application of the term:

33 Ellison, 81.

34 Corner and Hirsch, *The landscape imagination. The collected essays of James Corner*, 259.

35 Craig-Dupont, “Hunting, Timber Harvesting, and Precambrian Beauties: The Scientific Reinterpretation of La Mauricie National Park’s Landscape History, 1969-1975,” in *A century of Parks Canada*, 198.

36 Parks Canada Agency, “*Unimpaired For Future Generations?*” *Protecting Ecological Integrity with Canada’s National Parks Vol II*, 12-2 - 12-3.

“ecological integrity” means, with respect to a park, a condition that is determined to be characteristic of its natural region and likely to persist, including abiotic components and the composition and abundance of native species and biological communities, rates of change and supporting processes.³⁷

Despite the ecological framework, the System Plan reveals the relationship between the national park idea and socio-cultural production. Yet, this relationship remains veiled in a ‘rhetoric of wilderness’³⁸ in which the materiality of the parks express a distinctly “bona fide” typological relationship to the environment, while histories that do not co-operate with these concepts are effectively removed from the narrative.³⁹ Critically, the effect of hiding constructedness in the ‘natural environments’ of the parks imposes a dubious limitation on the potential for including other important conversations regarding the true effect of the human species on the Earth system.

This is not a unique practice to Canada. Building from William Cronon’s work, Alyson Byerly’s examination of American national parks in “The Uses of Landscape”, likewise concludes that they are not truly wilderness, but represent wilderness and provide a curated experience of the sublime, reflective of the aesthetic movement in which the parks system was initially developed.⁴⁰ Throughout the continent, these national landscapes are presented as historical wilderness, yet, “in order for visitors to be able to recognize the wilderness expected of national parks, official zoning

37 *Canada National Parks Act*, 2.1.2.

38 Campbell, “Governing a Kingdom: Parks Canada, 1911-2011,” in *A century of Parks Canada*, 13.

39 Craig-Dupont, “Hunting, Timber Harvesting, and Precambrian Beauties” 190.

40 Byerly, “The Uses of Landscape: The Picturesque Aesthetic and the National Park System” in *The Ecocriticism Reader: Landmarks in Literary Ecology*, 58.

plans had to initially circumscribe and label it as such.”⁴¹

Curated, circumscribe, label. The use of these terms in the literature surrounding national parks suggest they are a type of aesthetic object. Here, the *National Park System Plan* outlines the methodology of developing the content of Parks Canada, namely the way spaces are selected for “good representation of the natural features and processes characterizing the region” and minimal human impact.⁴² Expanded to the scale of the total system, these selection criteria begin to explain the mediating quality the parks have on our understanding of the wilderness. The total effect the parks have on the environmental consciousness of Canada represents an “emphasis on ecology as non-human nature [that] may prevent us from seeing the ways in which we humans encounter nature within its parks.”⁴³ To this I would add that this emphasis on ecology as non-human nature not only prevents new ways of seeing the nature within the existing parks, but ways of conceiving new possibilities of what parks can represent to us about the relationship between society and the environment. This necessitates that the national park idea become more inclusive of all aspects of the human-environment interface.

Furthermore, the System Plan suggests in its architecture a final resolution, or a completeness that can be achieved by successfully placing a park in each of the 39 natural regions. But if this brief history of the national park idea has not adequately outlined the incomplete, and shifting nature of the idea itself, the Anthropocene has forced new conditions of awareness upon the national park as a unit of relation between culture and the environment. As such, the structural completeness that 39 regions containing at least one park achieves does not mean the national parks project

41 Craig-Dupont, “Hunting, Timber Harvesting, and Precambrian Beauties” 195.

42 Parks Canada, *System Plan*, 6.

43 Campbell, “Governing a Kingdom”, in *A Century of Parks Canada*, 13.

finds completion. This would be a false completion, and viewing that resolution as a completion would result in a deadening of the purpose of the national parks as a vehicle for representing the continually emergent nature of the relationship between society and environment. It is worth considering then the potential for emergent responses to the Anthropocene as a concurrent phase of parks planning rather than a next step after the System Plan.

LANDSCAPE ARCHITECTURE

When William Cronon wrote the *“Trouble with Wilderness”*, the insight into the cultural production of nature it brought created the opportunity for the national parks to explore and include anthropogenic landscapes in its operation. That Parks Canada has not pursued this path seriously suggests they did not take to heart Cronon’s warning, and as a result, the national park idea has ossified into a state incapable of addressing the Anthropocene. Conversely, while landscape architecture has taken great leaps in hybridizing nature and culture since Cronon’s writing, this work has often remained focused on the city as the field of operation, in many respects allowing the national parks to continue along unchallenged in their practices of wilderness. Re-engaging with national parks as a unit of design would allow landscape architecture to apply the profession’s techniques of hybridization to a landscape type containing within its architecture one of the most accessible and valued forums for what James Corner deemed of landscapes: “the capacity to critically engage at the metaphysical and political programs that operate in a given society ... an active instrument in the shaping of modern culture”⁴⁴

This suggests the necessity of a transition out from the

44 Corner and Hirsch, *The landscape imagination*, 111.

paradigmatic hold of the sublime wilderness landscape on the national park idea, what J. B. Jackson termed Landscape Two, “the most successful landscape, aesthetically speaking, that there has ever been in the Western world.”⁴⁵ Typified as “spaces which are [homogeneous] and devoted to a single purpose,”⁴⁶ in this case aesthetic contemplation and renewal, “which we will always try to imitate when we want to produce landscapes for delight and inspiration.”⁴⁷

Jackson continues:

It was Landscape Two that taught us that the contemplation of nature can be a kind of revelation of the invisible world, and of ourselves. But it was also Landscape Two that impressed upon us the notion that there can be only one kind of landscape: a landscape identified with a very static, very conservative social order and that there can only be one true philosophy of nature: that of Landscape Two. That first heritage of love and wonder is still with us, stronger perhaps than ever. It is that other heritage, that clinging to obsolete forms and attitudes, that threatens the emergence of a truly balanced Landscape Three.⁴⁸

Ultimately Jackson’s argument, indeed his entire oeuvre, asks us to consider anew or more seriously the landscapes of Landscape Three as the most truthful representation of our societal connection to nature. To him, recovering Landscape Three is of critical importance.

When we see how we have succeeded in imposing our own rhythm on nature in the agricultural landscape, how we have altered the life cycle of plants and animals and even transposed

45 Jackson, *Discovering the Vernacular Landscape*, 153.

46 Jackson, 152

47 Jackson, 153.

48 Jackson, 155.

the seasons, we become aware of how dangerous a role we have assumed, and there a remand who say that the salvation of Landscape Three depends on our relinquishing this power to alter the flow of time and on our returning to a more natural order. But the ordering of time should affect not only nature, it should affect ourselves. It promises us a new kind of history, a new, more responsive social order, and ultimately a new landscape.⁴⁹

The landscapes of Landscape Three are the landscapes of the Anthropocene, and they demand of society a critical response and relationship with them. Within the title “Recovering Landscape as a Critical Cultural Practice” rests the *modus operandi* of James Corner’s vision as both an academic and practitioner of landscape architecture. In his writing and work he has explored in landscapes the necessity of a recovery or return to practice as “a great mediator between nature and culture, landscape architecture has a profound role to play in the reconstitution of meaning and value.”⁵⁰ Yet despite the best intentions of the national parks or perhaps even as a result of them, this loss of intimacy between humans and their environment⁵¹ has occurred. Intimacy is not simply affinity, it is a deep knowledge of a subject. Remaining confined to the paradigm of Landscape Two precludes this deep knowledge of our environment in favour of a simplistic affinity to an imagined idyll. This will require focusing the tools of landscape architecture onto the national park idea.

Of significant importance are the tools of method and means. The hermeneutic method James Corner invokes in “Three Tyrannies of Contemporary Theory” offers within its acute sensitivity to interpretation and perception, a means of reconciling the

49 Jackson, 157.

50 Corner and Hirsch, *The landscape imagination*, 73.

51 Corner and Hirsch, 77.

past understanding of the national parks idea with a radically Anthropocene interpretation by engaging , “the archaeology of previous accomplishments while also projecting into the future ... [finding] new joints of meaning between our ancestry and our Future.”⁵² Understanding the landscape as a text and that the national park is in fact a landscape modified by humans opens up the potential for “escaping and rescaping our relationship to nature and the “other” through the construction of built worlds.”⁵³ Christophe Girot has explored this “escaping and rescaping” through developing Topology, which he defines as, “precisely what makes the distinction between a natural topography and a designed topography. It is about the form of intelligence applied to the shaping of a landscape, resulting in a modified topography.”⁵⁴ However, the use of the definition is applicable beyond topography, and extends to all the formal and structural acts of landscape architecture as a spatial practice that provides the nourishment of meaning.

In the Anthropocene, the greatest limitation to reclaiming meaning is the deficit of awareness. By constructing a broader typology of landscape awareness, the national park can once again become an important medium for reclaiming meaning and intimacy with our environment.

52 Corner and Hirsch, 98.

53 Corner and Hirsch, 101.

54 Girot, *The course of landscape architecture : a history of our designs on the natural world, from prehistory to the present*, 345.

FORWARD STEPS

The best place to find new landscapes is in the West. Pictures painted on canvas is not what I mean, nor glimpses of pleasant rural scenery, but landscapes as we are now learning to see them: large-scale organizations of man made spaces, usually in the open country.

- J. B. Jackson⁵⁵

What would happen if we were more explicit about the constructedness of the national park? Unleashing national park landscape aesthetics from the paradigmatic sublime and the positivism of the System Plan has great potential as a way to deal with the ramifications associated with the onset of the Anthropocene. Revealing the manipulation required to achieve the naturalistic aesthetic of the current national parks opens up important new grounds of operation for engaging with the extractive landscapes of the Anthropocene that do not inhabit the tradition of the national parks landscape type.

“A fuller version of the Anthropocene fuel economy would recognize that, even apart from the most destructive extremes, different energy economies imply different landscapes: mines or windmills, power plants or solar panels, big power lines or distributed grids”

Jedediah Purdy⁵⁶

Techniques of landscape architecture can provide the national parks the means and method of meeting the realities of these landscapes face to face. Claiming these landscapes into the purview of the national parks will expand both our understanding of our place in the Anthropocene and our understanding of the

55 Jackson, *The Vernacular Landscape*, 141.

56 Renner, “The New Nature.”

national park as monuments in the sense that Jackson meant:

“to think that the value of monuments is simply to remind us of origins. They are much more valuable as reminders of long-range, collective purpose, of goals and objectives and principles.”⁵⁷

Broadening the scope of what we monumentalize as a national park broadens the scope of imagination for potential futures, values and meaning; including extractive landscapes in this broadening conversation expands the capacity for Canadian society to re-conceive our relationship with extraction.

57 Jackson, *The Vernacular Landscape*, 152.

SCALE I /
SYSTEM PLAN //

1. PACIFIC COAST MOUNTAINS
2. STRAIT OF GEORGIA LOWLANDS
3. INTERIOR DRY PLATEAU
4. COLUMBIA MOUNTAINS
5. ROCKY MOUNTAINS
6. NORTHERN COAST MOUNTAINS
7. NORTHERN INTERIOR PLATEAUX AND MOUNTAINS
8. MACKENZIE MOUNTAINS
9. NORTHERN YUKON
10. MACKENZIE DELTA
11. NORTHERN BOREAL PLAINS
12. SOUTHERN BOREAL PLAINS AND PLATEAUX
13. PRAIRIE GRASSLANDS
14. MANITOBA LOWLANDS
15. TUNDRA HILLS
16. CENTRAL TUNDRA
17. NORTHWESTERN BOREAL UPLANDS
18. CENTRAL BOREAL UPLANDS
19. GREAT LAKES-ST. LAWRENCE PRECAMBRIAN REGION
20. LAURENTIAN BOREAL HIGHLANDS
21. EAST COAST BOREAL REGION
22. BOREAL LAKE PLATEAU
23. WHALE RIVER
24. NORTHERN LABRADOR MOUNTAINS
25. UNGAVA TUNDRA PLATEAU
26. NORTHERN DAVIS REGION
27. HUDSON-JAMES LOWLANDS
28. SOUTHAMPTON PLAIN
29. ST. LAWRENCE LOWLAND
30. NOTRE DAME-MEGANTIC MOUNTAINS
31. MARITIME ACADIAN HIGHLANDS
32. MARITIME PLAIN
33. ATLANTIC COAST UPLANDS
34. WESTERN NEWFOUNDLAND HIGHLANDS
35. EASTERN NEWFOUNDLAND ATLANTIC REGION
36. WESTERN ARCTIC LOWLANDS
37. EASTERN ARCTIC LOWLANDS
38. WESTERN HIGH ARCTIC
39. EASTERN HIGH ARCTIC



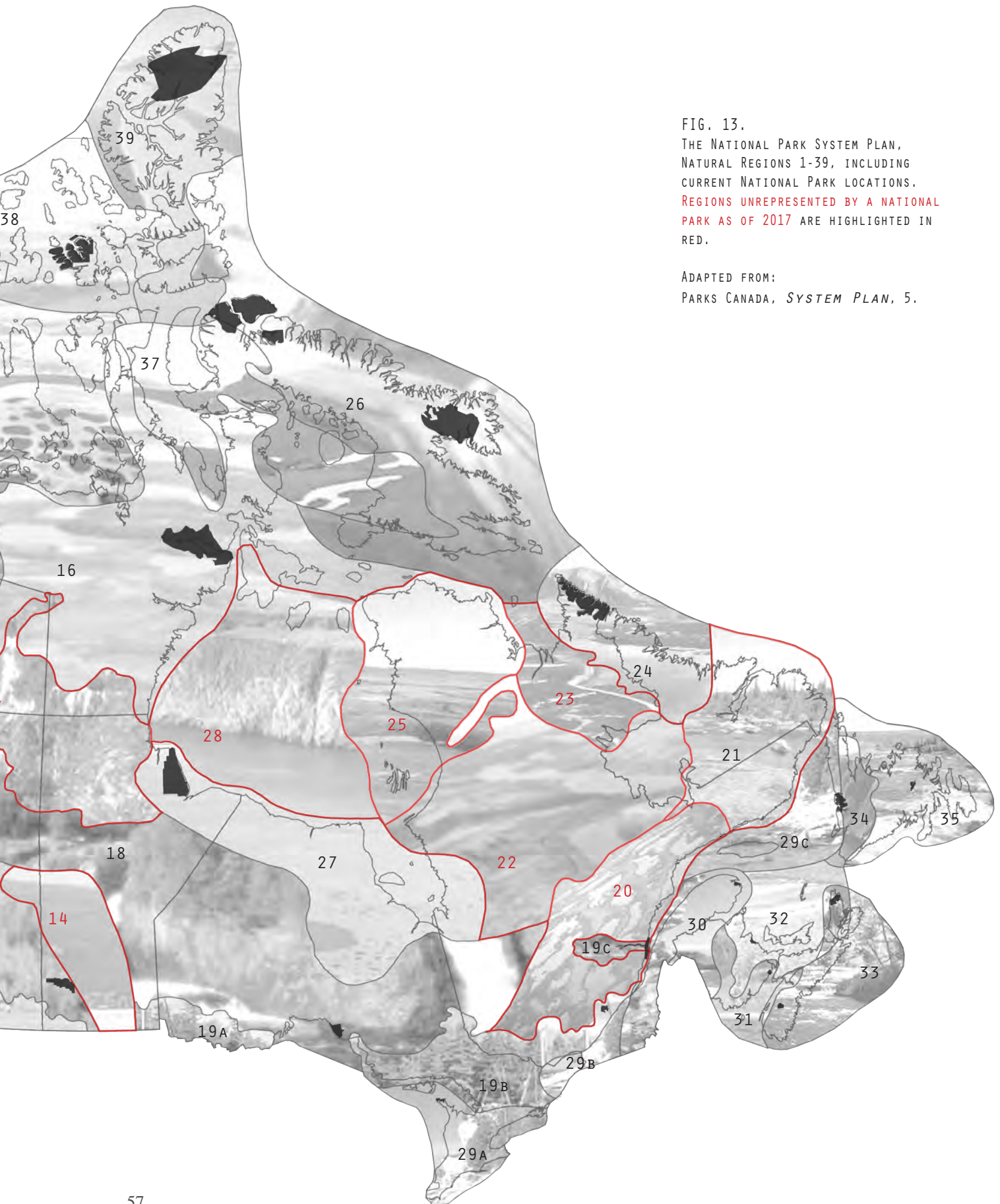


FIG. 13.
THE NATIONAL PARK SYSTEM PLAN,
NATURAL REGIONS 1-39, INCLUDING
CURRENT NATIONAL PARK LOCATIONS.
REGIONS UNREPRESENTED BY A NATIONAL
PARK AS OF 2017 ARE HIGHLIGHTED IN
RED.

ADAPTED FROM:
PARKS CANADA, *SYSTEM PLAN*, 5.

ON THE VALUE OF A REGION 40

While the National Park System Plan remains a critical organizational tool for the development of a national system of landscapes, an under-appreciated aspect of this document is how it represents and delimits the imagination of the organization. In their investigation of the zoning practices of Parks Canada, Amy Thede et al. defines the dual purpose of a broad scale policy document like the System Plan is to provide direction and purpose at the constitutive level and operational level.¹

It is at this constitutive scale, “where the goals, frameworks, rules and authority are established,”² that the System Plan establishes what Parks Canada considers capable of being a landscape worthy of representation in the national collection of spaces, and in the national psyche of what constitutes a significant Canadian landscape. The System Plan can thus be interpreted as a document that inscribes value in the landscapes of Canada; the aspirations of Parks Canada are inherent to the scope of inclusion the document establishes. The ability of Parks Canada to confront the landscapes of the Anthropocene will require an expansion of the organization’s capacity for imagination.

The System Plan reflects a singular message that the natural heritage the parks claim is concomitant to the Canadian identity, but this does not reflect the complete picture of Canadian values towards the environment. Indeed, it remains fraught with denial regarding the Indigenous history, ownership and management of those lands. The current parks are Indigenous landscapes, and especially with regard to the early generation of parks, the reality of Indigenous territoriality was often ignored or suppressed.³

1 Thede, Haider, and Rutherford, “Zoning in National Parks,” 629.

2 Thede, Haider, and Rutherford, 629.

3 Craig-Dupont, “Hunting, Timber Harvesting, and Precambrian Beauties:

Understanding this history reframes the landscapes of Parks Canada as not inherently Canadian, or, perhaps more accurately, not forthright about what is truly Canadian about them - their legacy as a collection of landscapes of colonial dispossession.

While efforts towards the reconciliation of this legacy are moving along an important, ongoing and improving trajectory^{4 5 6 7}, a corollary to this path is the question of what landscapes could be claimed as an *accurate* representation of the Canadian relationship to land.

It is the Anthropocene landscapes that reflect this relationship. While the Natural Regions 1-39 do reflect an ecological heritage of Canada, they fail to represent the cultural relationship to land that Canadian society has impressed upon it through extraction, urbanization and colonialism. This relationship requires representation in the plan. This necessitates the development of a new region of representation within the System Plan.

REGION 40.

The Anthropocene Region.

Region 40 comprises many distinct and distributed areas throughout the country. This region is defined not by a geologic or ecological framework, but by the presence of anthropogenic

The Scientific Reinterpretation of La Mauricie National Park's Landscape History, 1969-1975," in *A century of Parks Canada*, 197.

4 "Wild Bison Calves Born in Banff National Park 'a Huge Step' to Reintroduction." CBC.

5 Galloway, "Arctic Waters Get Long-Sought Protection after Ottawa, Inuit Group Reach Agreement," *Globe and Mail*.

6 Clare, "Part of Jasper National Park to Close for Indigenous Hunt," *Edmonton Journal*.

7 "Lawsuit Threatens to Shut down Kouchibouguac National Park," CBC.

disturbance. These disturbance regimes reflect a privileging of the capital value of land over ecological value. The visual appearance and ecological function of these lands are understood as products of industrial degradation affected by a multitude of processes depending on the respective location and type of disturbance regime, typified by their contributing pollutants.

As land is industrially processed, it is often changed at a fundamental level. These changes constitute a new type of physiographic form requiring representation. Mining excavations, dammed waterways, forest clearings, contaminated soils, and various other forms of impacted land are representative of anthropogenic physiology that so acutely represents the Anthropocene. This landscape type challenges the normative aesthetic systems that underlie the value criteria of Natural Regions 1 - 39.

Including an Anthropocene region in the current System Plan serves the purpose of expanding the constitutive scope of environmental consciousness present in the document. Including explicitly anthropogenic landscapes as a category in the System Plan expands within the document, entirely new conceptions of what a national park can and should look like in the Anthropocene epoch. By co-opting the existing descriptive format of the System Plan, the presence of this new category is sublimated into the imaginative capacity of the document.

This opens up the space needed for Parks Canada to improve the ability of the organization to address the effects of the Anthropocene in its current and future parks. Confronting these effects will require the recognition of the human impacts on land, and the human intervention required if the health of this heritage is to be maintained. This is messaging that the System Plan's 39 Natural Regions deny representation to. Region 40 can, therefore,

be interpreted as a form of critique, though the intention of creating what amounts to a type of counter-region within the document is not to undermine the past work of Parks Canada. This critique is additive to the document rather than a call to start over, with the intention that the inclusion of this new region holds a mirror up to the current 39. Illumination through the presence of explicitly human landscapes that while many of these parks are not visibly anthropogenic landscapes, their care, maintenance, and selection constitutes an explicitly anthropogenic intervention on the land.

The following pages render the proposal for Region 40 as a continuation of the System Plan document.



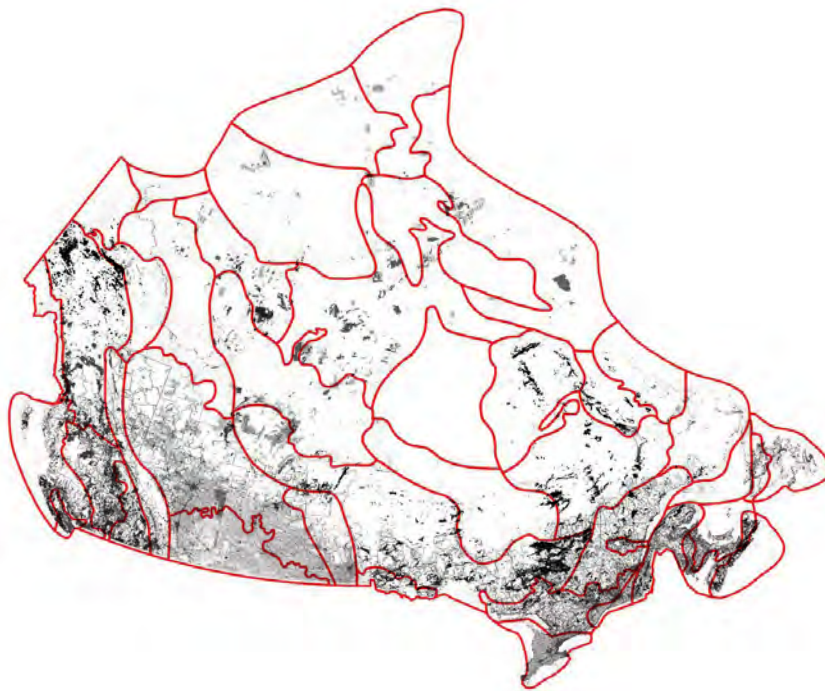
REGIONS 1-39

+

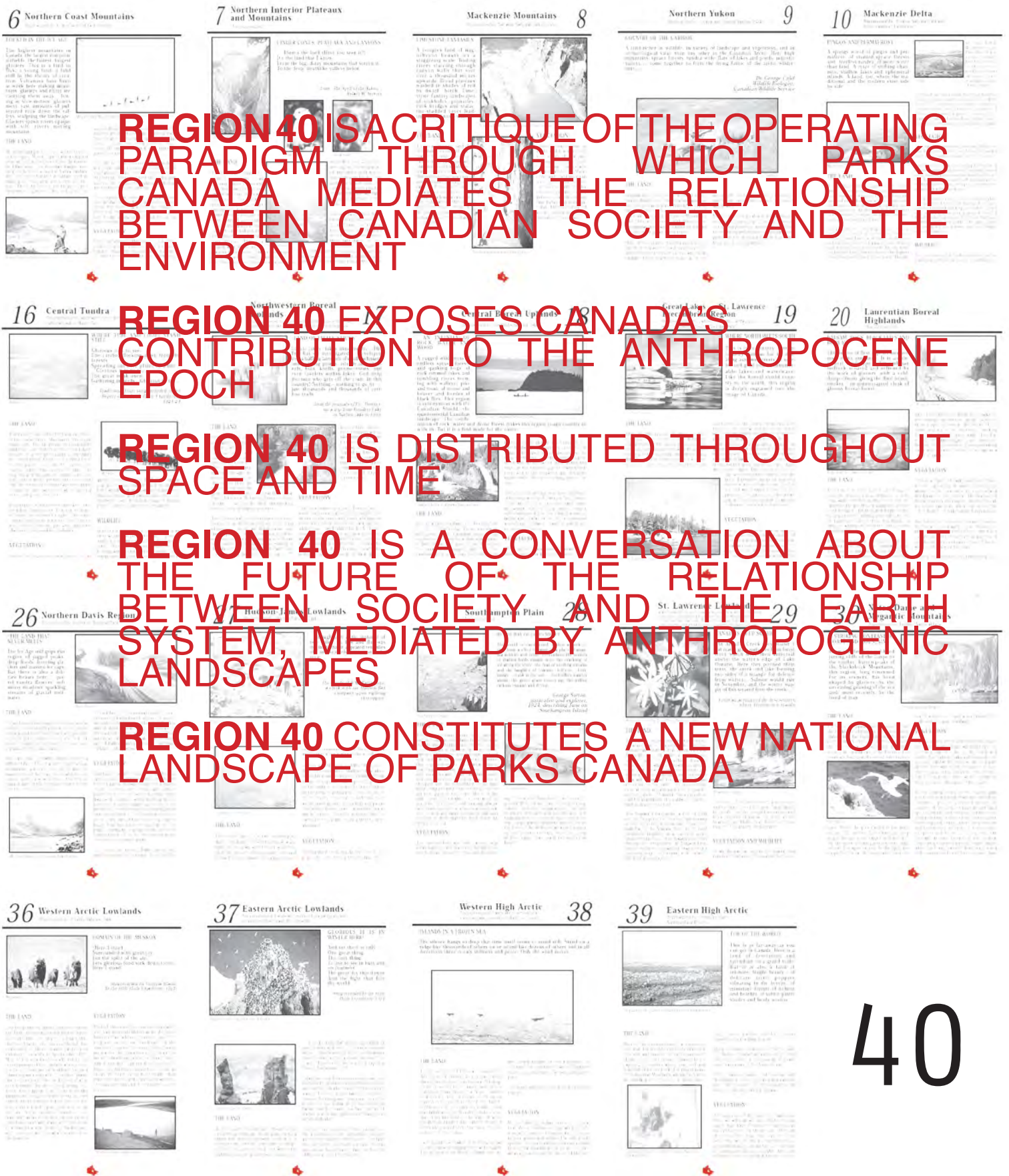


REGION 40

=



SYSTEM PLAN FOR
THE ANTHROPOCENE



40

40

ANTHROPOCENE CANADA

Not represented



Pipeline buried under the Boreal Forest

TERRAINS OF SOLASTALGIA

This region is referred to in past and future tenses, in terms of what was, what may be, and what may never be again. These are altered landscapes, existing in negative states that require representation in our ecological awareness. In the Anthropocene we will all be required to bear witness to this sorrow in order to understand it and act to change it.

THE LAND:

Region 40 comprises many distinct and distributed areas throughout the country. This region is defined not by a geologic or ecological framework, but by the presence of anthropogenic disturbance. These disturbance regimes reflect a privileging of the capital value of land over ecological value. The visual appearance and ecological function of these lands are understood as products of industrial degradation affected by a multitude of processes depending on the respective location and mode of extraction, typified by their contributing pollutants.

As land is industrially processed, it is often changed at a fundamental level. These changes constitute a new type of physiographic form requiring representation. Mining excavations, dammed waterways, forest clearings, contaminated soils, and various other forms of impacted land are representative of anthropogenic physiology that so acutely represents the Anthropocene. This landscape type challenges the normative aesthetic system that underlie the value criteria of Natural Regions 1 - 39.

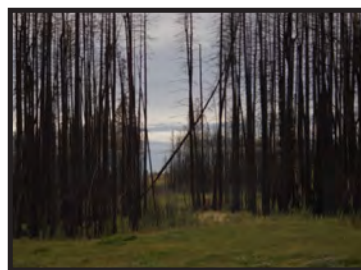
VEGETATION:



As these landscapes are distributed throughout the country, the vegetative characteristics of the region are undefinable by their flora. Instead, the dominant vegetative features that define the region are instances of absence and fragmentation caused by extractive practices in the endemic ecosystems. Vegetation is sacrificed either as a resource or as an externality to the extraction of another resource. These locations are characterized by topological patterns of loss reflecting

both the results of industrial processes required to access the resource value, and the degradations to vegetative communities due to pollution.

WILDLIFE:



Similar to the vegetative characteristics of these regions of disturbance, the wildlife characteristics of



Region 40 are defined primarily through absences. These landscapes exist as impediments to species proliferation and diversity, often creating human vectors in the terrain and vegetative cover that leads to the modification of wildlife settlement patterns and / or patterns of predation.

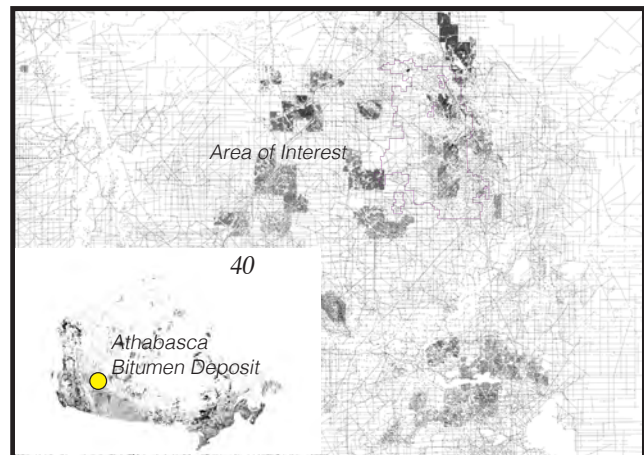
Common species become less common. An uneasy quiet permeates the air. The stillness of these places is not a beautiful one. It instills a sense of lament in the active mind that encounters it.



Landscape under construction

STATUS OF NATIONAL PARKS:

No National Park has yet been established in any of the distributed terrains of this region. This is a projective / newly established Regional classification and has not yet been implemented in the network of Parks Canada. The Athabasca Oil sands Region demands considerable attention when considering the establishment of the first park to represent this region. What has been lost ecologically and globally that this disturbed and disturbing landscape has contributed to? The landscapes created here typify both startling and dramatic examples of the Anthropocene as well as more subtle, but equally problematic manifestations.



Landscapes of extraction

The following table summarizes the status of system planning for each step toward establishing a new national park in this region.

Steps in the Park Establishment Process	Status
Representative Areas Identified:	done
Potential Park Area Selected:	done
Park Feasibility Assessed:	0
Park Agreement Signed:	0
Scheduled under the National Parks Act:	0





ATHABASCA /
BITUMEN /
EXTRACTION //



FIG. 14.15.16.
TOPOGRAPHIC AND VEGETATIVE
CHARACTERISTICS OF THE
ATHABASCA OIL SANDS REGION,
ALONG HWY 63 TOWARDS FORT
MCMURRAY.





FIG. 17.18.19.
HINTS OF THE EXTRACTION LANDSCAPE
PERMEATE THE REGION, ALONG HWY 63
TOWARDS FORT McMURRAY.





FIG. 20.21.22.
UNRECLAIMED EXTRACTION
LANDSCAPES PROLIFERATE
THROUGHOUT THE REGION. ALONG HWY
63 TOWARDS FORT McMURRAY.



THE ATHABASCA OIL SANDS

Located 400 km north of Edmonton, Alberta, the oil sands span roughly 20 % of surface area of the province, an area of about 140,000 sq km; can be as thick as 150 m in some places, and contain an estimated 168 billion barrels of oil.¹

Of the carbon fuels humanity has used over the course of industrialization, oil is the major contributor to the Great Acceleration² that led to the emergence of the Anthropocene epoch, made available through a global, spatial, point source matrix of extraction. The global conditions resulting from the lust for carbon energy sources can be located in the production of these extraction landscapes where the human species has extensively modified the landscape to access this resource. The point source becomes the grounds for operation where “... The connection between ubiquitous power and faraway destruction must become as vivid and immediate as the fuel efficiency of one’s car.”³

Extraction landscapes reorder vast swaths of land, completely changing the appearance, ecological function and the type of relationship society has with it. That these extractive practices often occur in a direct interface with the so-called ideal wilderness the national parks have established as a societal value is no small matter. Bitumen is extracted from under the idyllic boreal landscape the Group of Seven would have been just as likely to paint. This reality exposes a critical fissure that rises from the ground, both figuratively and literally. In these landscapes, the aesthetic value of the Canadian landscape is revealed as secondary to its economic value, despite attempts by organizations like Parks Canada to unify the two.

1 “The Location of Oil Sands - Oil Sands - Alberta’s Energy Heritage”
Alberta Culture and Tourism.

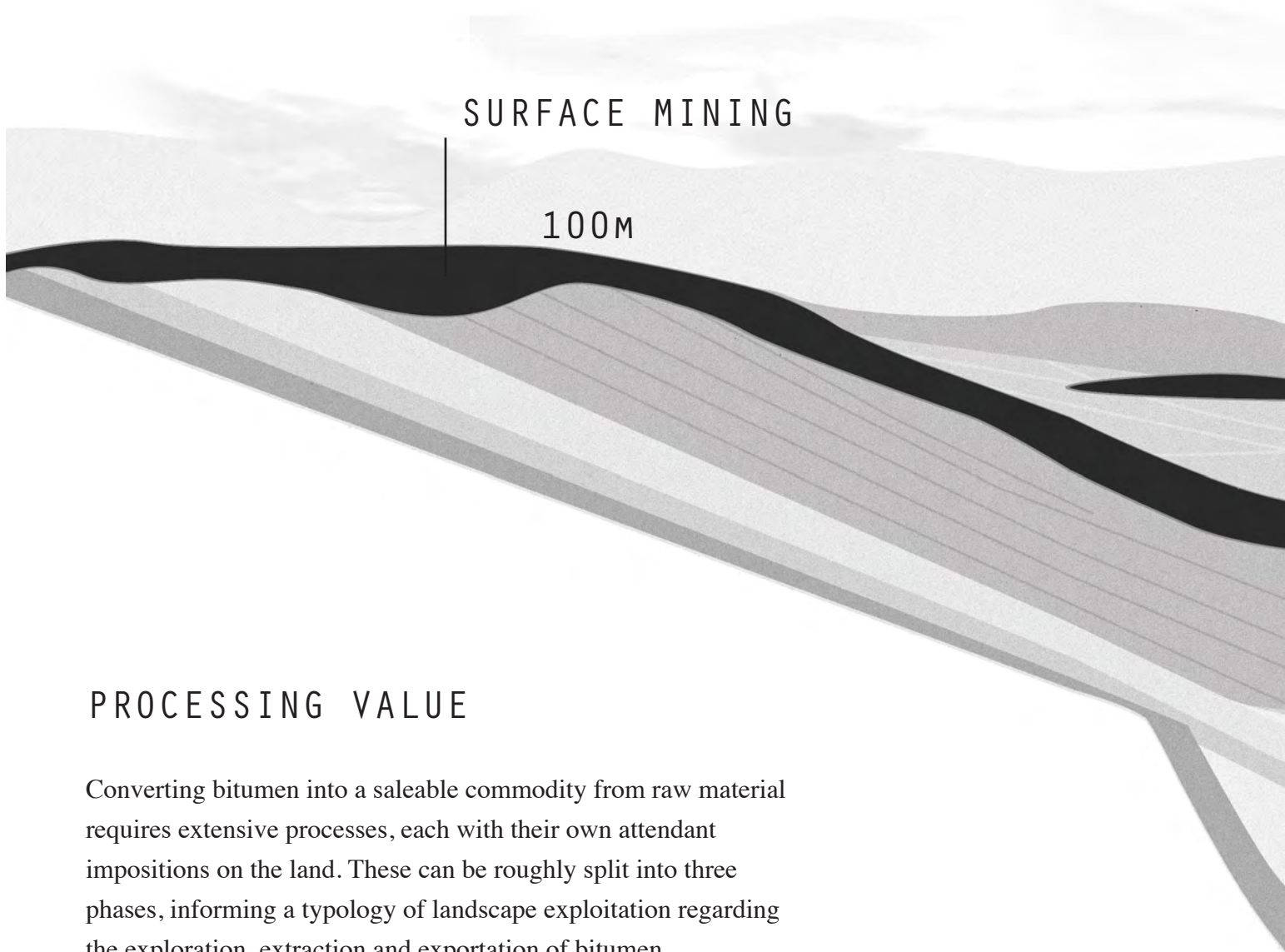
2 “Great Acceleration,” International Geosphere Biosphere Programme.

3 Renner, “The New Nature.”

While the most visually arresting landscapes of the oil sands are the pit extraction lands surrounding Fort McMurray, the Athabasca bitumen deposit occupies a vast region that is inaccessible to surface extraction. Instead, Steam Assisted Gravity Drainage - or SAGD - techniques have and will increasingly become the most widespread extraction technique. This process involves a parallel well system where bitumen is extracted by pumping high pressure steam into an injection well, liquefying the bitumen and allowing it to be collected by the extraction well below it.⁴ While this process requires less water per barrel than surface extraction, the effect of locating, mapping, and extracting these deep deposits results in highly fragmentary landscape processes enacted on the boreal forest of northern Alberta. These processes include magnetic and seismic testing, road construction, well pad excavation, settling pond creation, and pipeline connections between distributed well pads and central processing facilities, which require the stripping of vegetation, compaction of soil, draining of wetlands and flipping of muskeg. The Pembina Institute reported in a study of the effect of the SAGD extraction process on habitat that if every lease as of 2005 were fully built out, a total area of 2960 sq km of forest would be removed⁵— roughly equivalent to the total area of Riding Mountain National Park. This leased area number (36,000 sq km) accounts for only half of the total area of the deposit, meaning extrapolating further would see a total fragmentation area of roughly 6000 sq km distributed across the province— roughly the size of the first national park, Banff.

4 Lightbown, “New SAGD Technologies Show Promise in Reducing Environmental Impact of Oil Sand Production,”2.

5 Schneider, and Dyer, *Death by a Thousand Cuts: Impacts of In Situ Oil Sands Development on Alberta's Boreal Forest*, 11.



SURFACE MINING

100M

PROCESSING VALUE

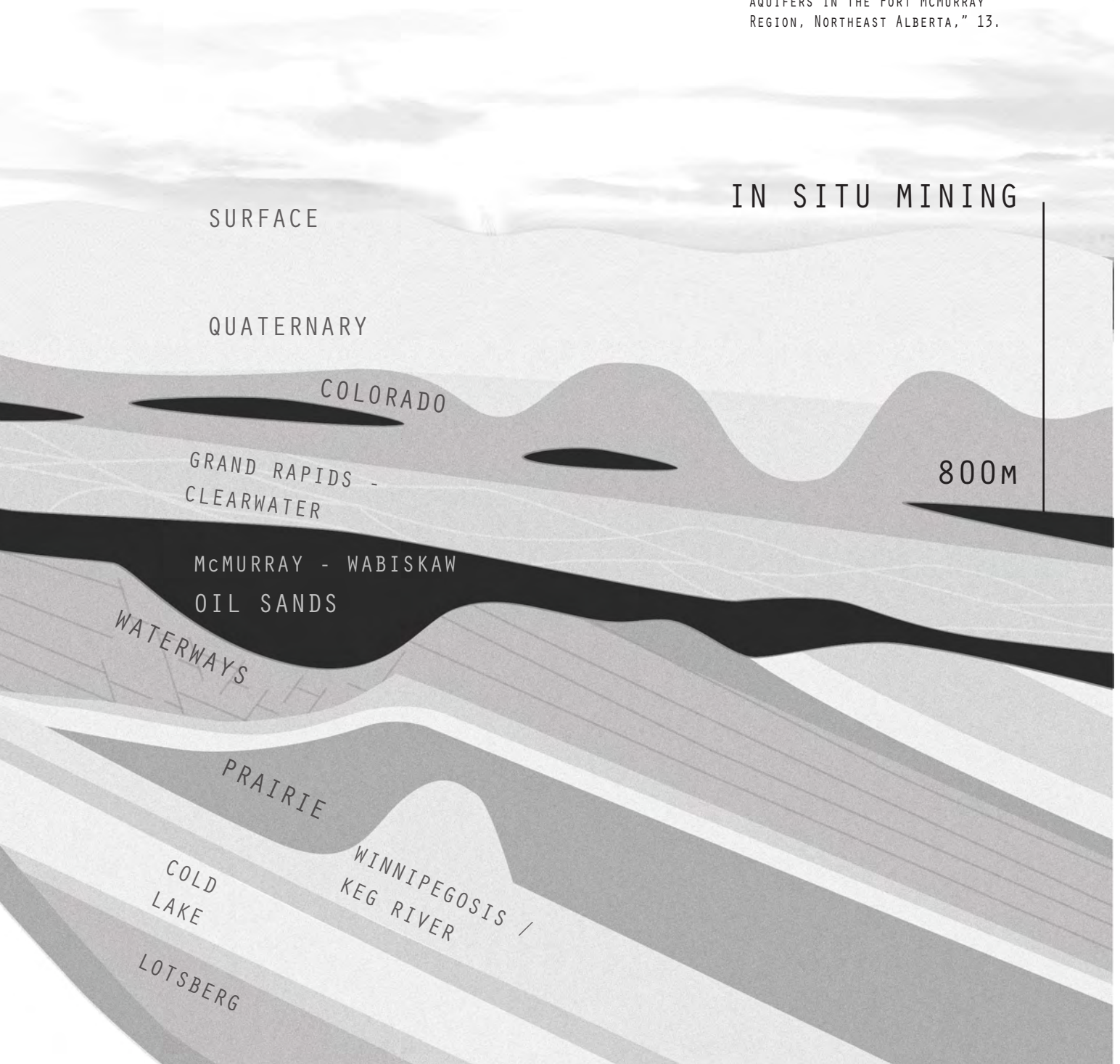
Converting bitumen into a saleable commodity from raw material requires extensive processes, each with their own attendant impositions on the land. These can be roughly split into three phases, informing a typology of landscape exploitation regarding the exploration, extraction and exportation of bitumen.

The 138,000 sq km of the Athabasca deposit present a unique challenge in that up to 81 % of the bitumen is too far below the

FIG. 23.

SUBSURFACE GEOLOGY OF THE ATHABASCA
DEPOSIT AROUND FORT McMURRAY.

ADAPTED FROM: ANDRIASHEK, ATKINSON,
"BURIED CHANNELS AND GLACIAL-DRIFT
AQUIFERS IN THE FORT McMURRAY
REGION, NORTHEAST ALBERTA," 13.



surface to extract using conventional mining techniques, and so requires the use of in situ methods.⁶ While the open pit mines north of Fort McMurray saturate the collective psyche's impression of what the oil sands are, the reality is that most of the deposit must be accessed by non-conventional methods, including the various iterations of Steam Assisted Gravity Drainage (SAGD) well drilling. The relatively recent development of this technology has allowed for a massive increase in the potential development area of the Athabasca deposit.

Accessing these deep deposits requires a preliminary exploration phase where the deposit is first prospected, surveyed and finally mapped in detail. This often requires the use of core sampling, and seismic testing to develop a three dimensional map of the surveyed deposit.⁷ Core holes sites are typified by the clearing of up to 1 hectare (ha) of forest per site,⁸ while seismic testing is characterized by clearing channels of forest (down from eight meters to two meters) in extensive gridded networks.⁹ These processes result in extensive fragmenting of forest systems to acquire valuable high resolution data.

Once a deposit has been mapped and studied, the project will move into concurrent phases of extraction and exportation. SAGD methods address extraction issues related to both the weight and viscosity of bitumen at extensive depths, which had previously rendered it locked in the ground. The technique involves drilling well pairs, one to inject steam and occasionally solvents into the ground from the top well that liquefy the oil in the bitumen and allow it to sink towards the bottom well which collects and

6 Schneider & Dyer, 14.

7 Graf, "Literature review on the Restoration of Alberta's Boreal Wetlands," 14.

8 Graf, 22.

9 Schneider & Dyer, 18.

delivers the product to the surface for further processing.¹⁰ As the technology has evolved, the amount of well pairs developed on a single production well pad has increased. While this increases the size of individual production well pads ranging from 4 - 10 ha,¹¹ it decreases the number of well pads required to extract from the deposit.¹²

When test and production wells are drilled, they require forest areas to be clear cut, graded and compacted for installation, storage, equipment, access and egress. Test core well pads litter the Athabasca deposit, and while companies are required to rehabilitate these sites back to their original condition, often they are abandoned and left to develop feral ecologies that do not reflect or respond to the surrounding environment. “There are currently 11,500 well pads in production across Alberta, with many more added every year. More importantly, Alberta has 52,831 unreclaimed oil and gas wells as of 2012, 68% of which were abandoned in the last decade.”¹³ If they are remediated, it is often to an upland condition, despite the prominence of wetland and peat land ecosystems that are also affected by drilling practices.¹⁴

Exportation requires pipelines in all phases of production, and as a result, they spiderweb across the province. They are used to send solvents and water to production wells from the central project area, and they are used to transport the raw extracted product to upgrader facilities which then transport via pipeline the upgraded product to refineries that finish the production cycle and deliver a marketable product such as gasoline. Right of ways are cleared

10 Lightbown, 2.

11 Graf, 22.

12 Graf, 24.

13 “ST37: List of Wells in Alberta Monthly Updates,” Alberta Energy Regulator.

14 Xu and Bird, “Assessing Peatland Restoration Success to Meet Alberta’s Peatland Reclamation Criteria,” 14.

up to twenty meters for export pipeline construction.¹⁵ Export pipes are commonly buried underground and when improperly installed - above the recommended depth of 1.2 m to accommodate peat freezing depths of up to 80 cm¹⁶ - lead to surface settling and complications due to permafrost freeze / thaw cycles that contribute to the over 60,000 breaches over the past 40 years.¹⁷

15 Alberta Energy Regulator, 48.

16 Graf, 18.

17 Young, "Open Data: Alberta Oil Spills 1975-2013."

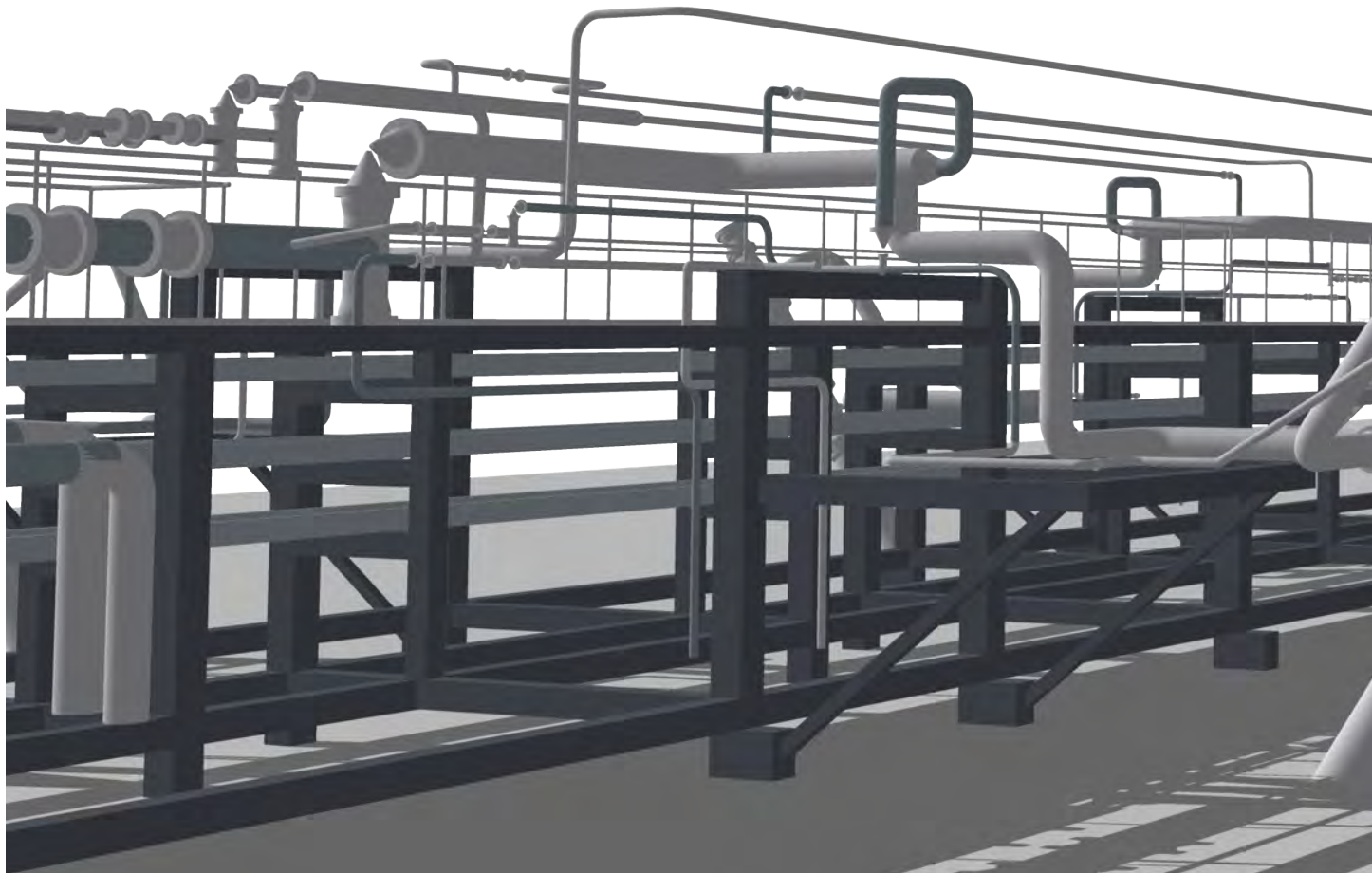


FIG. 24.
STEAM ASSISTED GRAVITY DRAINAGE WELL
PAIRS. AS THE TECHNOLOGY HAS EVOLVED
UPWARDS OF TEN PAIRS CAN BE PLACED
WITHIN A SINGLE WELL SITE.

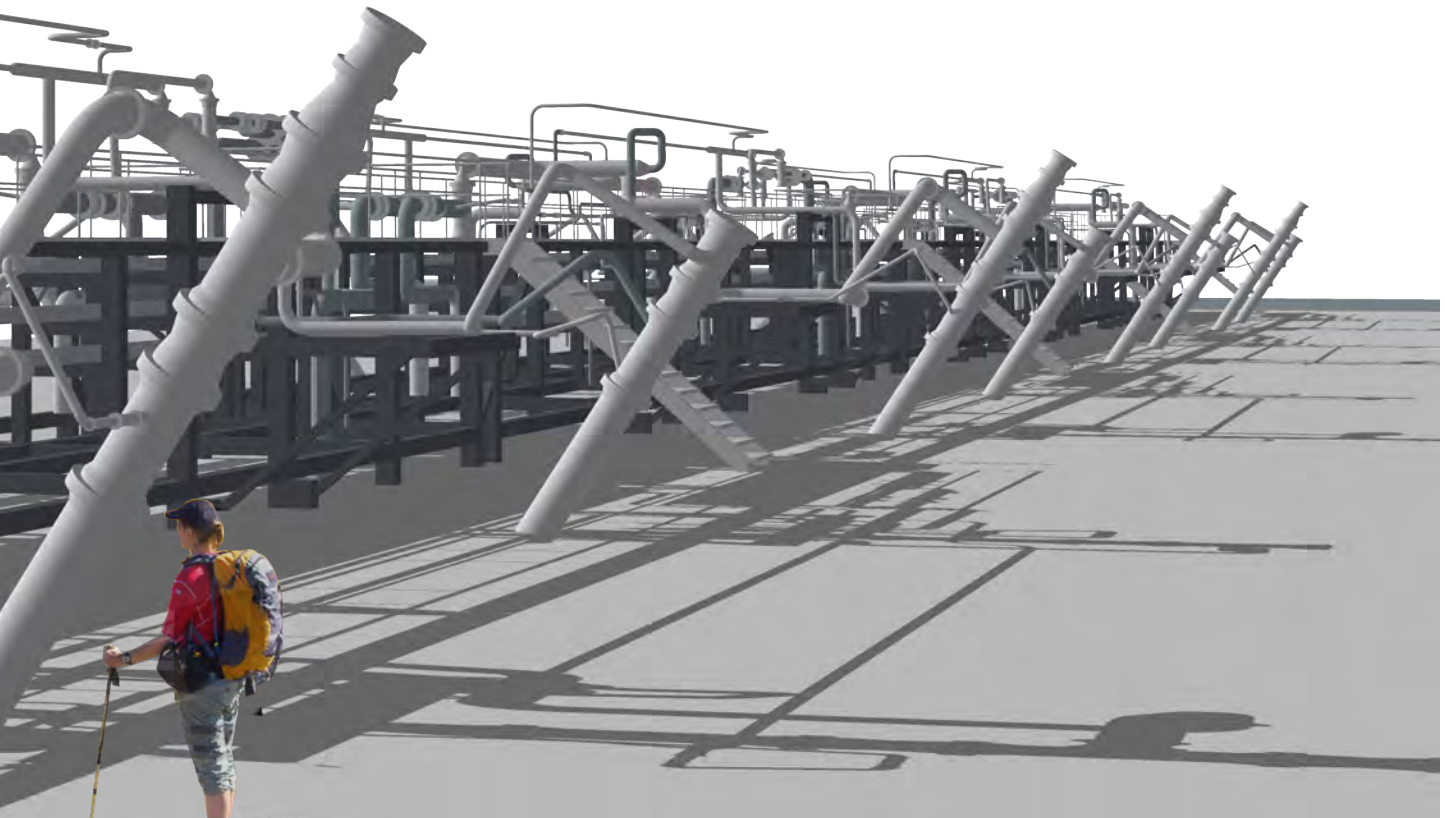
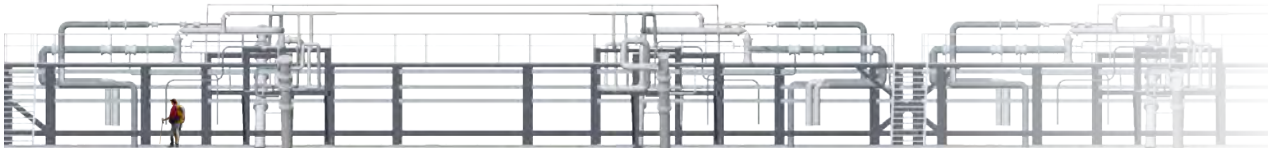
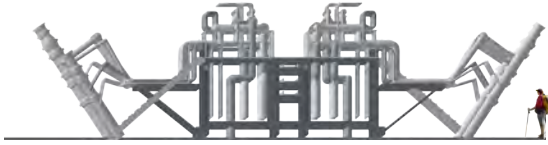
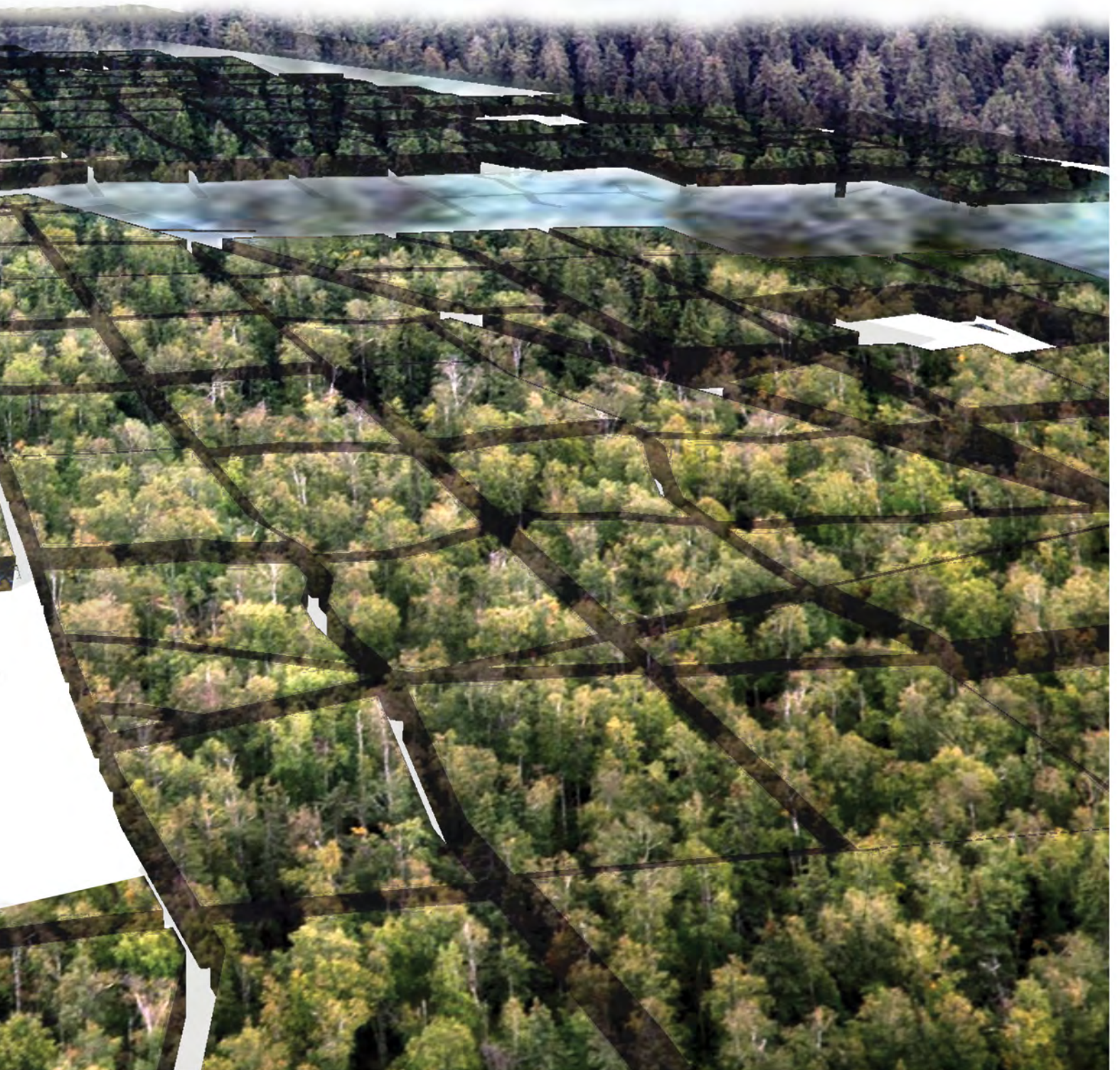




FIG. 25.
REPRESENTATIVE IMAGE OF THE
DISTURBANCE PATTERNS IMPOSED ON THE
BOREAL LANDSCAPE.



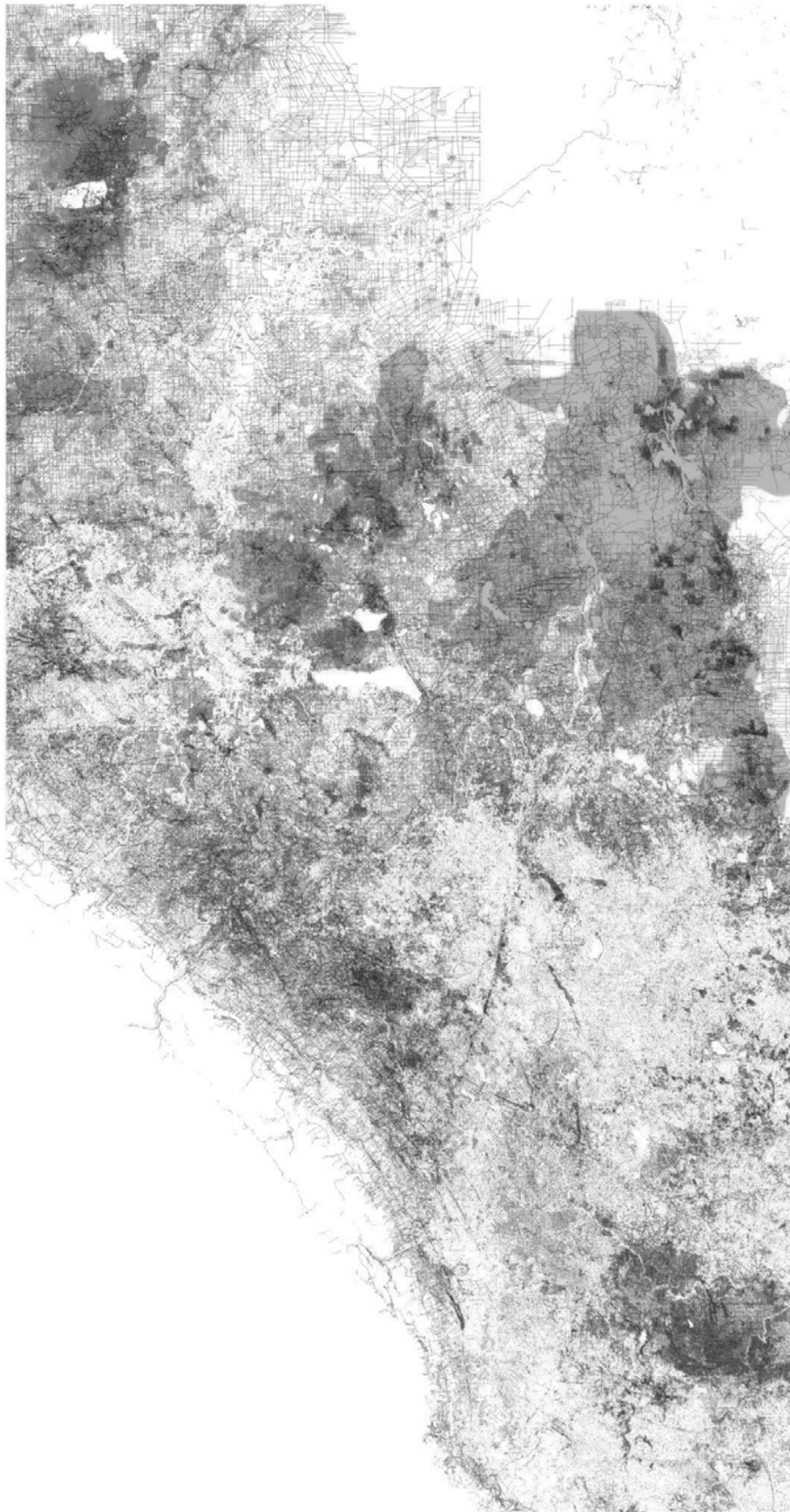
BITUMEN

587,712	WELLS DRILLED
86,103	ABANDONED WELLS
422,000	KM OF PIPELINES
177,240	OILSAND RELATED KMS ¹
138,000	SQKM DEPOSIT AREA
1.8 TRILLION BARRELS ²	

FIG. 26.
COMPOSITE RENDERING OF MAJOR
OIL INFRASTRUCTURES THROUGHOUT
ALBERTA, INCLUDING WELL PADS,
PIPELINES AND SEISMIC TESTING
LINES.

1 "Pipeline Safety," Alberta Energy Regulator.

2 "Oil Sands," Alberta Energy Regulator.

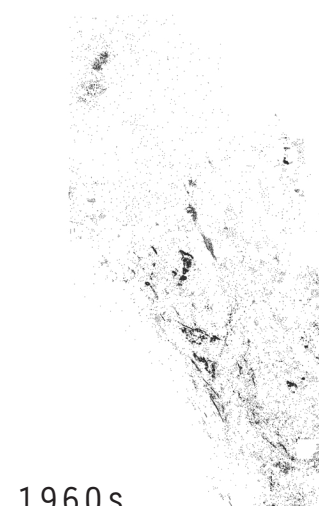




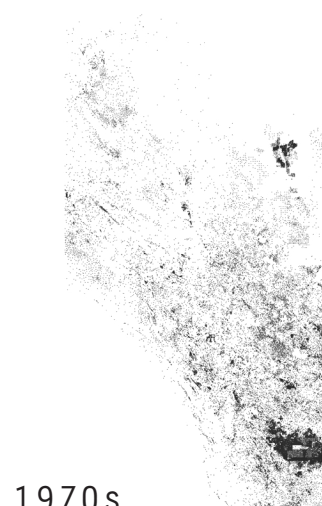
1940s



1950s



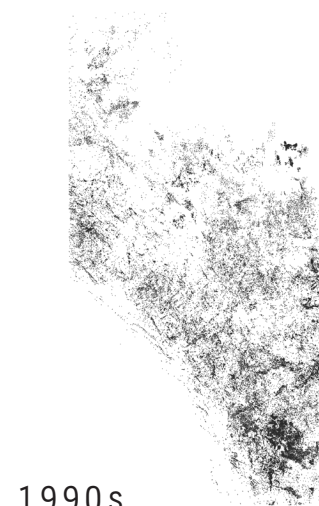
1960s



1970s



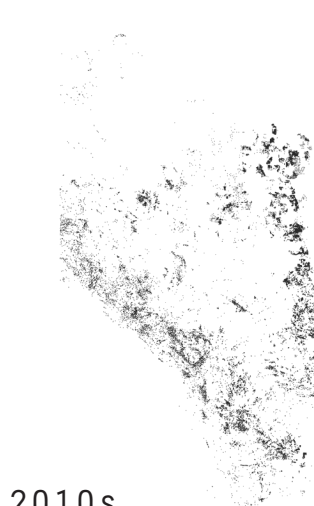
1980s



1990s



2000s



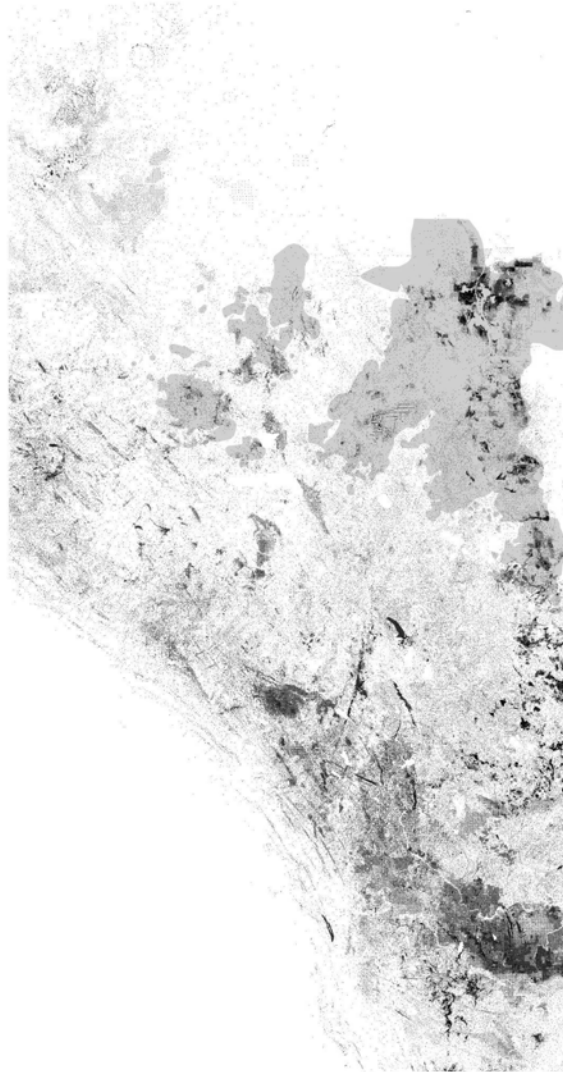
2010s

FIG. 27.
ALBERTA'S LEGACY OF OIL. WELL
CONSTRUCTIONS ACROSS THE
PROVINCE 1930-2010.

FIG. 28.
RIGHT: WELL PADS OF ALBERTA

FIG. 29.
NEXT PAGE LEFT: PIPELINES OF
ALBERTA

FIG. 30.
NEXT PAGE RIGHT: SEISMIC CUT
LINES OF ALBERTA



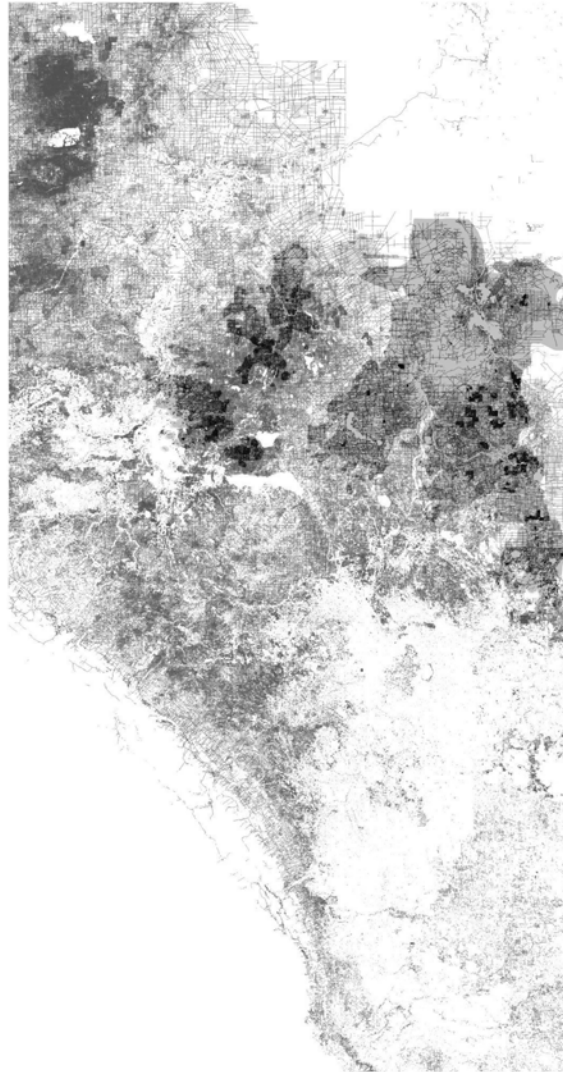
WELL PADS

587,712 TOTAL
91,597 WITHIN
ATHABASCA DEPOSIT



PIPELINES

422,000 KILOMETERS,
177,240 KM WITHIN
ATHABASCA DEPOSIT



CUT LINES (SEISMIC)

FIG. 31.
BING MAPS. TRANSECT THROUGH THE ATHABASCA
LANDSCAPE.

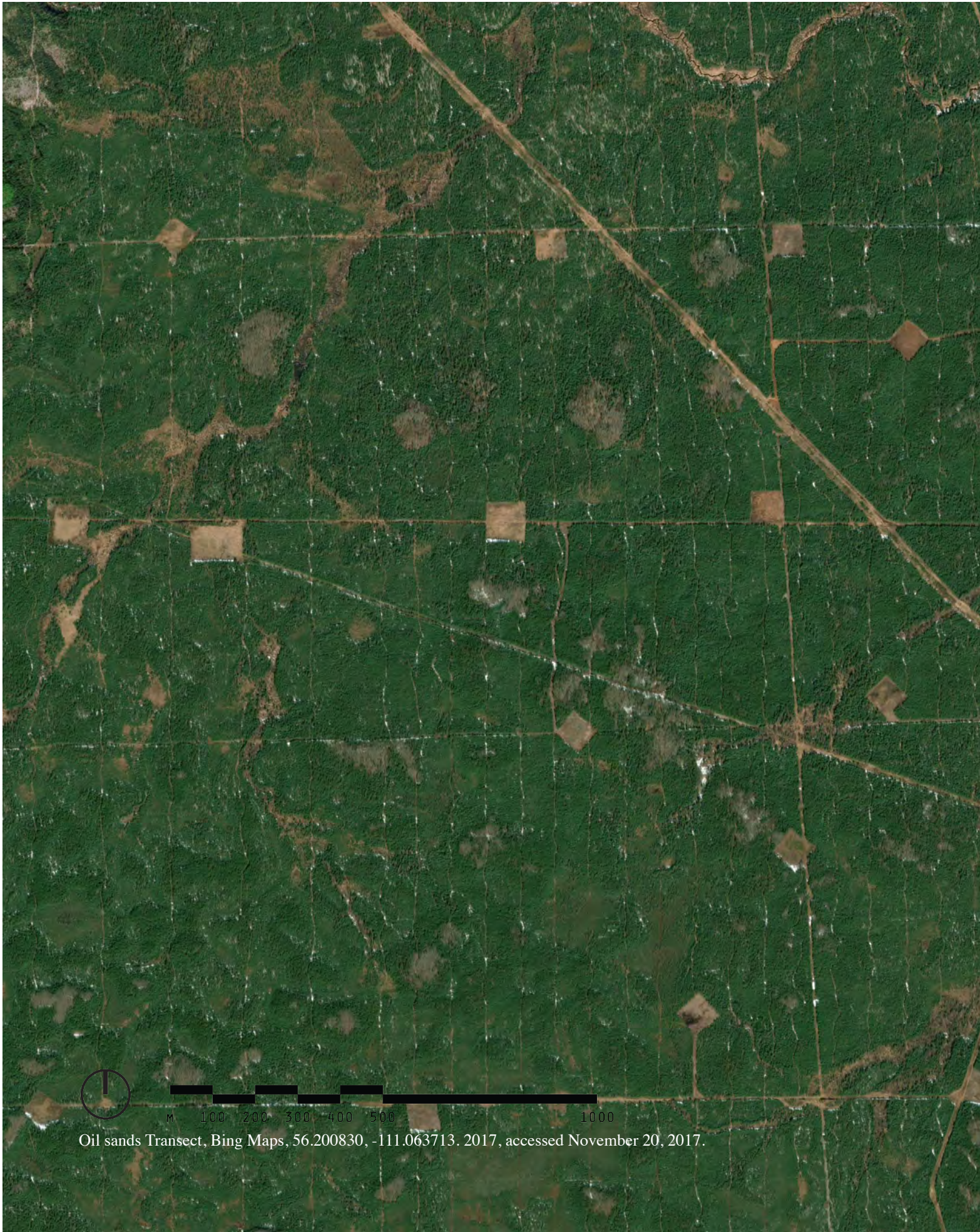




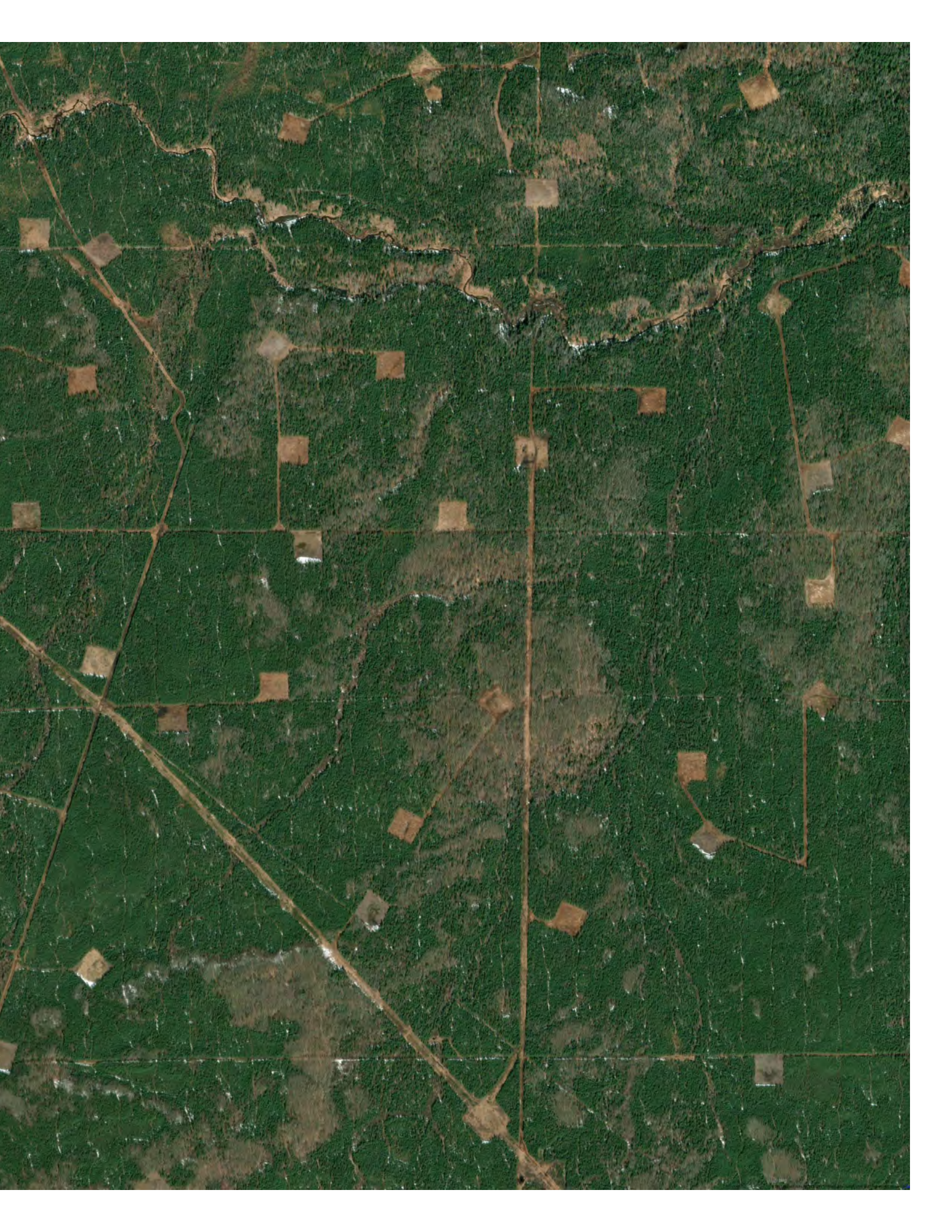


Oil sands Transect, Bing Maps, 56.199588, -111.201682. 2017, accessed November 20, 2017.





Oil sands Transect, Bing Maps, 56.200830, -111.063713. 2017, accessed November 20, 2017.





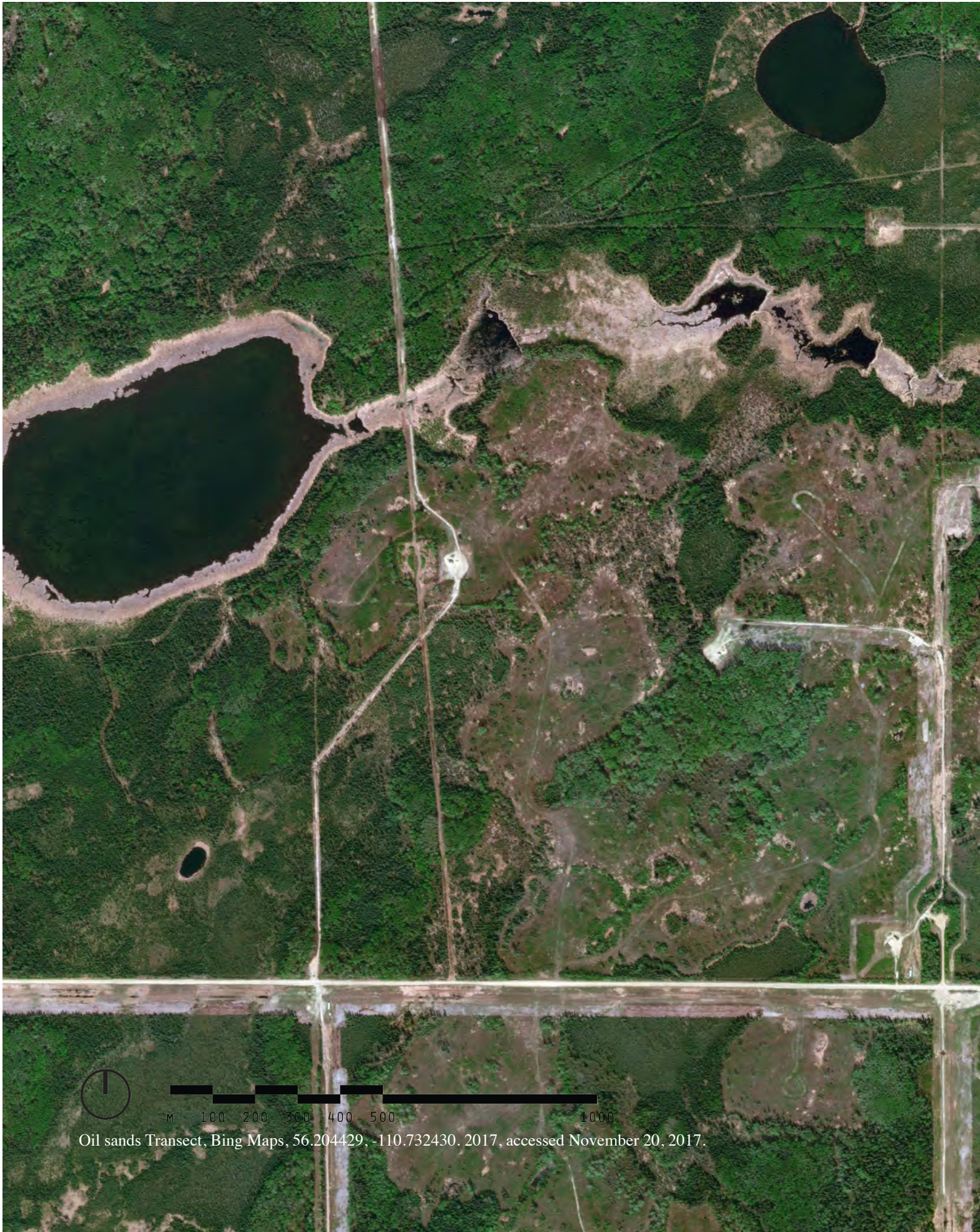
Oil sands Transect, Bing Maps, 56.202824, -110.991803, 2017, accessed November 20, 2017.





Oil sands Transect, Bing Maps, 56.207299, -110.876238. 2017, accessed November 20, 2017.





Oil sands Transect, Bing Maps, 56.204429, -110.732430, 2017, accessed November 20, 2017.



CONTEXT

Fort McMurray is 430 kilometers northward along Highway 63 from Edmonton, Alberta.

POPULATION

1971	6,800	
1996	33,000	
2015	82,000	permanent residents
	38,000	living in project accommodations
2030	196,000	(projected) ¹

1 McDermott et al., “Resilient Fort McMurray Rolls with Relentless Boom and Bust Cycles.”



FIG. 32.





BOREAL FOREST & PEATLANDS

$\frac{1}{3}$ global soil carbon is stored in boreal peatlands in the form of peat.

In Alberta,

17% wetlands (mainly peatlands) account for the total land area.

70% peatlands in the boreal region of northern Alberta.¹

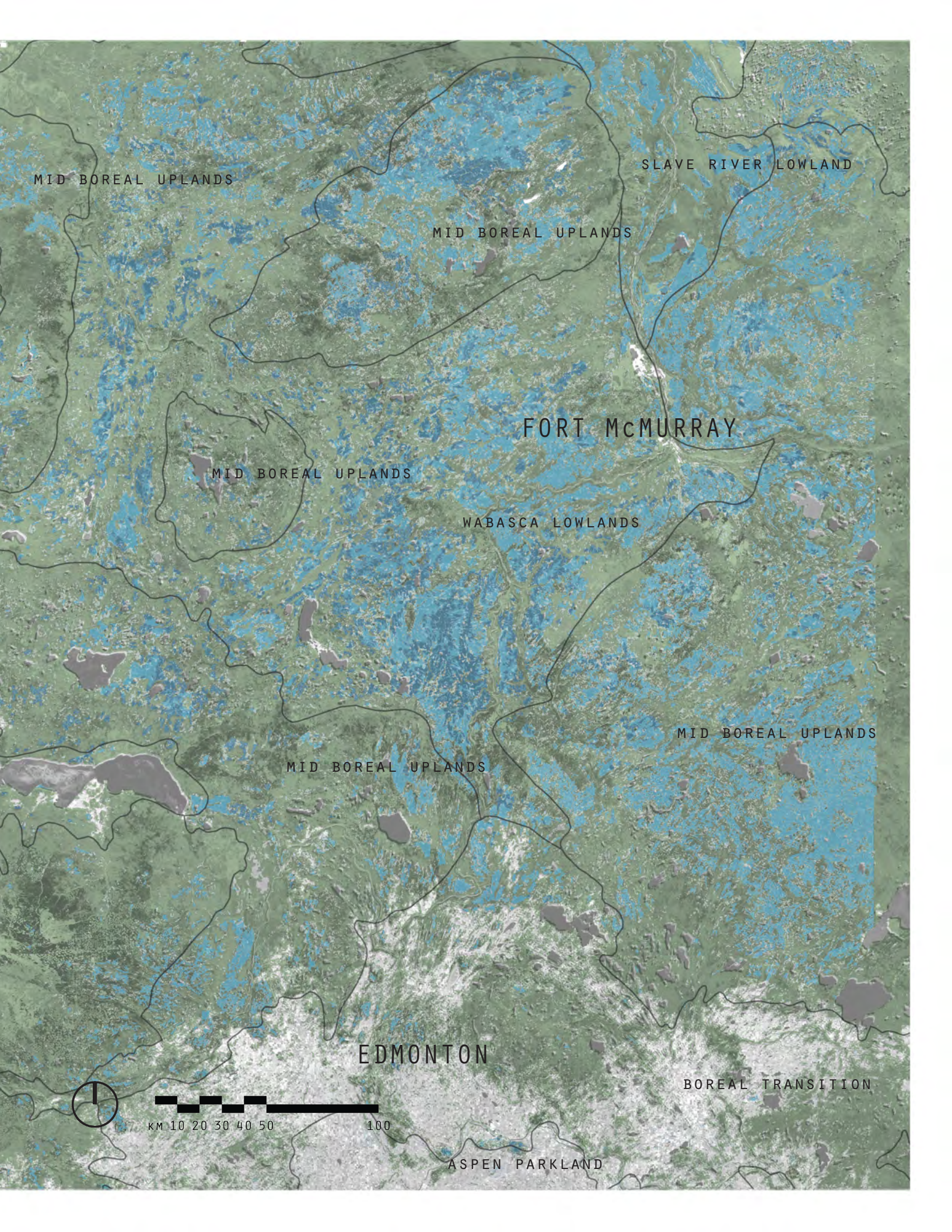
¹ Tarnocai et al. 2009, Vitt and Bhatti 2012 as found in Xu, Bird, "Assessing Peatland Restoration Success to Meet Alberta's Peatland Reclamation Criteria," 14.

ECOSYSTEMS

1:3,500,000

- ECOREGIONS
- FORESTED AREA
- BOG
- FEN
- WETLAND TREED AREAS





MID BOREAL UPLANDS

SLAVE RIVER LOWLAND

MID BOREAL UPLANDS

FORT McMURRAY

MID BOREAL UPLANDS

WABASCA LOWLANDS

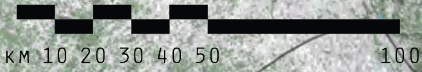
MID BOREAL UPLANDS

MID BOREAL UPLANDS

EDMONTON

BOREAL TRANSITION

ASPEN PARKLAND



BITUMEN IN PLACE

20% of the total area of Alberta is covered by the Athabasca bitumen deposit.

90% of the deposit is too deep to for surface extraction and requires in situ methods including Steam Assisted Gravity Drainage (SAGD).¹

40M thickness of bitumen located in pockets throughout the in situ areas south of Fort McMurray.²

- 1 Lightbown, “New SAGD Technologies Show Promise in Reducing Environmental Impact of Oil Sand Production,”².
- 2 “Bitumen pay thickness shape files, Figure R3.16,” Alberta Energy Regulator, 2017.

BITUMEN IN PLACE PAY THICKNESS
1:3,500,000

- ATHABASCA BITUMEN DEPOSIT AREA
- 10M PAY THICKNESS
- 20M PAY THICKNESS
- 30M PAY THICKNESS
- 40M PAY THICKNESS

FIG. 34.



SURFACE
MINEABLE
AREA

IN SITU
MINEABLE
AREA



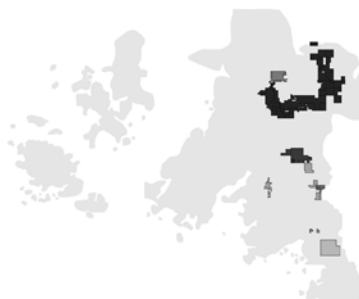
109 км 10 20 30 40 50 100

MAJOR OIL SANDS STAKEHOLDERS



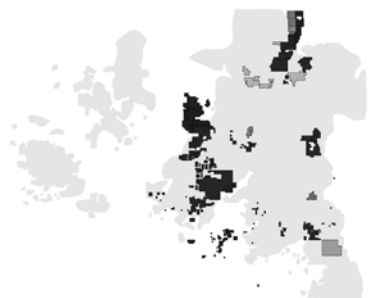
CENOVUS¹

6 LEASES
517,268 HA
164,396 BBL/D



SUNCOR²

11 LEASES
387,286 HA
187,000 BBL/D



CANADIAN NATURAL³

11 LEASES
697,912 HA
123,265 BBL/D



NEXEN (CNOOC)⁴

14 LEASES
105,843 HA
40,304 BBL/D

- 1 Cenovus. "Cenovus Delivers Strong Operational Performance in 2016 Higher Oil Sands Production, Lower Costs."
- 2 Suncor. "Suncor Energy Reports Fourth Quarter 2016 Results."
- 3 Canadian Natural Resources Ltd. "Canadian Natural 2016 Annual Report."
- 4 China National Offshore Oil Corporation. "CNOOC Annual Report 2016."

FIG. 35.





CURRENT STATE OF EXTRACTION ACTIVITY

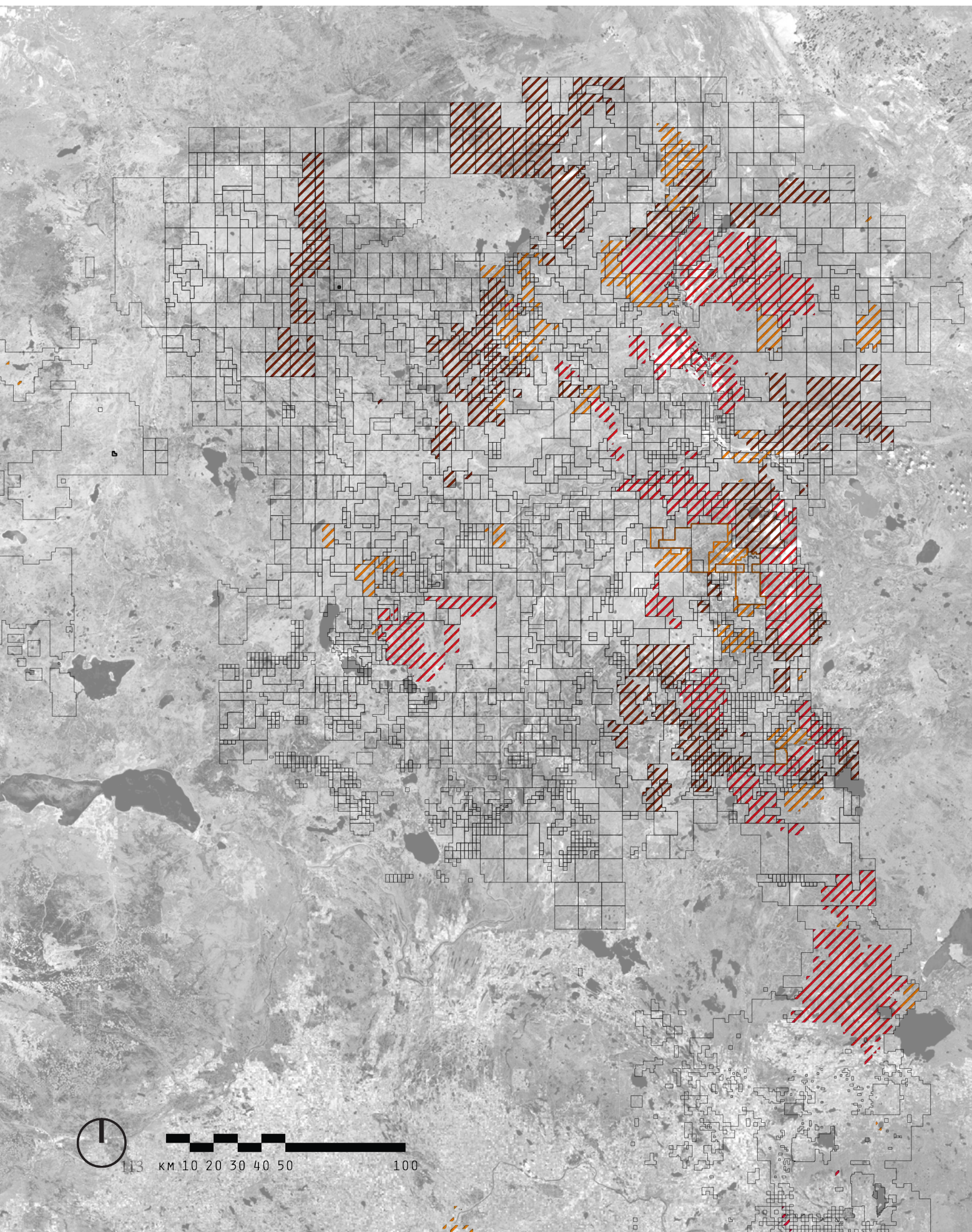
FIG. 36.

IN APRIL 2016, SYNCRUDE CEO MARK WARD TOLD THE FORT McMURRAY CHAMBER OF COMMERCE THE DAYS OF NON-STOP GROWTH AND THE OIL SANDS MEGA-PROJECTS WERE NOT ONLY OVER, BUT A SIGN OF “THE NEW NORMAL.”¹

1 McDermott et al., “Resilient Fort McMurray Rolls with Relentless Boom and Bust Cycles.”

PROJECT STATUSES 2017
1:3,500,000

- ACTIVE PRODUCTION LEASES
- OPERATING
- APPROVED
- PROPOSED



CURRENT PRODUCTION

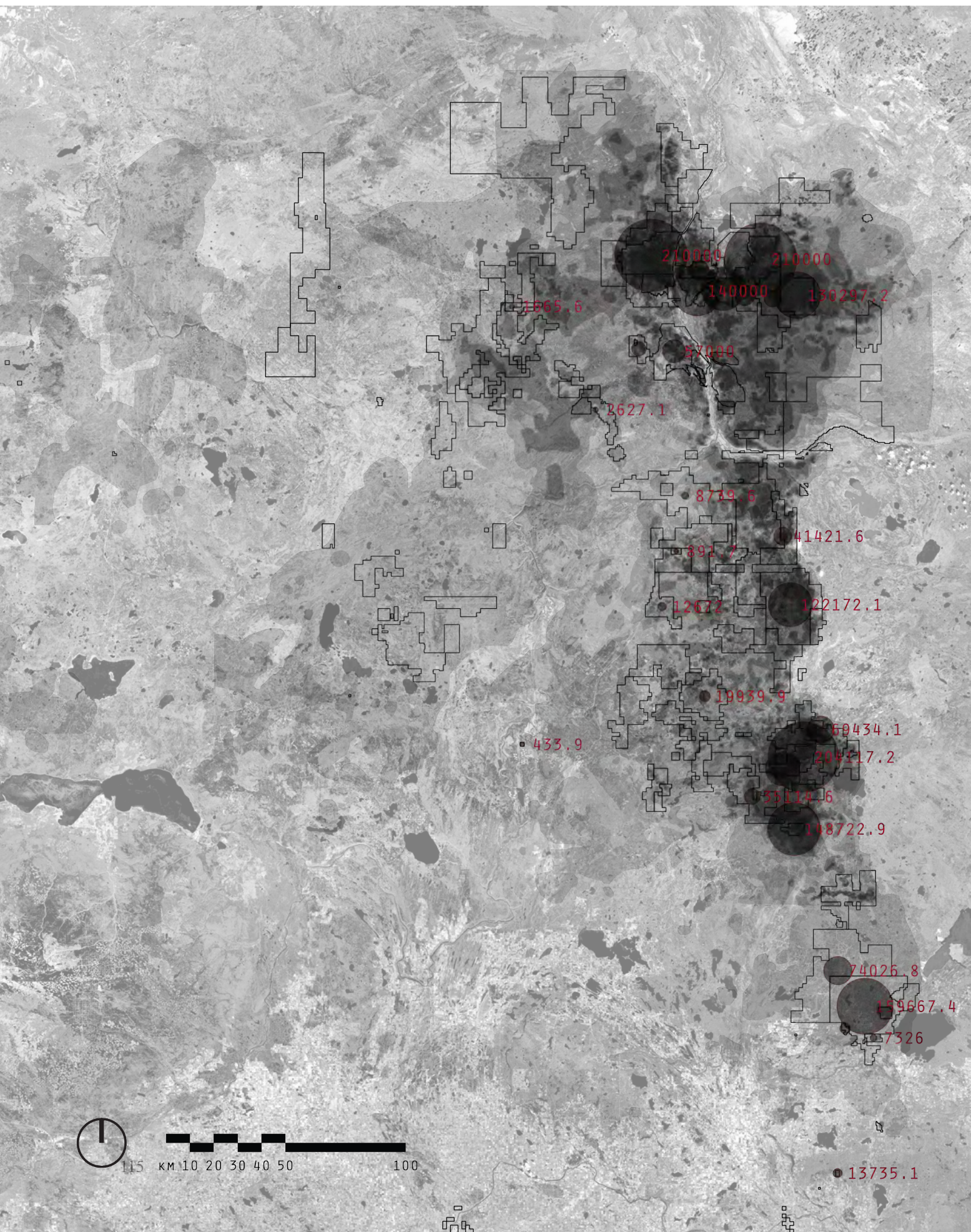
FIG. 37.

IN 2014, CRUDE BITUMEN PRODUCTION (DAILY OUTPUT) BY IN-SITU EXTRACTION (201.2×10^3 M³/DAY) HAS EXCEEDED THAT PRODUCED BY OPEN PIT MINING (165.1×10^3 M³/DAY) (ALBERTA ENERGY REGULATOR 2015)¹

1 Xu, Bird, "Assessing Peatland Restoration Success to Meet Alberta's Peatland Reclamation Criteria," 14.

OIL SANDS PRODUCTION
BARRELS PER DAY (BBL/D)
1:3,500,000

- ACTIVE PRODUCTION LEASES
- 10M PAY THICKNESS
- 20M PAY THICKNESS
- 30M PAY THICKNESS
- 40M PAY THICKNESS



INDUSTRIAL GLACIATION

The extractive landscape is simultaneously a broad relationship of industrial processes across the landscape, and a massively distributed collection of specific locations. These patterns represent the human interface on the landscape, creating a series of disturbance corridors and patches which fragment the landscape into a multitude of fine scale habitat patches too small to create interior habitat quality at a scale necessary for large mammals to successfully reside. This landscape reflects the temporality of various extractive practices in the duration of their existence and maintenance. Pipelines and roads exist for longer durations yet cause less disturbance across the landscape than the massive corridor construct that seismic testing requires. Well pads occur intermittently as a project evolves, reflecting the shifting nature of the subterranean substance as it is extracted. These landscape types are often left abandoned and unremediated, creating a network of disturbance to fauna and a multitudinous vector regime for invasive species of flora. Recovering these landscapes is crucial to the long term viability of the ecosystems atop the bitumen deposit.

ANTHROPOGENIC AND NATURAL DISTURBANCE PATTERNS

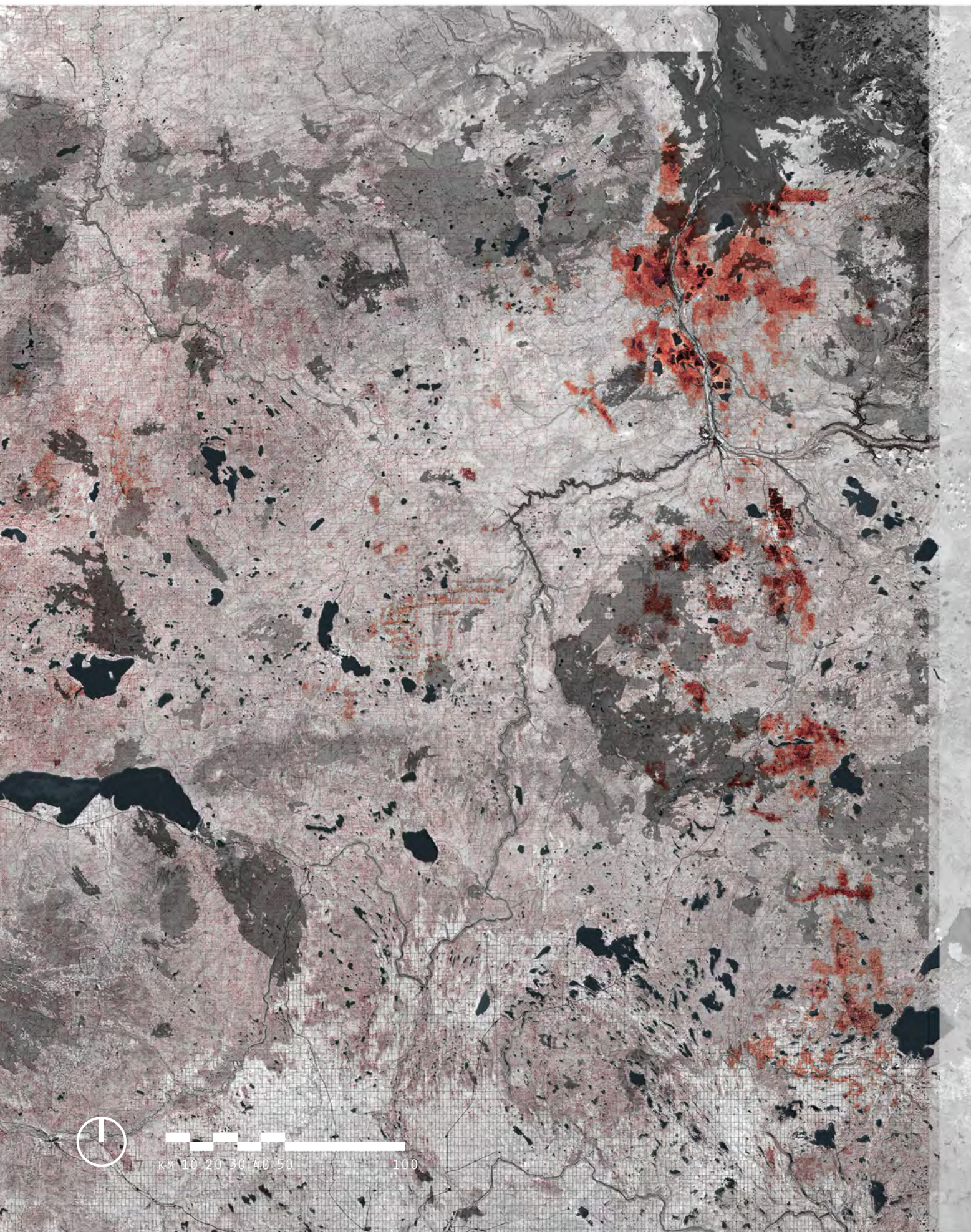
1:3,500,000

- SEISMIC LINES & PIPELINES
- WELL PADS
- HISTORIC FOREST FIRES 1960

PRESENT

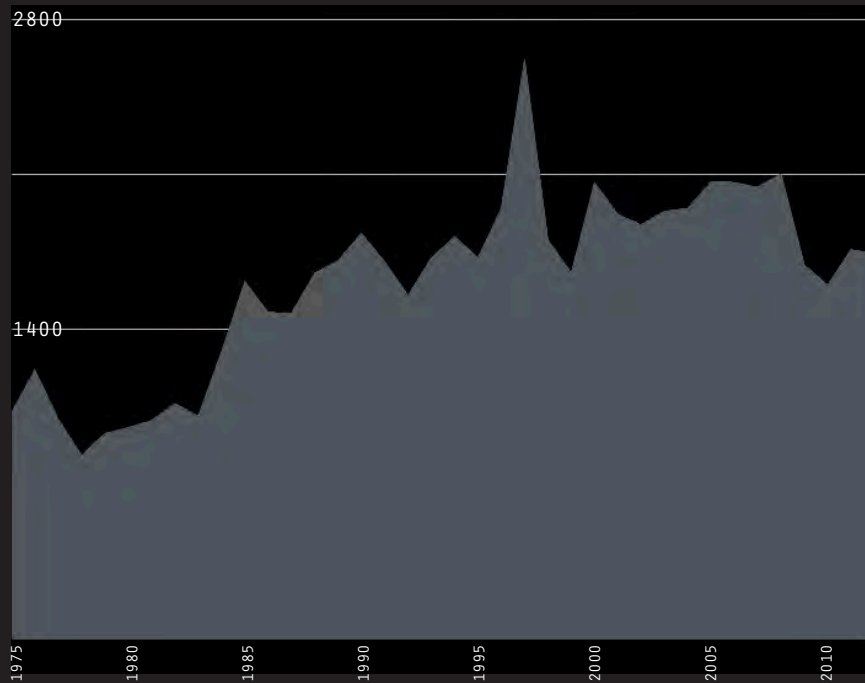
FIG. 38.





CONTAMINATION

PIPELINE SPILLS¹



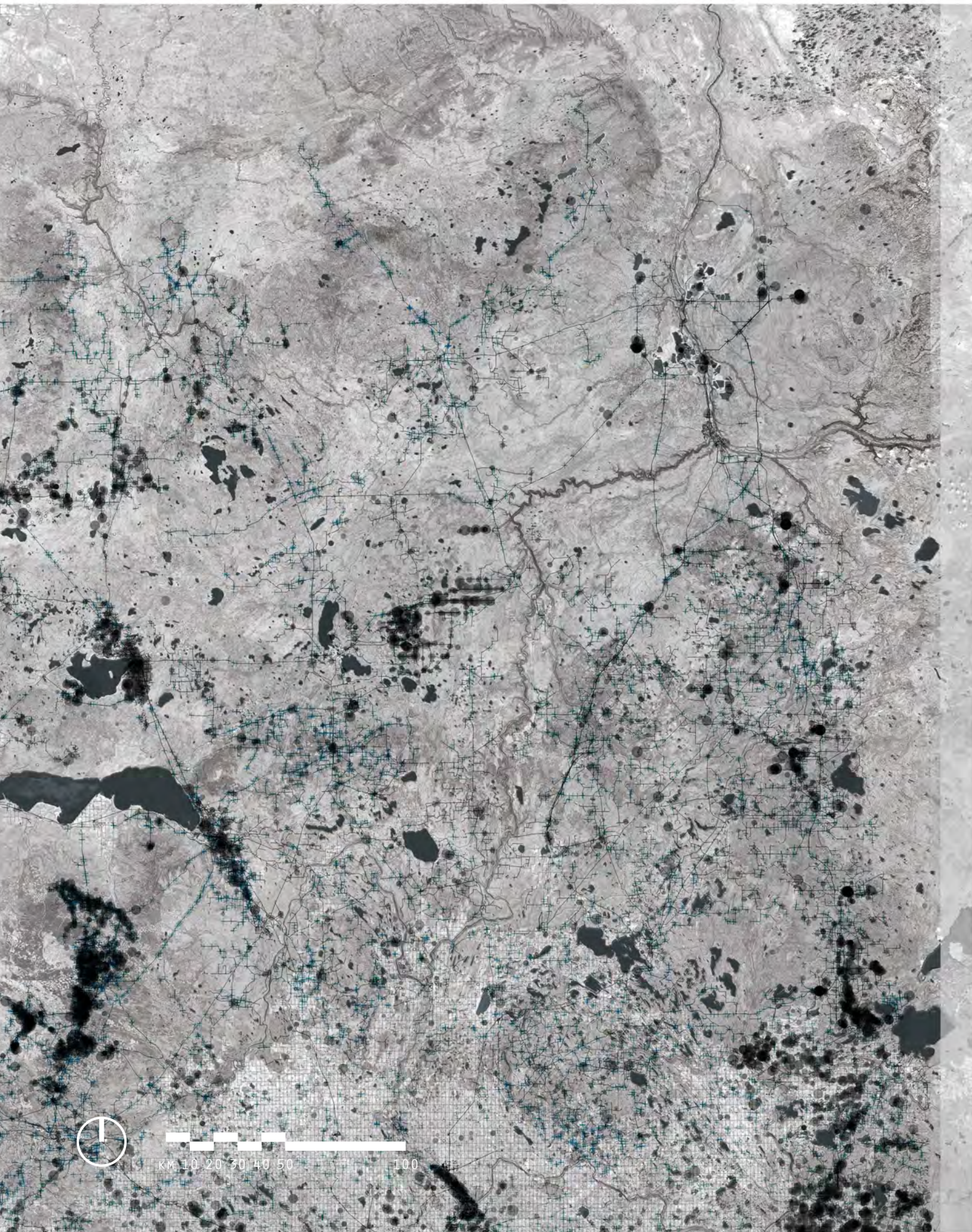
1 Young, "Open Data: Alberta Oil Spills 1975-2013."

PIPELINE SPILLS SINCE 1980 AND
POTENTIAL WATER CONTAMINATION SITES
1:3,500,000

- | | |
|------------------------|----------------------------|
| ● OIL SPILL | ■ PIPELINES |
| ● OIL SPILL > 100 SQM | + PIPELINES CROSSING WATER |
| ● OIL SPILL > 1000 SQM | ■ WELL PADS |
| ● OIL SPILL > 2000 SQM | |

FIG. 39.





FRAGMENTATION

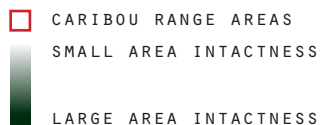
FIG. 40.

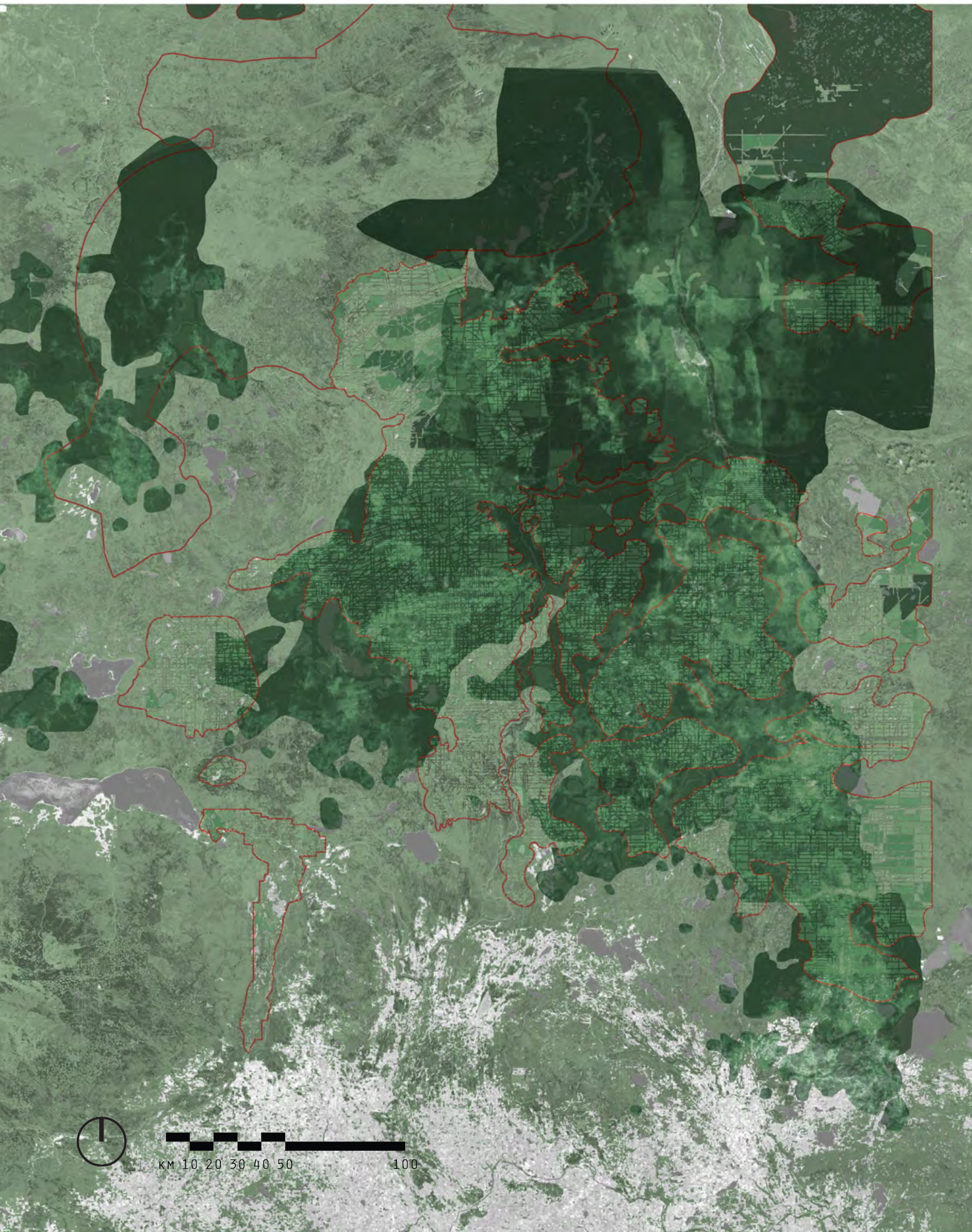
The main effects on the ecosystems covering the deposit region caused by resource extraction activities, including in-situ well pads and associated linear features, are:

- 1) FRAGMENTATION OF THE LANDSCAPE AND DESTRUCTION OF HABITAT
- 2) ALTERED HYDROLOGY BY COMPACTION AND DRAINAGE
- 3) PHYSICAL AND CHEMICAL CHANGES IN SOIL AND WATER PROPERTIES
- 4) ULTIMATE LOSS OF ECOSYSTEM FUNCTION AND SERVICE¹

1 Tarnocai et al. 2009, Vitt and Bhatti 2012 as found in Xu, Bird, "Assessing Peatland Restoration Success to Meet Alberta's Peatland Reclamation Criteria," 14.

HABITAT FRAGMENTATION
INTACT AREA ANALYSIS
1:3,500,000





SCALE II /
REGION //

DEFINING BOUNDARIES

Juliet Fall's work *Drawing the Line* exposes the ontological and methodological rifts between ecologic/scientistic and socio-cultural approaches to defining a boundary around protected spaces.¹ Her work begins by unearthing a dichotomy between bona fide and fiat methodologies of delineating preserved land from vernacular land. Bona fide methods develop boundaries by considering geological or ecological occurrences as the given structure of the land, while fiat methods construct boundaries along cultural understandings of territory and sense of place in the creation of park spaces.²

In the case of Parks Canada, these divergent methodologies are often used in tandem to establish the boundary of a national park. So while the landscapes the parks contain are commonly related to in exclusively naturalistic ways, the true hybridity of these landscapes is revealed by the mosaicked use of fiat, anthropogenic and bona fide, natural boundaries. This relationship is made especially apparent in the boundaries of many of the parks that occur within the populated south where the natural systems the parks contain or identify with are confronted with encroaching and orthogonal land development across their border.

This is reflected in the language and methodologies used to delineate park lands in legislation. The Canada National Parks Act, Schedule 1 provides in writing the locations of each park brought into legislation. The boundary of each park is forged in a combination of linkages of latitudes and longitudes, geographic features (including summits, river forks, stream outlets, lake shores, and on) and township survey borders.³

1 Fall, *Drawing the Line*,

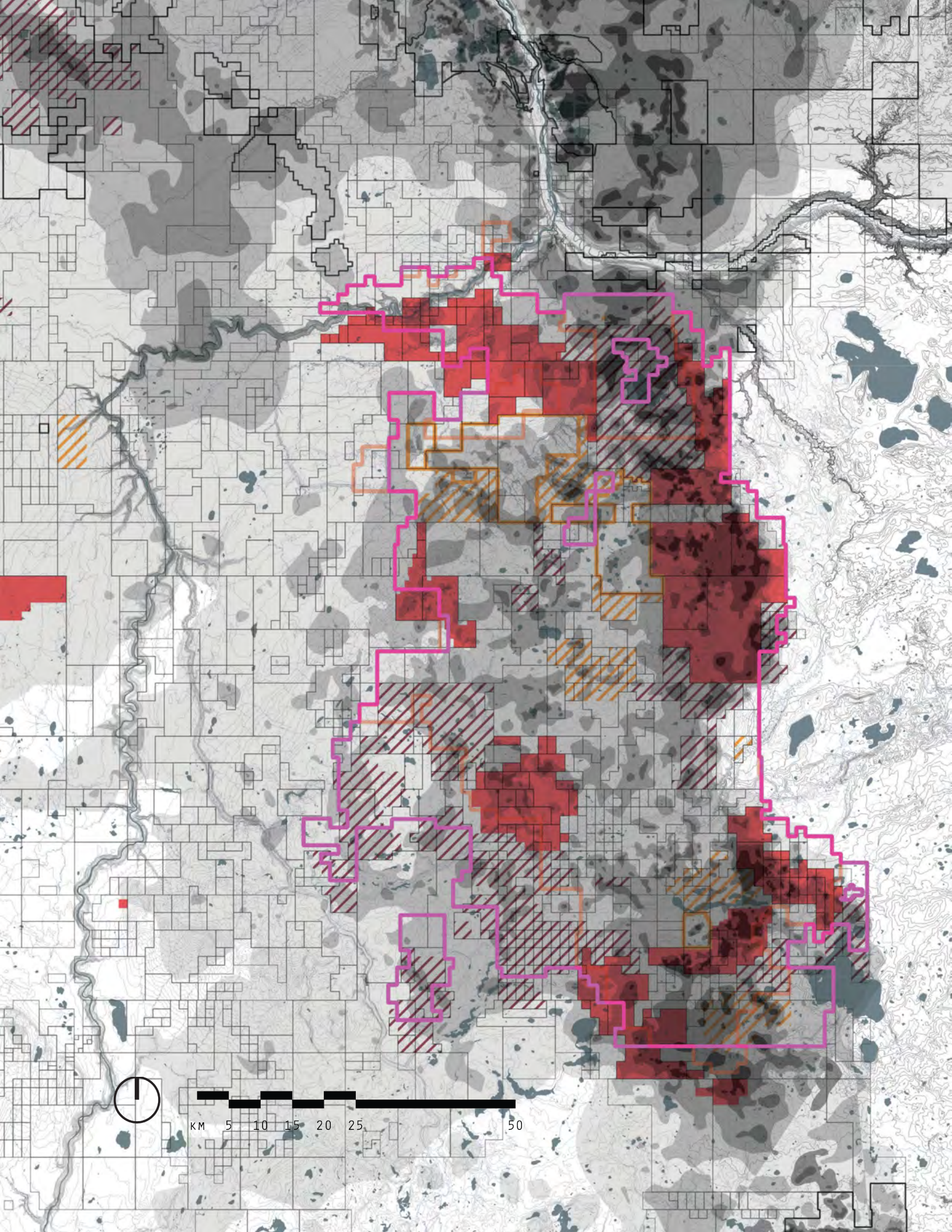
2 Fall, 15.

3 *Canada National Parks Act*.

Like the national parks, the oil sands region expresses a dichotomous bona fide and fiat relationship to the land, however in this case that bona fide relationship is subterranean, with a goal of extraction rather than preservation. Here, the presence and activity of leased land are directly related to the presence and quantity of the subterranean bitumen deposit. These leases have been prospected and sold; lapsed by leaseholders and resold by the province; and consolidated by large corporations into large working areas of extraction, with little regard for the surface characteristics of the land.

In many respects, the scale of the bitumen deposit is masked by the boreal surface covering it. Because the majority of the deposit is only extractable by in situ methods, it remains hidden except for those moments where signs of extraction invade the eye of the passerby. A closer reading of these invasions through GIS reveals the relationship of their presence and structure to the leasing system. Therefore the presence of the Athabasca bitumen deposit is made visible as a landscape *through* the leasing structures of the region. Visible extraction activity is made possible by this invisible anthropogenic overlay; future extraction lands will be bounded in the same way. A Region 40 national park in the Athabasca bitumen lands should represent this relationship, therefore the proposed park boundary is derived by encompassing the boundaries of those in situ leases active, approved and proposed.

Using the exclusively fiat categorization of leases allows the Region 40 national park to expose the primary environmental relationship of a commodified environment *through* the implementation of the park boundary. Consequently, the industrial and natural processes at work within the boundaries of the leases contained by the park add further detail to the extents of the



LEASING BOUNDARIES

1:1,250,000

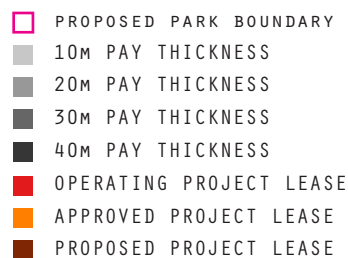
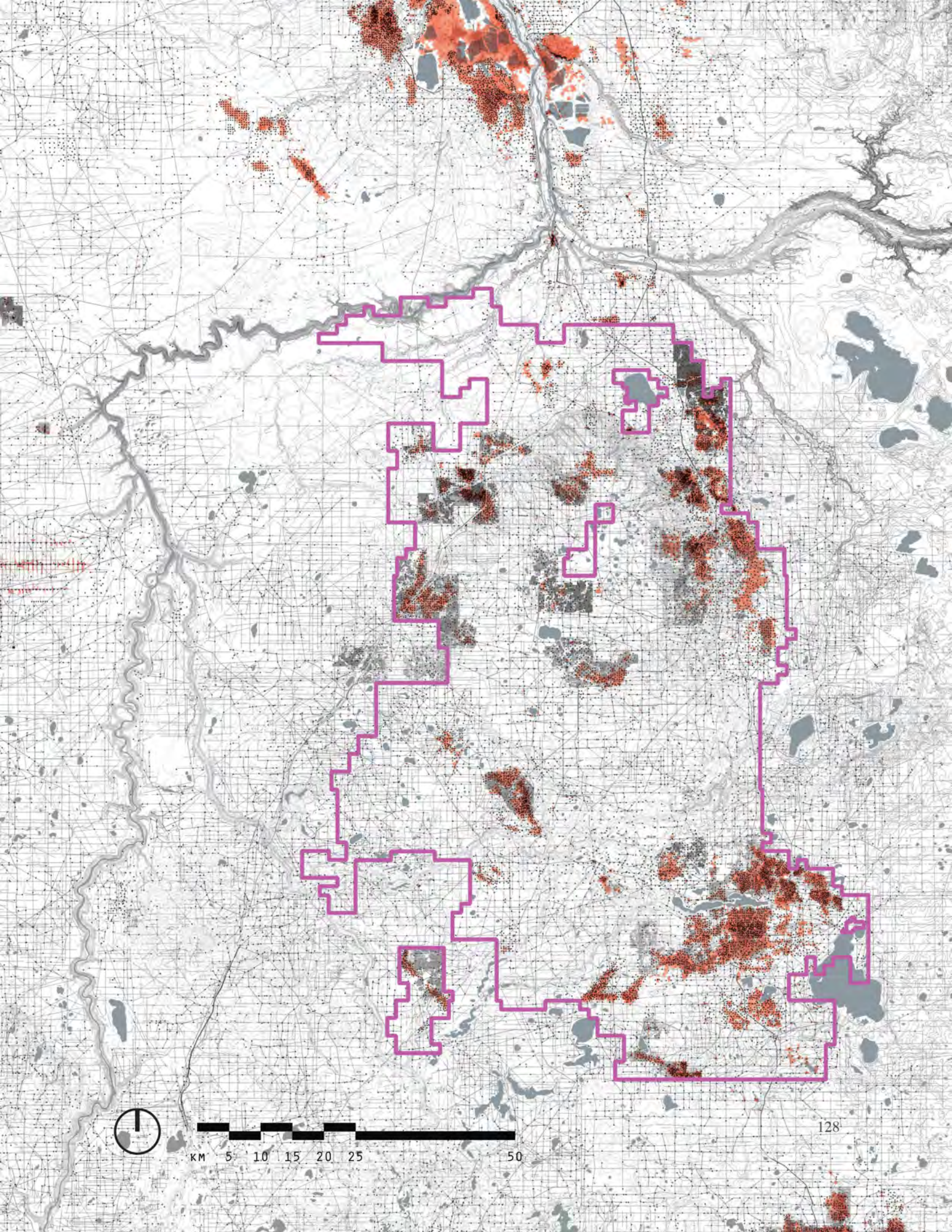
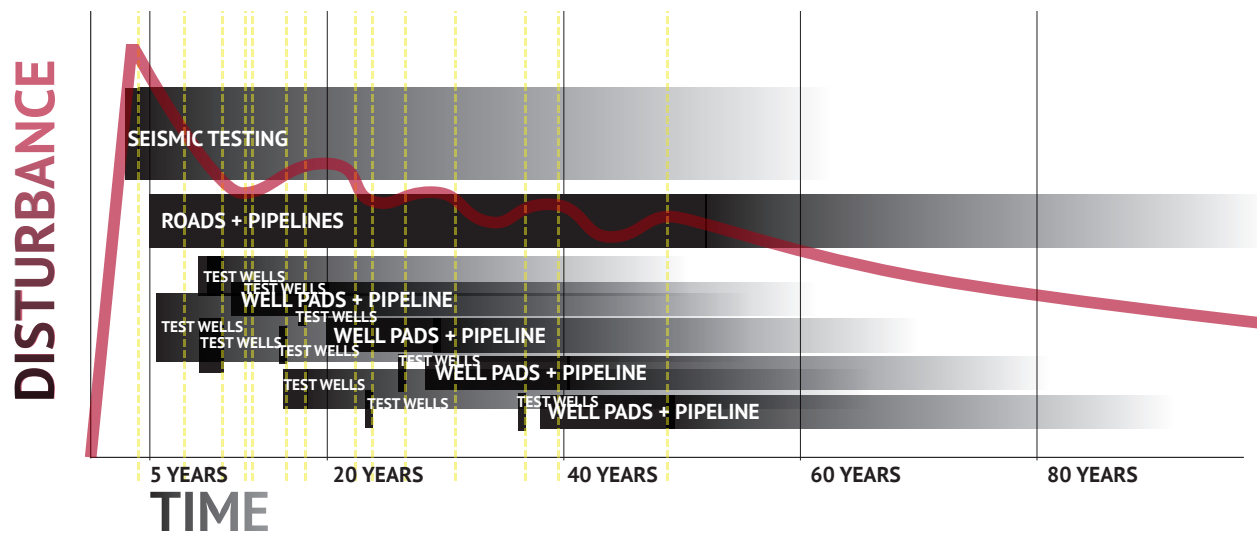


FIG. 41.
LEASING PATTERNS DEFINE THE
BOUNDARIES OF A NATIONAL PARK
IN THE OIL SANDS.

extractive relationship Canadians have to their environment.

The location and boundary of the park derive from a relationship between the anthropogenic and the subterranean spheres of the region. In most of the deposit, the depth to access requires the use of in situ methods to bring the product to the surface. South of Fort McMurray many higher quantity deposit areas have been located. In these areas, up to 40 meters of bitumen is located below hundreds of meters of surficial geology. These pockets inform the present and potential location of the occurrence of active industrial processes in this landscape. The park boundary considers the resulting fractured landscape that results from this temporal relationship between the location of rich bitumen deposit, the technologies required to extract from these locations and their attendant affect on the surrounding landscape, all at the whim of the daily value of the price of oil, patiently waiting for the necessary value to allow for future extraction to continue.





ANTHROPOGENIC
DISTURBANCE
PATTERNS
1:1,250,000

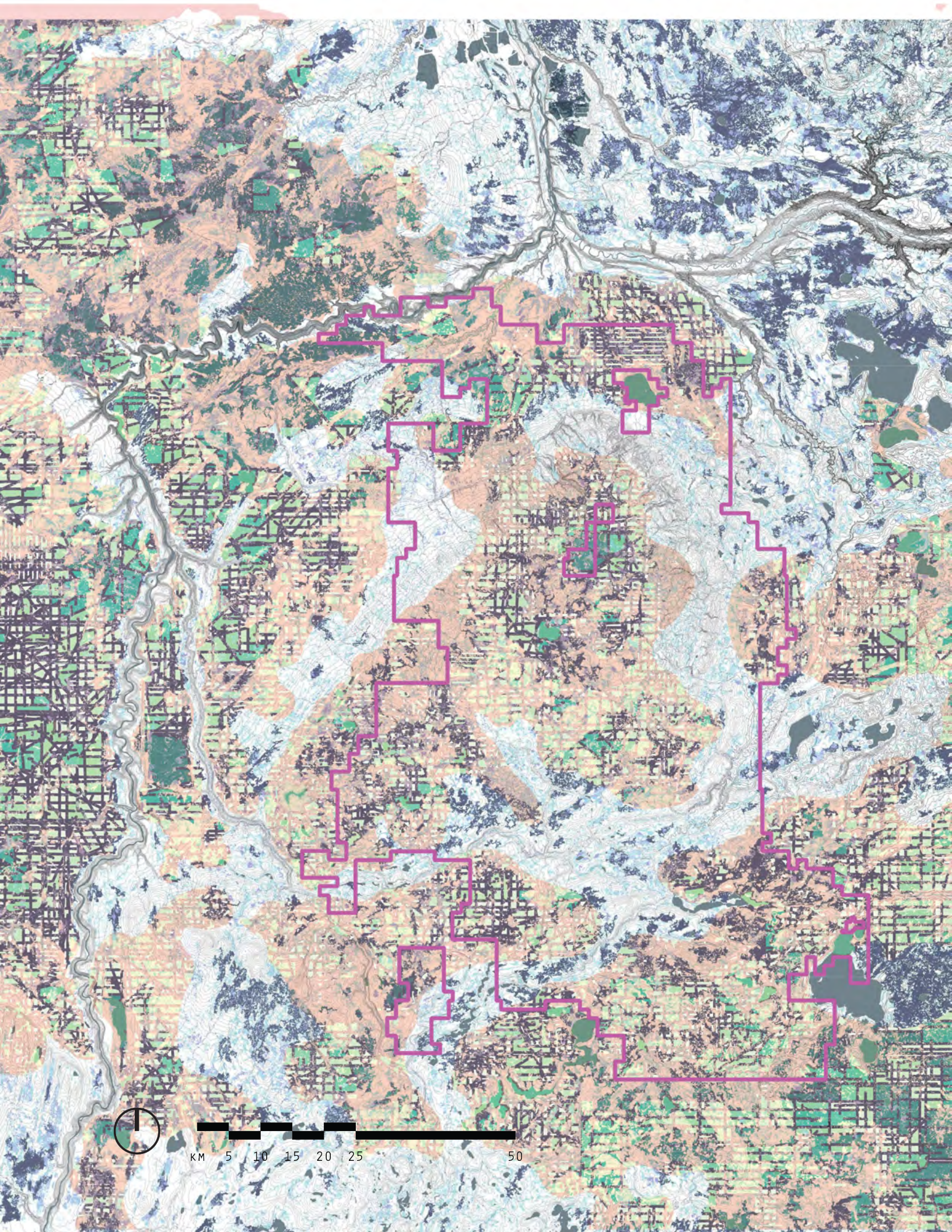
- PROPOSED PARK BOUNDARY
- SEISMIC LINES & PIPELINES
- HIGH DISTURBANCE AREAS

FIG. 42.
TOP: REPRESENTATIVE DIAGRAM
OF THE LIFE-CYCLE OF A
MINING PROJECT JUXTAPOSED
TO THE POTENTIAL IMPACT OF
CLIMATE CHANGE ON THE TREE
COMMUNITIES OF THE REGION.

FIG. 43.
LEFT: INDUSTRIAL PROCESSES
PROLIFERATE THROUGHOUT THE
PROPOSED PARK AREA.

Within the proposed park boundary, a massively distributed collection of hyper site specific locations reflect the broad landscape pattern of extraction. These patterns represent the human interface on the landscape, creating a series of disturbance corridors and patches which fragment the landscape into a multitude of fine scale habitat patches too small to create interior habitat quality at a scale necessary for large mammals to successfully reside.⁴ Critically, this landscape is temporal; various extractive practices present multiple durations of existence and maintenance. Pipelines and roads exist for longer durations yet cause less fragmentation across the landscape than the massive corridor construct that seismic testing requires. Well pads occur intermittently as a project evolves, reflecting the shifting nature of the subterranean substance as it is extracted. These landscape types are often left abandoned and unremediated, creating a network of disturbance to fauna and a multitudinous vector regime for invasive species of flora.

4 Forman, *Land Mosaics*, 413.



ECOLOGICAL DISTURBANCE
PATTERNS
1:1,250,000

- PROPOSED PARK BOUNDARY
- PEATLAND > 1 SQ KM
- PEATLANDS
- CARIBOU RANGES
- INTACT LANDSCAPE PATCHES

FIG. 44.
RESTORING HABITAT
FRAGMENTATION WILL BE A
PRIMARY OBJECTIVE OF A
NATIONAL PARK IN THE OIL
SANDS.

The temporal scale of extraction exposes the mutability of the endemic species composition. This begs the question of how Parks Canada should interpret and instigate reclamation acts to reflect the potential scenario where all current endemic species' core ranges have shifted out of the region by the end of the century.⁵ Recovering these landscapes is crucial to the long term viability of the ecosystem, and providing access to the public to witness this landscape is required to allow for it to be interrogated. Defining this extractive region as a national park rather than a national historic site exposes the landscape to the various priorities that Parks Canada considers when developing and maintaining a site. Region 40 operates as an overlay to the existing region this landscape exists within— in this case Region 12: The Southern Boreal Plains & Plateaux.⁶ Considerations will therefore be given to important communities of flora and fauna endemic to the region. In this region of Canada, the most critically endangered species is the Woodland Caribou, whose range overlaps extensively with the industrial activity of the oil sands.⁷ The future existence of this species in the area is considered an important objective of remediation and preservation plans proposed by the Alberta and Canadian governments.⁸ A priority of the establishment of a national park in this region would be the reconnection of forest landscape to improve landscape interiority⁹ that large species like caribou require, alongside the preservation of large areas of fragile peatlands upon which the caribou relies.¹⁰ Establishing a park also avails the caribou to human resources that can ensure the continuation of their presence in this location through active management, without which the chance of remaining in their

5 Government of Canada, "Canada's Plant Hardiness Site."

6 Parks Canada, *National Parks System Plan*, 36.

7 Russell, Pendlebury, and Ronson, "Alberta's Caribou: A Guide to Range Planning Vol.1: Northeast Alberta,"2.

8 McCarthy, Semeniuk, "Provinces haven't stopped boreal caribou's decline, and Ottawa may have to intervene, report says," *Globe and Mail*.

9 Forman, *Land Mosaics*, 413.

10 Russell, Pendlebury, and Ronson, 1.

historic range is close to nil.

ZONING

Much like the System Plan, the zoning plan Parks Canada developed provides guidance at the same constitutive and operative levels of parks planning.

In the case of the zoning plan, Thede et al. describe through a series of interviews with various Parks Canada employees a framework that remains valuable despite the need for the implementation of critical re-evaluation measures to modernize.¹¹ Thede et al. discovered a number of concerns amongst Parks Canada staff regarding the zoning plan, including, “the layering of dated zoning policies below new management planning policies, and a zoning system that may be spatially much too coarse, and may not offer the flexibility required for ecosystem-based management or adaptive management practices, or may otherwise misalign with these new approaches.”¹² Those interviewed expressed a desire to see the zoning management system incorporate more, “flexibility or adaptability of strategic level zoning by introducing temporal or seasonal zoning”¹³, and that incorporating this flexibility, temporal or otherwise should be, “unambiguously available throughout the system for unique circumstances, proposed uses, or activities.”¹⁴

Critically, Thede et al. determined that:

11 Thede, Haider, and Rutherford, “Zoning in National Parks.”

12 Thede, Haider, and Rutherford, 634.

13 Thede, Haider, and Rutherford, 636.

14 Thede, Haider, and Rutherford, 636.

15 Canadian Parks Service. “National Parks Management Planning Process Manual.” 82-93.

CURRENT PARKS CANADA ZONING CATEGORIES & CRITERIA¹⁵

ZONE I - SPECIAL PRESERVATION

Specific areas or features which deserve special preservation because they contain or support unique, threatened or endangered natural or cultural features, or are among the best examples of the features that represent a natural region. Preservation is the key consideration.

ZONE II - WILDERNESS

Extensive areas which are good representations of a natural region and which will be conserved in a wilderness state. The perpetuation of ecosystems with minimal human interference is the key consideration. Zones I and II will together constitute the majority of the area of all but the smallest national parks, and will make the greatest contribution toward the conservation of ecosystem integrity.

Zone II areas offer opportunities for visitors to experience, first hand, a park's natural and cultural heritage values through outdoor recreation activities which are dependent upon and within the capacity of the park's ecosystems, and which require few, if any, rudimentary services and facilities. Where the area is large enough, visitors will also have the opportunity to experience remoteness and solitude.

ZONE III - NATURAL ENVIRONMENT

Areas which are managed as natural environments, and which provide opportunities for visitors to experience a park's natural and cultural heritage values through outdoor recreation activities requiring minimal services and facilities of a rustic nature. While motorized access may be allowed, it will be controlled. Public transit that facilitates heritage appreciation will be preferred. Park management plans may define provisions for terminating or limiting private motorized access.

ZONE IV - OUTDOOR RECREATION

Limited areas which are capable of accommodating a broad range of opportunities for understanding, appreciation and enjoyment of the park's heritage values and related essential services and facilities, in ways that impact the ecological integrity of the park to the smallest extent possible, and whose defining feature is direct access by motorized vehicles. Park management plans may define provisions for limiting private motorized access and circulation.

ZONE V - PARK SERVICES

Communities in existing national parks which contain a concentration of visitor services and support facilities. Specific activities, services and facilities in this zone will be defined and directed by the community planning process. Major park operation and administrative functions may also be accommodated.

... it became evident that in most cases, park zoning does not set specific objectives towards a desired future state or a vision of a site or ecosystem, but simply preserves the current state or status quo conditions. Land use decisions in older parks predated the zoning system, and zoning was applied after certain human uses and development patterns had been established. Inevitably, in such a situation zoning is predominantly reflective of historic land use rather than concern with ecological or cultural values.¹⁶

This disinclination to consider the future state of parks in zoning management planning reflects the inherent historicism of the ecological integrity framework Parks Canada operates within and will limit the ability for the organization to address Anthropocene changes that all the parks— across all Regions, 1 through 40; present and future will experience.

In *Uncertain Path*, William Tweed outlines three potential scenarios for national parks management in the 21st century. These methods reflect differing attitudes regarding the purpose and meaning of national parks.

First, the historic management practices that still inform the direction of national parks management which holds to the foundational purpose of the system to maintain park lands “unimpaired for future generations”. This approach advocates a “path of minimal intervention, to a path that emphasizes wildness,” or a state of nonintervention where, “much will change... and things will be lost, but letting ecosystems find their own solutions will work best in the long run.”¹⁷ Returning to the concepts outlined in the “Responses to the Anthropocene” section of Part I, this response reflects a solastalgic attitude where change and loss

16 Thede, Haider, and Rutherford, 637.

17 Tweed, *Uncertain Path*, 197.

are accepted, though reluctantly so.

Second, an emergent “good anthropocene” type of response that advocates like ecologist for the USGS, Dr. Stephenson see as a way to anticipate and “manage for change”.¹⁸ This response relies on strategies that prioritize resistance and resilience, or the ability for ecosystems to resist stress and to recover from stress.¹⁹ These strategies would necessitate that parks management play an active role accommodating expected species migration into and out of park boundaries.

A final approach, defined as an “ecosystem museum”²⁰ rests primarily on the public perception of parks as representations of natural systems. This strategy rests on a perceived stasis of ecosystems, where for example a park named Grasslands should contain grasslands, though the anticipated climate shift reflects a transition to semi arid desert conditions.²¹ This approach operates with the intention to “identify and artificially sustain key biological elements in national parks.”²² The author contends that the ecosystem museum approach represents the, “logical outcome of current NPS policy when applied to the problems of the twenty-first century.”²³ This problem exists across the 49th parallel in Canada’s park system as well.

Ultimately Tweed sees the success of the national parks response to the Anthropocene as reliant on a tripartite use of these strategies where, “conflicting demands may require that national parks be divided into management zones that allow the Park Service to pursue all three approaches at once but in different areas or even

18 Tweed, 197.

19 Tweed, 191.

20 Tweed, 198.

21 Rizzo and Wiken, “Assessing the Sensitivity of Canada’s Ecosystems to Climatic Change,” 7.

22 Tweed, 198.

23 Tweed. 199.

sometimes to blend them together.”²⁴

As currently constituted, Parks Canada’s current zoning categories provide only the criteria for spatially accommodating the first and third management scenarios outlined by Tweed. The zoning plan provides five categories for managing park land. The first two categories define the primary function of land for ecological management in either a Special Preservation classification, akin to the ecosystem museum approach described by Tweed, or a Wilderness classification related to the nonintervention approach. Zones three through to five account primarily for the degree to which human activity is permitted within park areas, Zone 3 representing the inflexion point between the ecologically focused Zones 1 and 2 and the touristic focused Zones 4 and 5. None of these zones provides within their categorizations the necessary parameters to zone spaces within parks to accommodate active management practices. This reflects a lack of spatiality in the development of active management.

National parks in the Anthropocene will require a more concerted effort to showcase that the ecological effects of climate change are spatial, and will demand consideration of how to adapt to these changes spatially. Priorities ecological, commercial, or otherwise will have different spatial consequences on the demand for parks to appear a certain way, so adaptations to the zoning plan that reflect the spatial requirements of addressing climate change will need to be made.

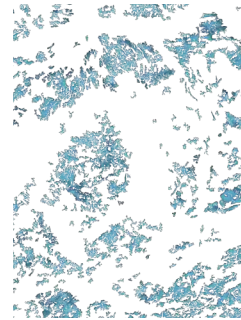
Region 40 parks offer a potential avenue for exploring how adaptive management strategies could become spatially defined in the zoning plan. The disturbed nature of these sites eliminates the pretence of nonintervention on these landscapes; success requires extensive human intervention. These impacted lands can provide

24 Tweed, 201.

a testing ground for the implementation of greater flexibility or adaptability of strategic level zoning, introducing temporality into the administration of zoning categories and developing greater detail within the existing zoning framework.

The following pages render the proposal for a zoning plan within the boundaries of Bitumen National Park, and explores how greater detail can be added to the existing zoning categories as well as the opportunity to introduce new categories that can address the Anthropocene.

ZONE I_A / SPECIAL PRESERVATION



ZONE I_B / SPECIAL RECLAMATION



ZONE II / "WILDERNESS" GRADIENT

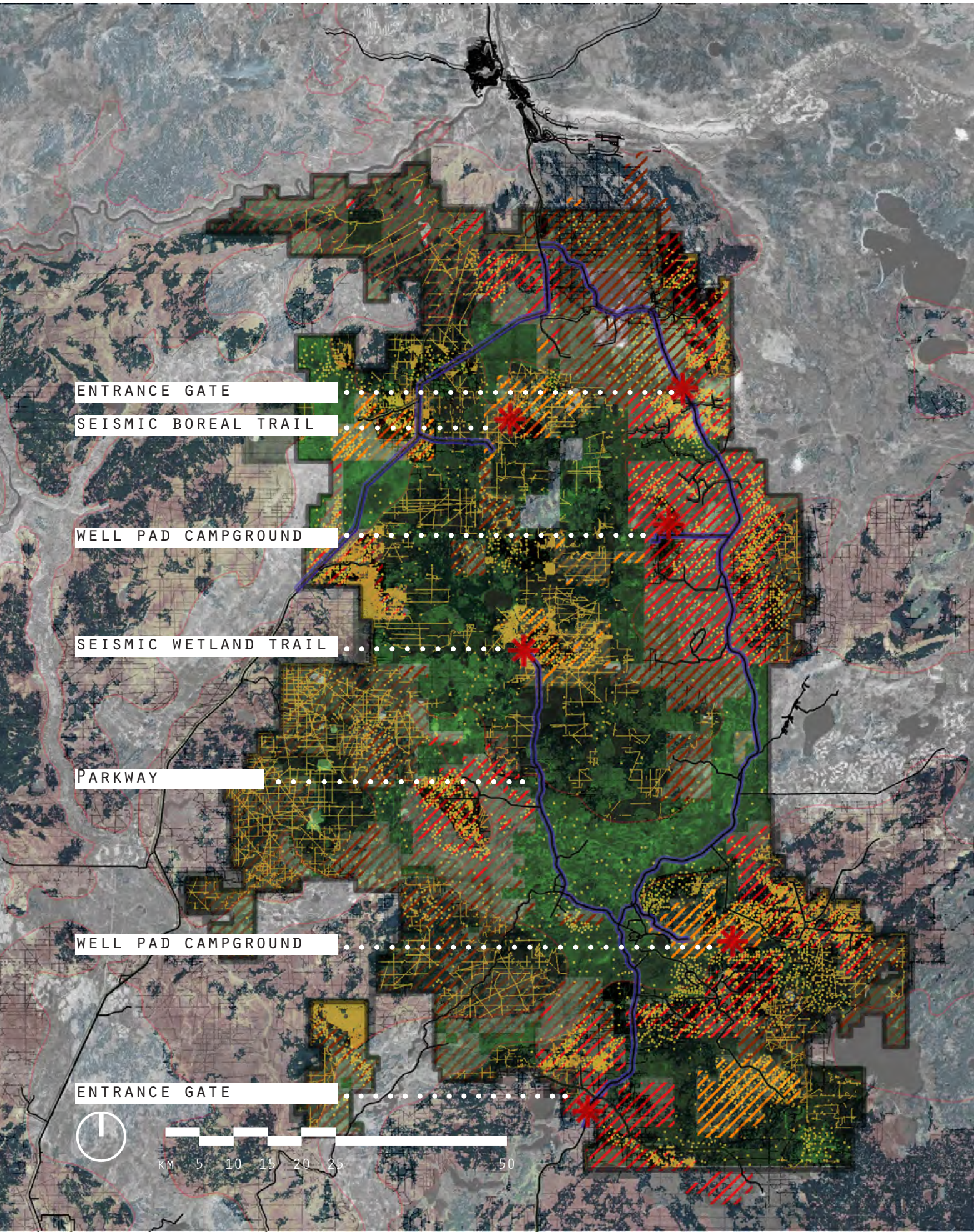


ZONE III / "NATURAL" AREAS



ZONE IV / RECREATION





ENTRANCE GATE

SEISMIC BOREAL TRAIL

WELL PAD CAMPGROUND

SEISMIC WETLAND TRAIL

PARKWAY

WELL PAD CAMPGROUND

ENTRANCE GATE



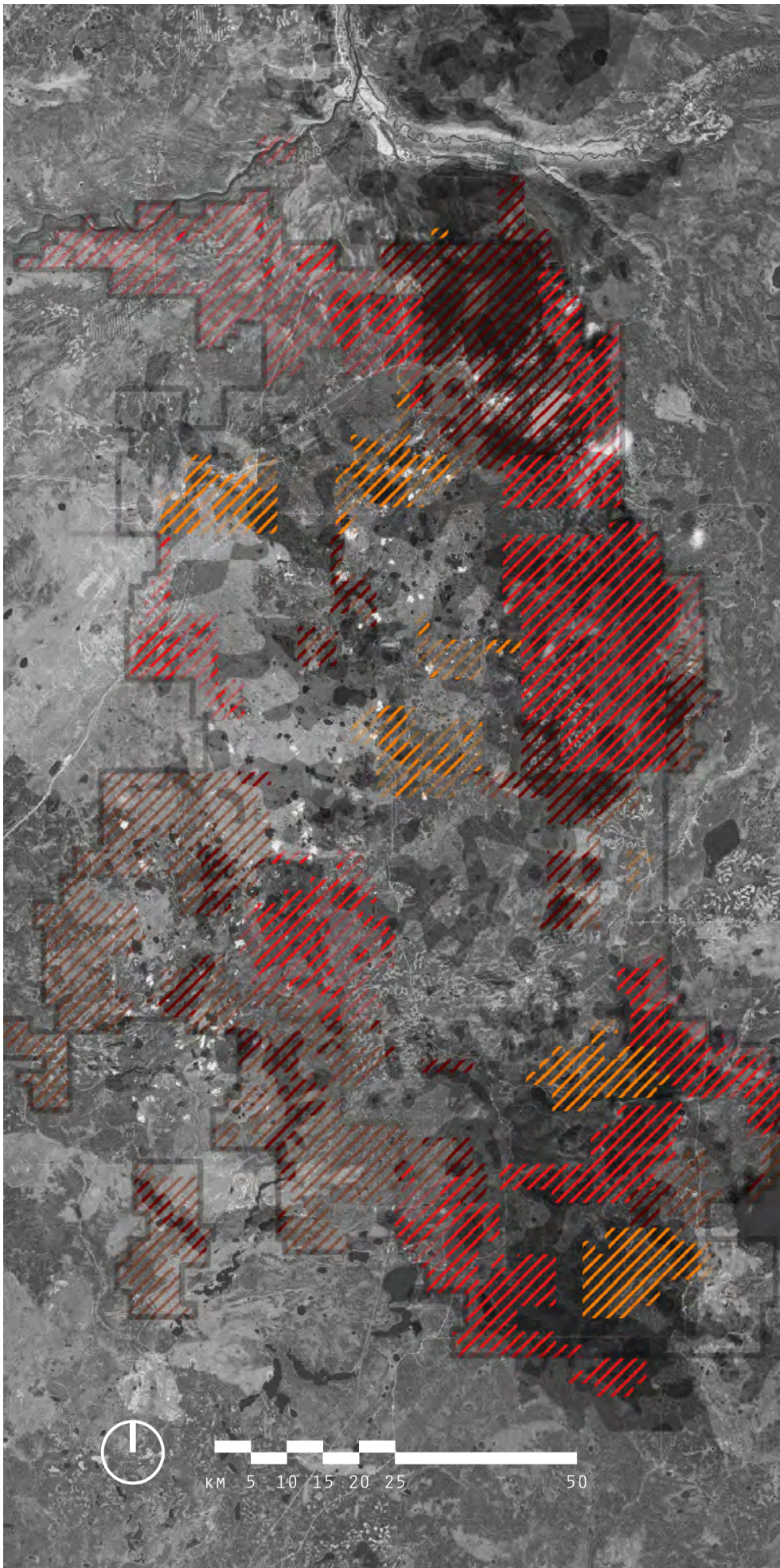
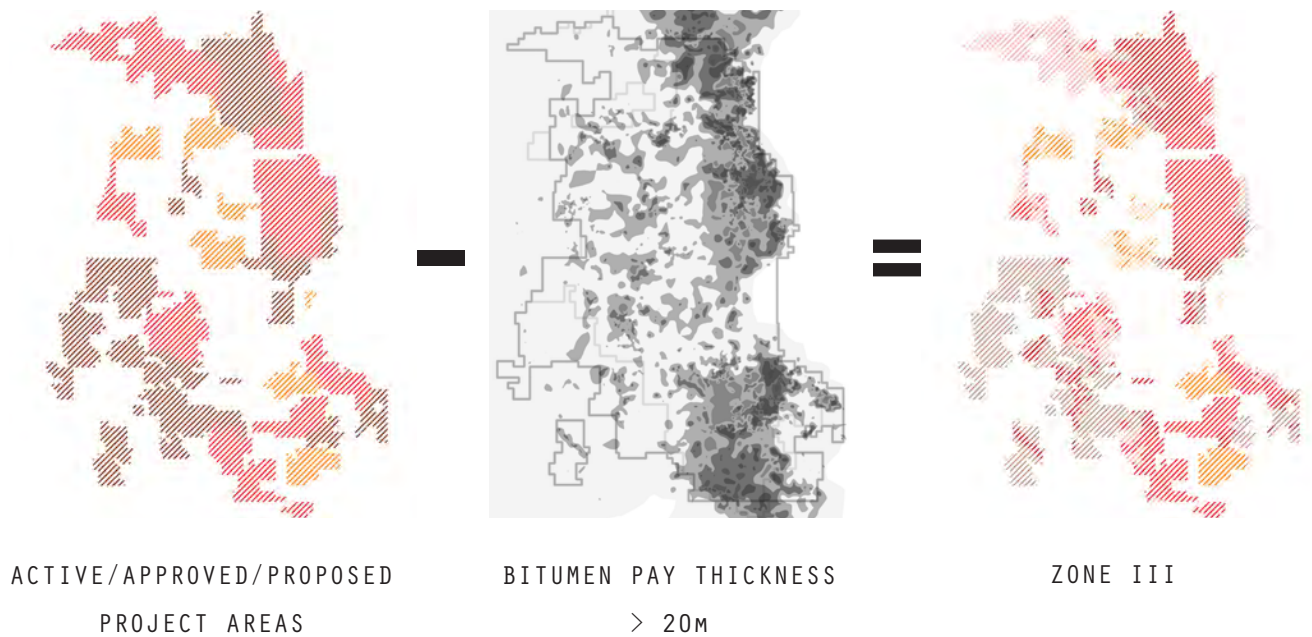


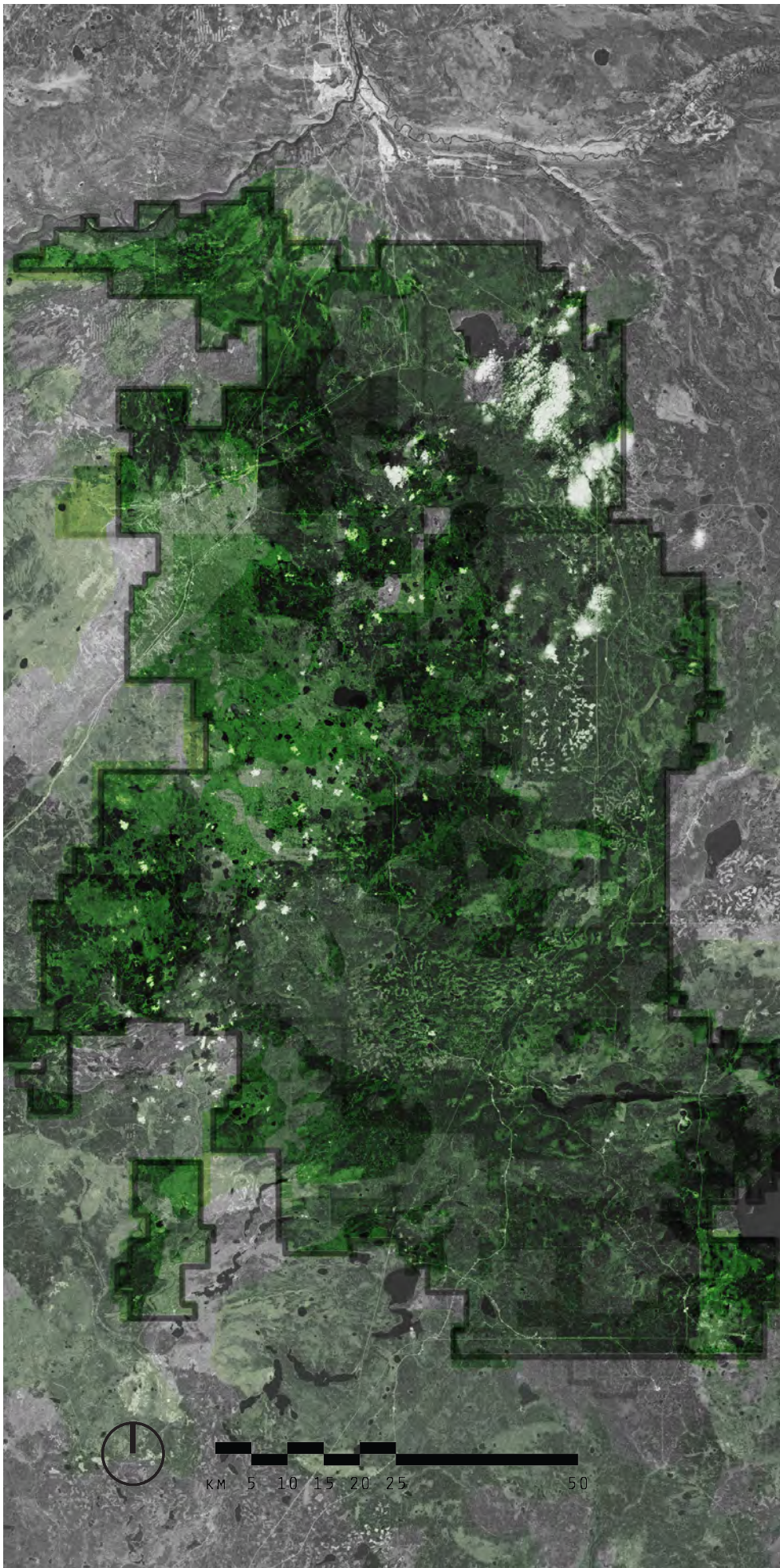
FIG. 45.
LEFT: ZONE 3 AREAS WITHIN
BITUMEN NATIONAL PARK

FIG. 46.
RIGHT: BASIC OVERLAY PROCESS
FOR DEVELOPMENT OF ZONE.



ZONE III / “NATURAL” AREAS

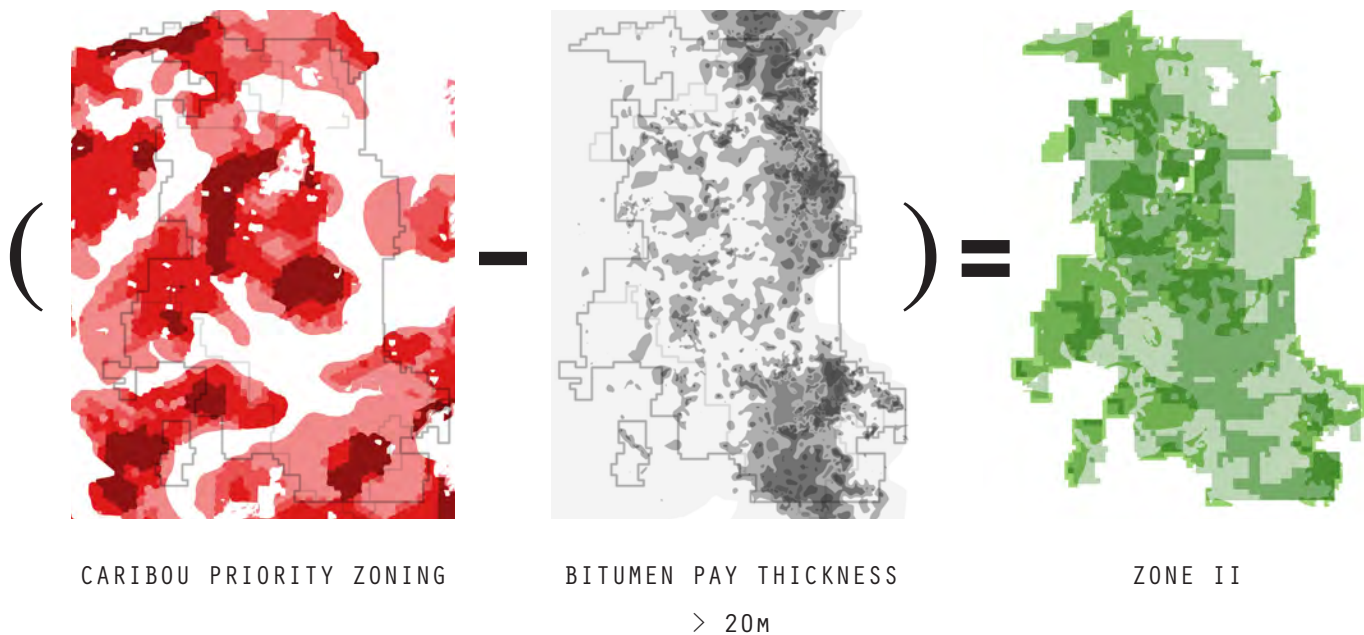
As the transition point between the explicitly ecologically focused Zones 1 & 2 and the predominantly anthropocentric focused Zones 4 & 5, Zone 3 represents the hybrid landscape type. In the context of Region 40, Zone 3 becomes the primary operative landscape for reclaiming Anthropocene regions. In Anthropocene national parks, Zone 3 should be applied in areas where the human / environment interface reflects the most intense overlap. With respect to Bitumen NP, the temporal mosaic of the extraction landscape is expressed through the leasing processes of Active, Approved and Proposed extraction projects, beginning with seismic exploration, to test and operational wells, through to export through pipelines. However, the lease boundaries represent only the limits of ownership and not the scale of potential industrial activity. The correlation between bitumen pay thickness areas greater than 20 metres and current extraction activity reveals with greater accuracy the location of where future extraction projects are likely to occur; the true boundaries of a hybrid Zone 3 are revealed by this correlation.



INACTIVE BITUMEN LEASED
AREAS

FIG. 47.
LEFT: ZONE 2 AREAS WITHIN
BITUMEN NATIONAL PARK

FIG. 48.
RIGHT: BASIC OVERLAY PROCESS
FOR DEVELOPMENT OF ZONE.

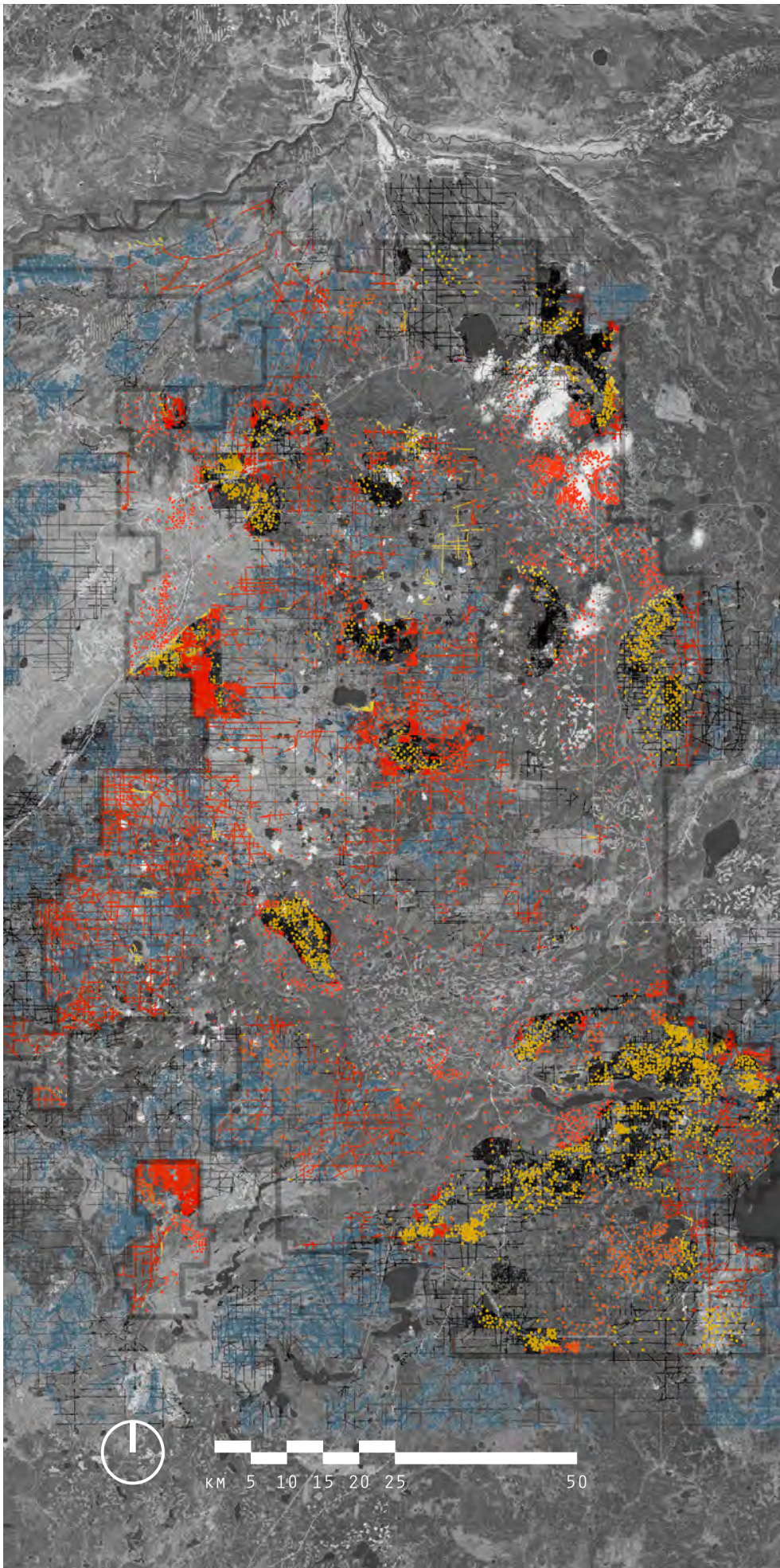


ZONE II / “WILDERNESS”

Wilderness areas in Region 40 parks are expressed through absence more than presence. While this zone continues to define the largest areas of park space,²⁵ it exhibits the extensive effects of extraction processes. In Region 40 parks, Zone 2 areas present an inverse relationship to Zone 3 areas, where they are defined not by the presence of high quality wilderness area *per-se*, but instead are defined by the relative absence of anthropogenic disturbance. Like the Zone 3 areas of Region 40 parks, these areas exist as a gradient of wild states.

In this respect, areas that are over top high bitumen pay thickness areas will be a lower priority to maintain. This creates a harmonized dichotomy of wilds between the areas that can be regenerated to a new hybrid wilderness and the areas that will exist as wilderness by neglect, given their high potential as future sites of extraction. Colour density reflects this relationship, where the darkest green zones will become the hybrid wilderness and the lighter green reflects the neglected wild of prospected resource exploitation.

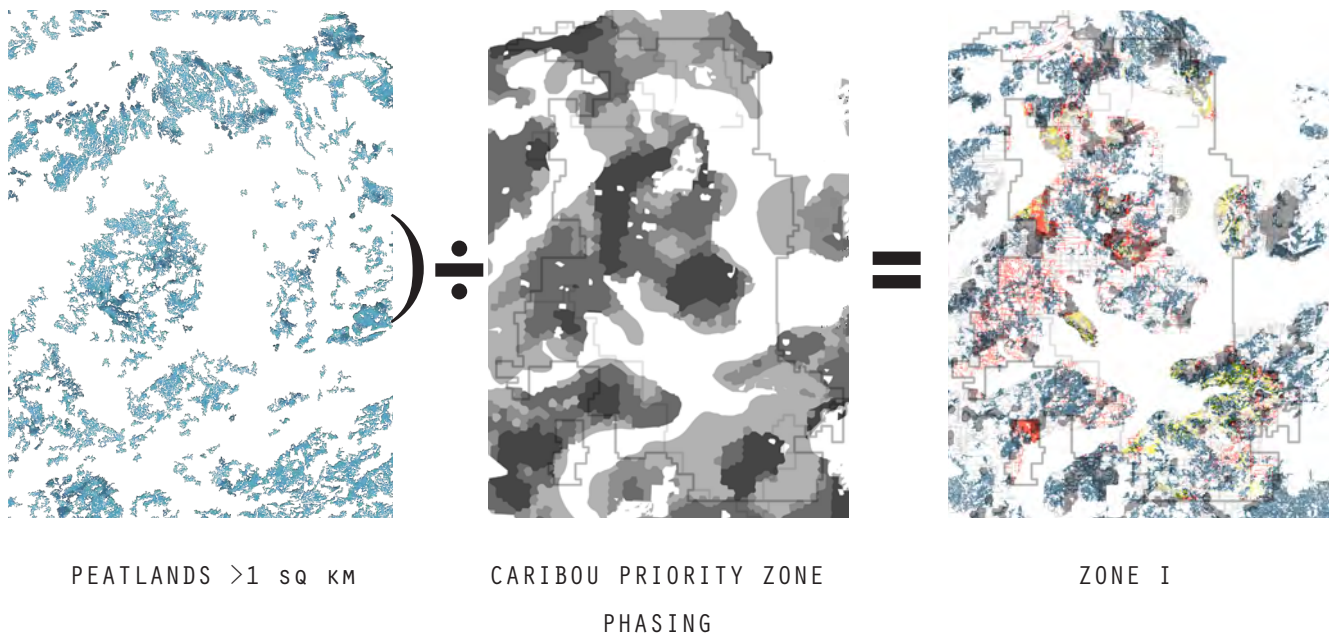
²⁵ Canadian Parks Service, “National Parks Management Planning Process Manual,” 87-89.



EXISTING INDUSTRIAL
DISTURBANCE AREAS

FIG. 49.
LEFT: ZONE 1 AREAS WITHIN
BITUMEN NATIONAL PARK.

FIG. 50.
RIGHT: BASIC OVERLAY PROCESS
FOR DEVELOPMENT OF ZONE.



ZONE 1A+B / SPECIAL RECLAMATION

In Region 40 parks, reclamation must be considered equal to preservation as a primary objective of landscape management. The degraded nature of these landscapes requires special consideration for the restoration of ecological structure, necessitating an expanded Zone 1 classification:

Zone 1A: Preservation and Zone 1B: Reclamation

The dual classifications of Zone 1 are defined by the intense management required to either sustain or regenerate their respective ecologies. Zone 1 landscapes as currently constituted are often inaccessible to the public because of their extreme sensitivity and require a high degree of care. While they are meant to reflect the, “unique, threatened or endangered natural ... areas,”²⁶ their intense management effectively renders them hybrid. Zone

²⁶ Canadian Parks Service, 82-87.



FIG. 51.
LEFT: WOODLAND CARIBOU

COURTESY CC BY-SA:
LAKEATHAPAP, MAY 31, 2014.

FIG. 52.
RIGHT: SPECULATIVE RENDERING
OF PARKS CANADA STAFF
MONITORING CARIBOU WITHIN A
HYBRID PIPELINE RIGHT OF WAY.



1B is also a hybrid zone, where the management requirements of regenerating an ecological system are celebrated.

This celebration requires that Zone 1B landscapes are publicly accessible, as they will showcase reclamation activities required to reestablish the integrity of the landscape. In Bitumen National Park, this new categorization coincides and overlaps with the traditional preservation mandate.

Region 40 parks foreground anthropogenic disturbances in the landscape as part of the continuum of ecological processes acting on the land; reclamation is part of that continuum. Reclamation begins as a human process, and so is reflective of human values. How reclamation is implemented in the Anthropocene, and to what end will determine the success or failure of the capability of many species to exist in their endemic habitats.

Including reclamation as a principal component of landscape zoning ensures that, “a new vision of national parks must come to grips with the idea that in many cases we are most likely to save those elements that we actively manage.”²⁷

27 Tweed, 196.

CARIBOU PRIORITY 4 AREAS
BECOME RESILIENT FOREST
PRODUCTION AREAS



Implementing a national park establishes certain conservation goals in the region regarding endangered species and habitats that would allow for more intense management of caribou populations and their ecosystems in the oil sands area, which otherwise would not occur.

Zone 1A considers the sensitivity and necessity of preserving peat lands for posterity. Intact peat lands above one sq km in area are to be especially considered for preservation zoning given the large interiority of habitat that they provide for woodland caribou as well as the greater resilience of the peat system in larger intact areas.

The strategy for implementing Zone 1B relies on the Canadian Parks And Wilderness Society report “Alberta’s Caribou: A Guide to Range Planning” detailing the plight of woodland caribou in the extraction lands of Alberta. The report develops a priority zoning schema for reclaiming industrially impacted areas to 65% undisturbed habitat within each range in Alberta, based on the occurrence of active and projected mining projects, and the quality of current habitat.²⁸ Zone 1B takes those recommendations and

FIG. 53.
TOP: PHASING SCENARIO FOR
THE COMPLETION OF THE ZONE 1
RECLAMATION FRAMEWORK.

ADAPTED FROM:
RUSSELL, PENDLEBURY, AND
RONSON, “ALBERTA’S CARIBOU:
A GUIDE TO RANGE PLANNING
VOL.1: NORTHEAST ALBERTA,”
31.

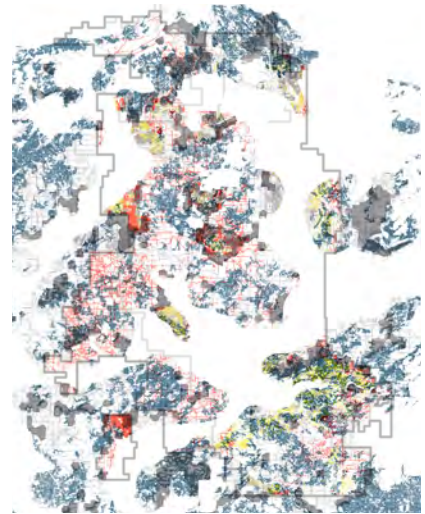
28 Russell, Pendlebury, and Ronson, “Alberta’s Caribou: A Guide to Range



CARIBOU PRIORITY 1 AREAS



CARIBOU PRIORITY 2 AREAS



CARIBOU PRIORITY 3 AREAS

tweaks the timing of their implementation.

In this proposal, Priority 4 areas, which constitute the areas most intensely anthropogenic and least accommodating to caribou become the primary vehicle for implementing the reclamation of the higher priority zones through the development of a reforestation program. The industrial voids of abandoned well pads and legacy seismic lines in Priority 4 areas are re-purposed as tree plantations that will produce the raw material of reclamation for the Priority Zones 1 through 3. These plantations will double as research centres for Parks Canada to understand how climate change is affecting both endemic and migratory species in the region. The results of the research will help develop a program for delivering resilient forest communities to future reclamation sites.

As the program evolves, secondary and tertiary Caribou Priority zones will receive resilient planting over time to produce a completed matrix of Zone 1 reclamation and preservation. These sites will continue to be monitored and evaluated under the management responsibility of Parks Canada.

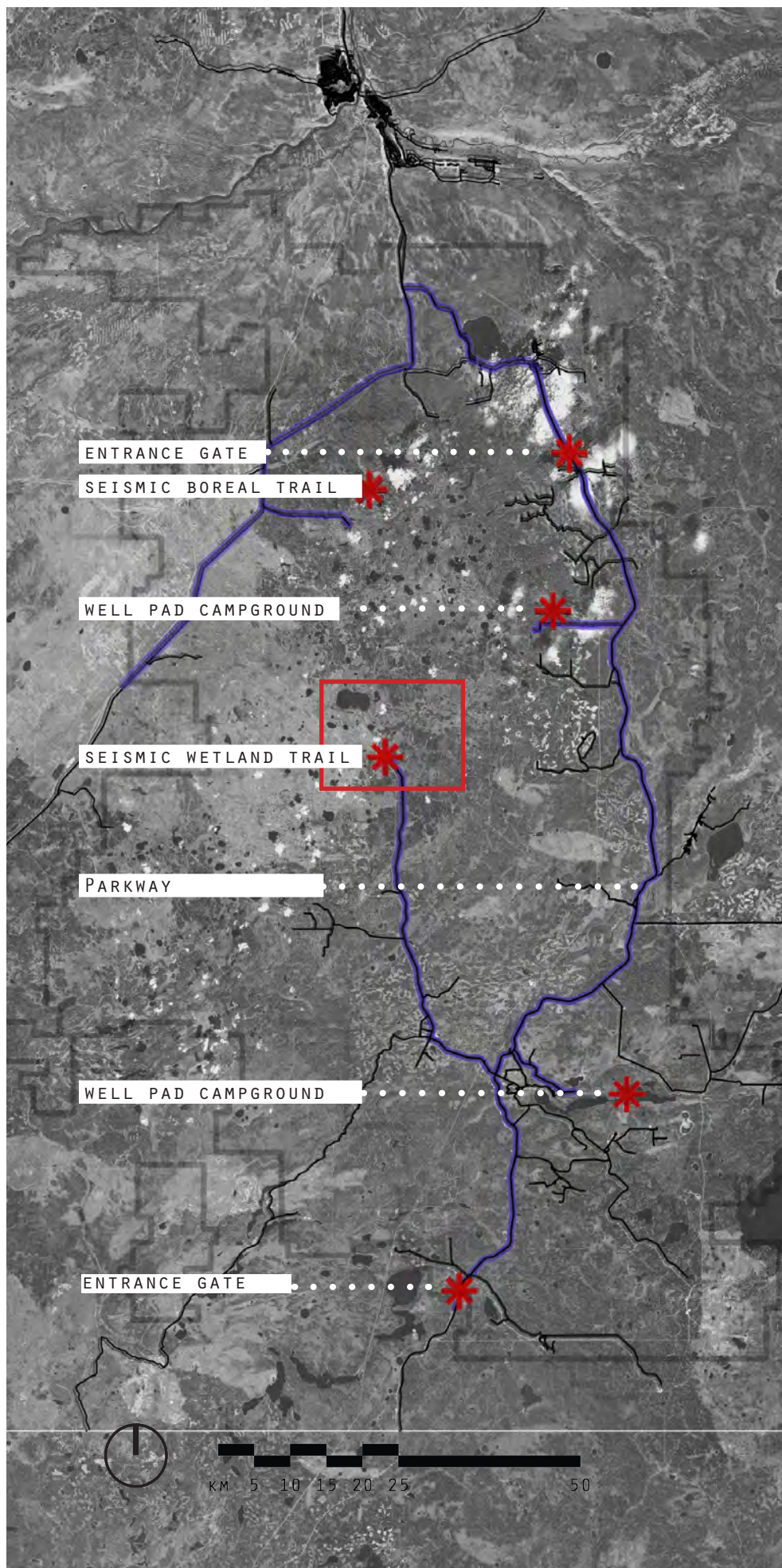


FIG. 54.
ZONE 4 AREAS WITHIN BITUMEN
NATIONAL PARK.

ZONE IV / RECREATION

The purpose of Zone 4 as, “limited areas which are capable of accommodating a broad range of opportunities for understanding, appreciation and enjoyment of the park’s heritage values and related essential services and facilities,”²⁹ will remain consistent in Region 40 parks. Highway 881, the back road highway leading to Fort McMurray will be repurposed as a parkway through the extraction landscape. Here speeds are slowed down to allow for the landscape the opportunity to reveal itself to the passerby. Sites along the parkway will be developed for interpretive purposes, including the implementation of built assets such as visitor entrance gates, camping facilities, and interpretive trails. Each of these program types will traverse through intensely used industrial space as well as less degraded, more intact landscape to provide the full panorama of how the Athabasca bitumen deposit is currently extracted.

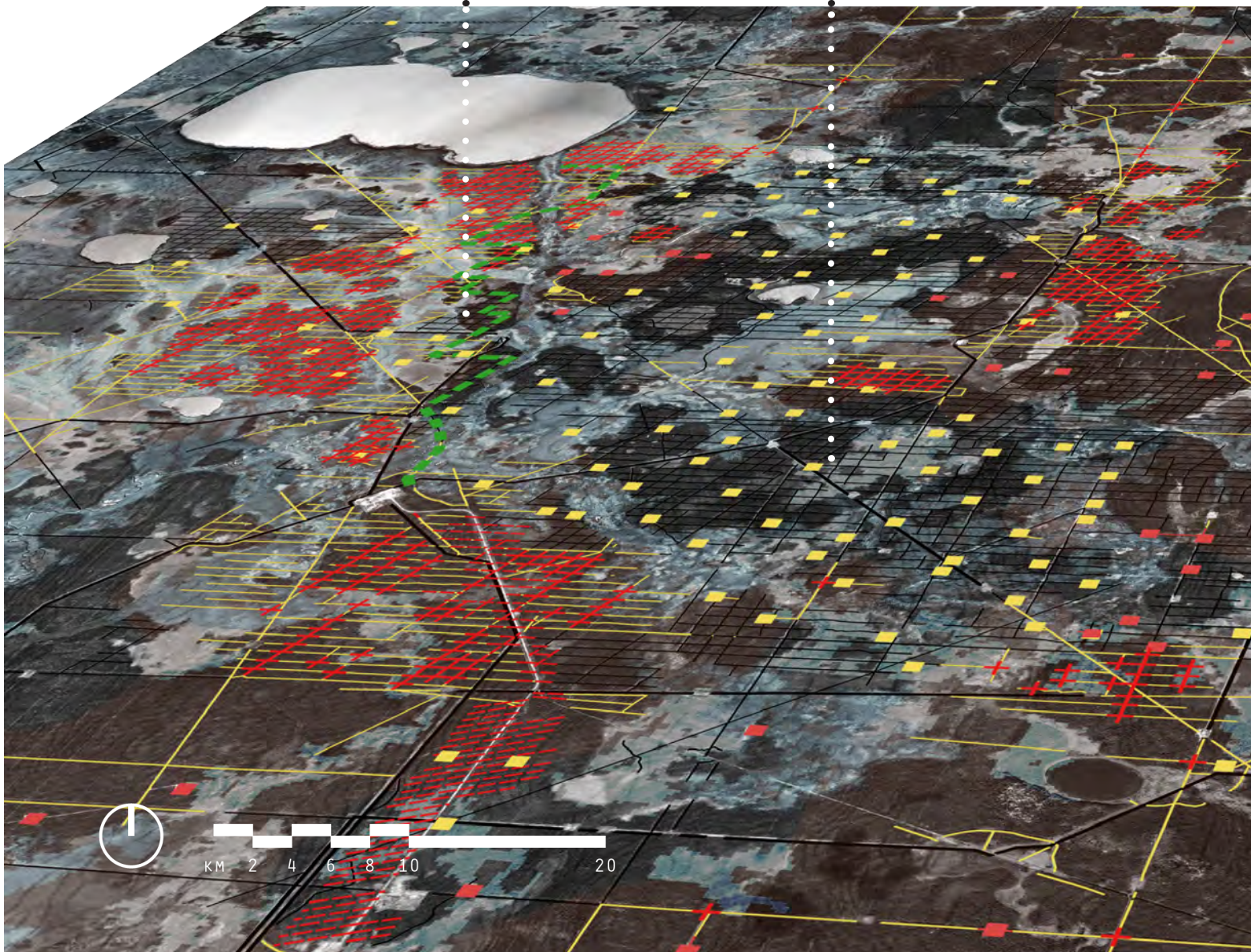
29 Canadian Parks Service, 91-92.

FIG. 55.

REPRESENTATIVE AREA LANDSCAPE PLAN IMPLEMENTATION

Interpretive Trail location
utilizing the existing
seismic incursion as
the determinant of path
routing.

Abandoned well pads
to be used as locations
of tree nurseries. These
sites exist in locations
where the Deposit Pay
Thickness is such that
further degradation is
likely to occur over the
lifespan of a project.



•

•
•
•
•
•
•
•
•
•

.....

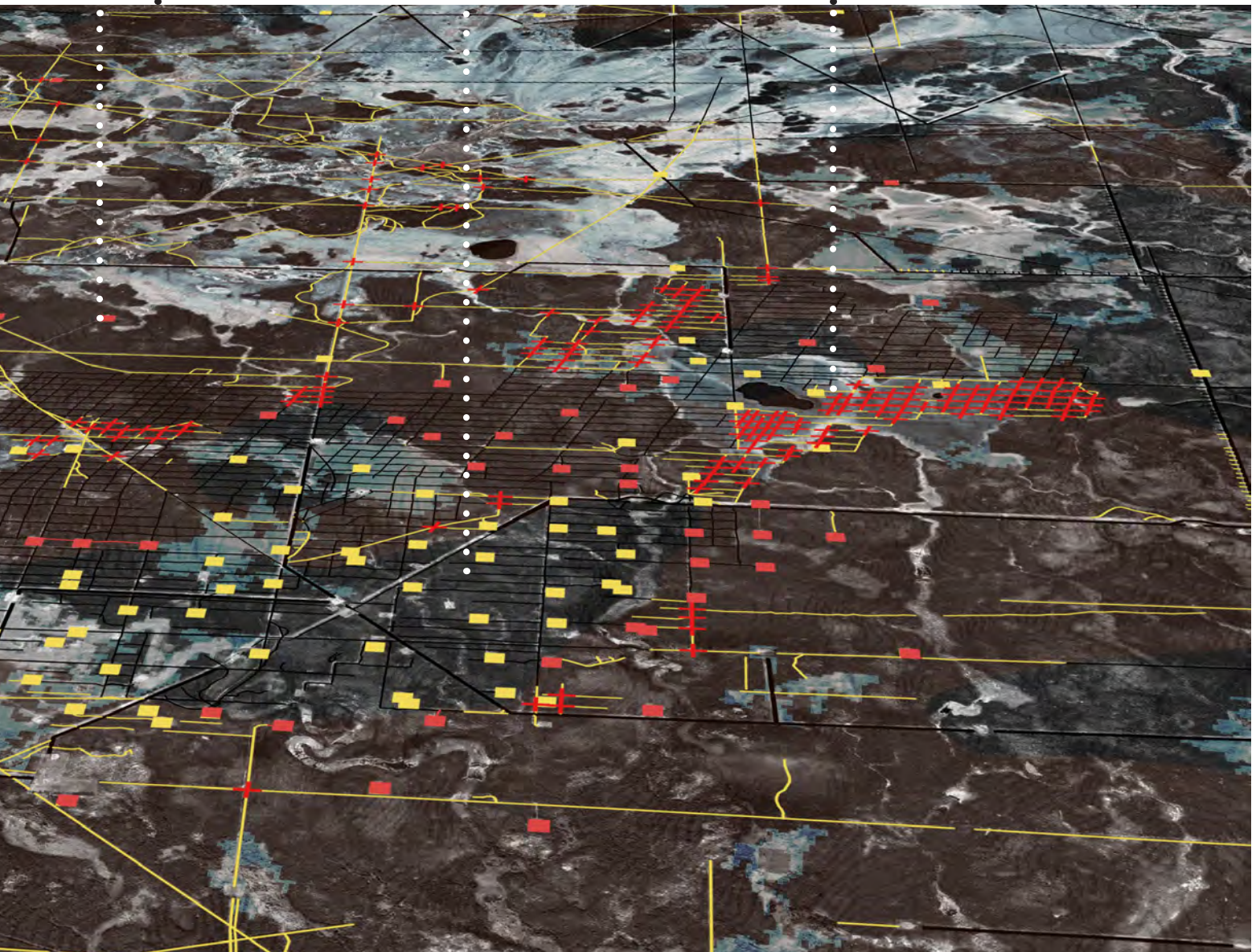




FIG. 56.
COLLAGE; HOW WILL PEOPLE
BE INSERT THEMSELVES INTO A
NATIONAL EXTRACTION LANDSCAPE?

SCALE III /
SITES //





FIG. 57.
TOP: COLLAGE; THE RED CHAIRS
REPRESENT A SIGNATURE PARKS
CANADA PROMOTIONAL TOOL.
REMEDIATION LANDSCAPES BECOME
A PHOTO OPPORTUNITY.

FIG. 58.
LEFT: DIGITAL COLLAGE; HOW
CAN THE LANDSCAPE BE USED
TO CREATE A CONTEMPLATIVE
EXPERIENCE OF AN ACTIVE
INDUSTRIAL PROCESS?

While zoning defines spatial relationships within a national park at the broad scale, how a park is understood, interacted with, and value is determined by the relationships visitors develop with spaces at finer scales. Within a national park, the objective of recreation areas is to afford visitors the potential to deeply connect with the landscape they are in. This is often manifested through the use of interpretive trails, camping facilities and through vehicular parkways. Tourism can be seen as a conflicting program when considering the ecological objectives of a park, given the presence of human interface is often at the expense of areas of habitat. But without that contact with the landscape, the values of the national parks would not be retained. Access to the parks can instill in people that appreciation for the environment can exist beyond the boundaries of the parks themselves and that treating our environment with more compassion does not need to be relegated to these crown jewels alone; in the case of Region 40, this access is especially important. Only through engaging with the landscape will its truths become evident.

As such Region 40 parks showcase the effects and causes of the Anthropocene on the environment. Accessing degraded landscapes and interpreting them as a component of a national ecognosis

offers the opportunity for the re-interpretation of these landscapes in an ongoing process. These landscapes require witness to understand their scope and effect on the environment, but this exposure also opens up a dialogue between the visitor and the national park regarding the re-interpretation of this landscape and the “rescaping [of] our relationship to nature and the “other” through the construction of built worlds.”¹ The implications of this interaction on the national ecognosis revolve around how the Anthropocene reorders the composition and function of local ecosystems both through the immediate impositions of extraction and the broader global changes wrought by the use of extracted material on continental systems. How these impositions are reinterpreted becomes a means for addressing their existence and questioning how their remediation can assist in addressing the damage caused by their creation.

FUTURE FORESTS

One of the primary concerns of the Anthropocene is how (or if) the ecological systems of the planet will respond to the intense pressure humans have put on them in a rapidly changing climate regime. Trees are among the species most at risk of being devastated by the pace of change given that their migratory capacities are incredibly slow moving relative to the migration of the climate zones.

In Canada, the climate shift will move primarily northward, which will put serious pressure on the identity and composition of the boreal forest in dramatic ways, including the potential disappearance of the Black spruce from the southern ranges around Fort McMurray (Fig. 62). These changes will be apparent

1 Corner and Hirsch, *The landscape imagination*, 101.

FORESTS ARE
CLIMATE
SENSITIVE, AND
A RANGE OF
CLIMATE CHANGE
IMPACTS ARE
ALREADY EVIDENT
ACROSS CANADA.
TREES APPEAR TO
BE RESPONDING
TO WARMING
TEMPERATURES BY
DISPERSING INTO
MORE CLIMATICALLY
SUITABLE
HABITATS.
HOWEVER, SOME
POPULATIONS
WILL BE UNABLE
TO KEEP UP WITH
THE RAPID RATE
OF ENVIRONMENTAL
CHANGE.

NATURAL RESOURCES
CANADA

at multiple stages and scales as various species will experience the effects of range migration at different rates of temporality.

Natural Resources Canada provides species range shift modelling of various scenarios, including a plant hardiness tool that provides species shift projections based on ANUCLIM models showing how a species climatic range is predicted to shift as it overlaps a selected location on the North American continent². In the case of this study, the location selected is Fort McMurray. The graphic representation that Natural Resources Canada provides through its website reflects an extreme projection: the fifth assessment RCP 8.5 scenario:

The RCP 8.5 scenario combines assumptions about high population and relatively slow income growth with modest rates of technological change and energy intensity improvements, leading in the long term to high energy demand and GHG emissions in absence of climate change policies. Compared to the total set of Representative Concentration Pathways (RCPs), RCP 8.5 thus corresponds to the pathway with the highest greenhouse gas emissions³.

This scenario is simply the Do Nothing scenario, the worst case scenario; the scenario most likely to catapult society into Rizzo and Wiken's 600ppm carbon dioxide Ecoprovincial shift.⁴ With the constant bombardment of news highlighting the unprecedented rapidness of change already occurring, it is a likely scenario.

The disparate rates of change between the climate and terrestrial ecology pose a dramatic problem: how to ensure the long term

2 Government of Canada, "Canada's Plant Hardiness Site."

3 Riahi et al., "RCP 8.5—A Scenario of Comparatively High Greenhouse Gas Emissions."

4 Rizzo and Wiken, "Assessing the Sensitivity of Canada's Ecosystems to Climatic Change," 7.

viability of the ecological systems of the earth? They will likely not be able to respond to the rapidity of change on their own. The solutions will certainly require anthropogenic intervention and the development of hybridized ecosystems.

Natural Resources Canada defines three types of assisted migration, which reflect a temporal scale shift as well as a risk factor, where the risk of failure increases as the time frame considered expands:

Assisted population migration—The human-assisted movement of populations within a species' established range—Lower risk

Assisted range expansion—The human-assisted movement of species to areas just outside their established range, facilitating or mimicking natural range expansion—Intermediate risk

Assisted long-distance migration—The human-assisted movement of species to areas far outside their established range (beyond areas accessible through natural dispersal)—Higher risk⁵

Within the forests atop the oil sands, it is anticipated that forest composition will change from a highly coniferous boreal condition to a transitional deciduous forest. This change will be very difficult and likely involve detrimental impacts to overall forest health. Softening the impacts of this shift will require human intervention. In an ironic twist, the clearing of hectares of forest for extraction provides a landscape system of dispersed plots of land that require reforestation. Well pads offer a unique opportunity for implementing an assisted migration program in Bitumen National Park. First, many of these locations are left in an abandoned state

5 “Assisted Migration,” Natural Resources Canada.

awaiting the required remediation to current states. As indicated earlier (see Fig. 42) reclamation is the final step of an industrial ecological process that can take up to half a century before implementation, necessitating a reconsideration about what state should be considered. The landscape cannot be put back to what it was; the original state disappeared with the trees.

This proposal seeks to develop an assisted migration program that utilizes post extractive landscapes - already denatured - as the vehicle to explore each of these strategies in combinatorial iterations. As a representation of the application of this strategy, tree species were specifically considered to showcase the potential response mechanisms to this climate shift, and how reforestation will have to consider resilience as a gradient of species between the current climate and future extremes.

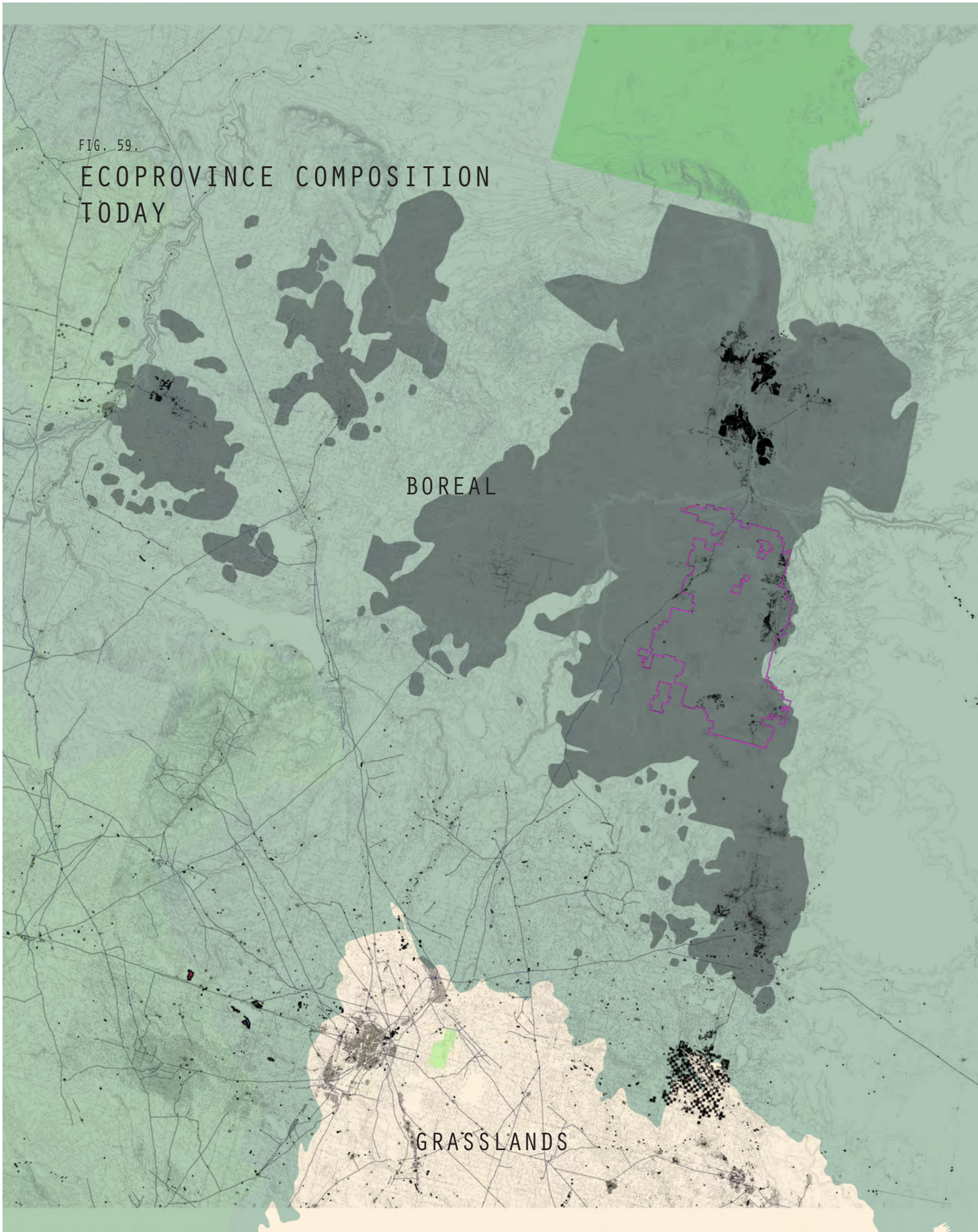
Implementing assisted migration techniques to create future forests within these denuded sites serves the purpose of rehabilitating these lost landscapes while questioning the evolving state of the earth created by industrial activity. By implementing all three assisted migration techniques in concert, resiliency is built into the process so that the success of the forest rehabilitation is not dependent on accommodating one scenario. This involves developing nurseries and planting forest mosaics that seem out of place in the surrounding boreal forest. The contrast of these plantations serve as a signpost to the futures we are creating, and may encounter.

FIG. 59.

ECOPROVINCE COMPOSITION TODAY

BOREAL

GRASSLANDS



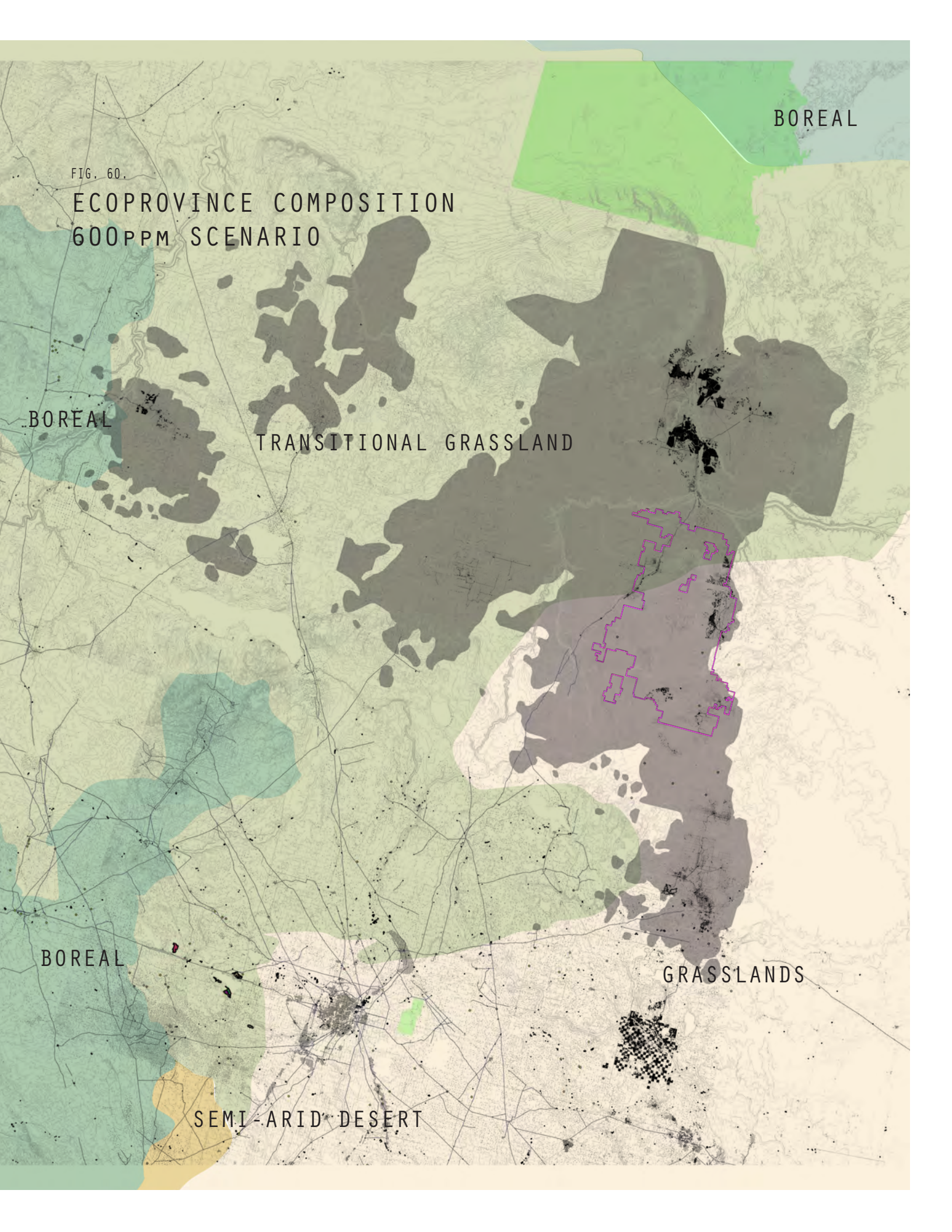


FIG. 60.

ECOPROVINCE COMPOSITION 600PPM SCENARIO

BOREAL

BOREAL

TRANSITIONAL GRASSLAND

BOREAL

GRASSLANDS

SEMI-ARID DESERT



2020

FIG. 61

FOREST SPECIES CHANGE
RCP 8.5 SCENARIO - FORT MCMURRAY

	PONDEROSA PINE	
BRISTLECONE PINE		
BLUE SPRUCE		
DWARF ELM		
STERN COTTONWOOD		
GREEN ASH		
	HORSECHESTNUT	
LIMBER PINE		
	NARROWLEAF BALSAM POPLAR	
ROWAN		
WHITE ELM		
	WHITE FIR	

2040

2060

2080



ABIES CONCOLOR
WHITE FIR



FRAXINUS PENNSYLVANICA
GREEN ASH



PICEA MARIANA
BLACK SPRUCE



POPULUS TREMULOIDES
TREMBLING ASPEN



■ CORE
■ RANGE

2020

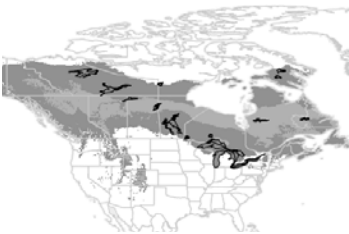
FIG. 62.

FOREST SPECIES CHANGE

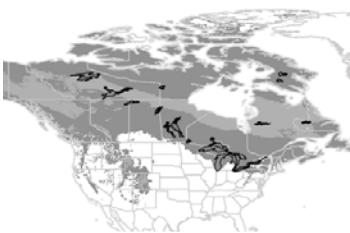
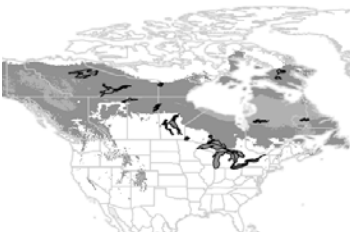
Picea mariana BLACK SPRUCE

MAPS ADAPTED FROM: CANADA'S PLANT HARDINESS SITE, NATURAL RESOURCES CANADA

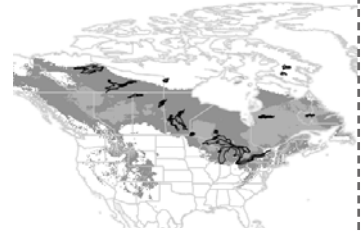




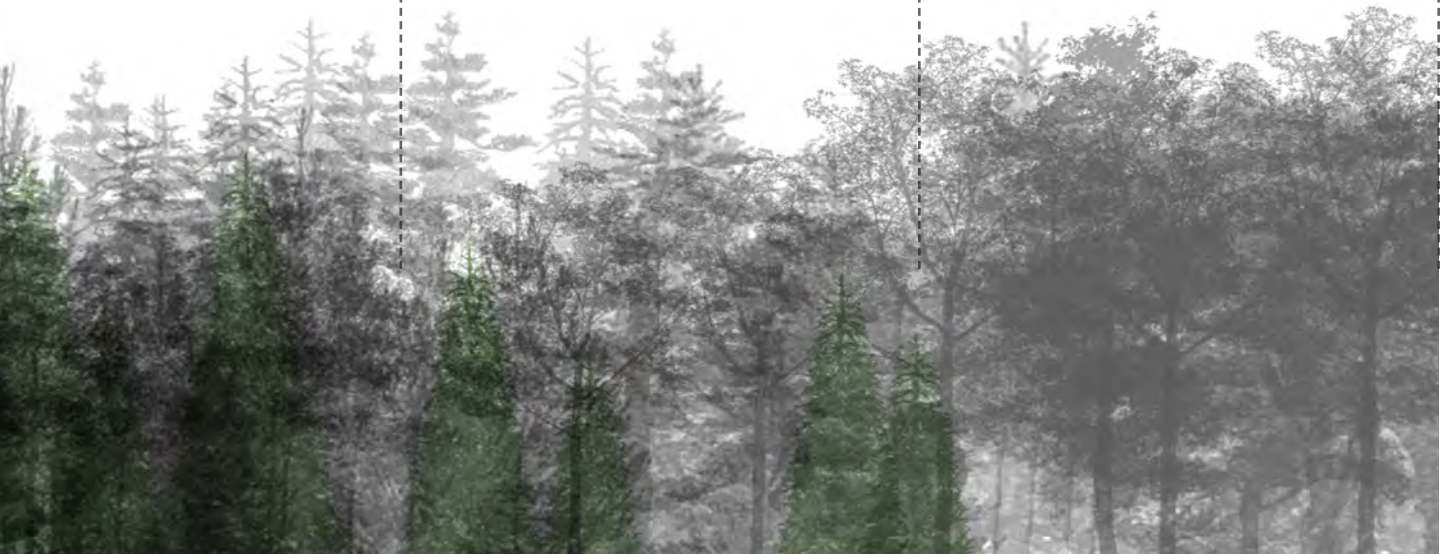
2040



2060



2080



FOREST GARDENS

The public accessibility of the assisted migration strategy is as important as its implementation. This requires consideration of how these hybrid landscapes are designed, juxtaposed with their industrial environments and accessed by the public for interpretation.

The forest garden represents an historical antecedent to the national park. As Vittoria Di Palma outlines, the historical use of the term forest was as a legal term, whose purpose was to delineate the acceptable use of an area of land and enforce modes of interaction with it.¹ This process of enclosing lands through legislation bears a striking resemblance to the process of defining a national park, and for similar purposes. For the intention of forest legislation in England was to define a landscape of privilege bound to the King, and therefore the nation.² In a fledgling country like Canada, this principle could be adapted to define landscapes as representative of the nascent national identity. As forest management became an issue, methods of afforestation and ideas regarding the layout and design of forests were incorporated into the definition of forest, leading to the development the forest garden as a landscape type.³

Various design interventions were incorporated into these forested landscapes, including, “acres of woods, interlaced with tree-lined avenues of varying widths and dotted with fountains, glades, and other small openings, provided long walks, secret recesses, and shady bowers.”⁴

Formally, the extraction landscape in the Athabasca region bears

FIG. 63.

THROUGH A COMPARATIVE VISUAL ANALYSIS, THE SPATIAL SIMILARITIES BETWEEN FOREST ESTATES AND IN SITU EXTRACTION LANDSCAPES IS REVEALED

LEFT: ADAPTED FROM: DI PALMA, *WASTELAND*, 209 (CCA)

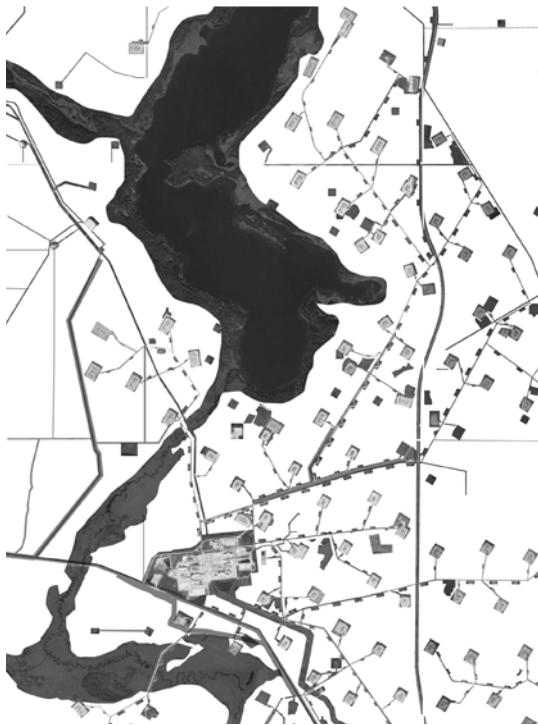
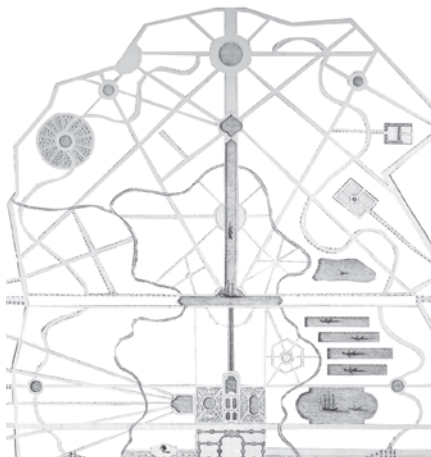
RIGHT: ADAPTED FROM: BING MAPS

1 Di Palma, *Wasteland*, 178.

2 Di Palma, 182.

3 Di Palma, 199.

4 Di Palma, 200.



a striking resemblance to these forest gardens of old, albeit at a scale larger than the historic antecedent. The in situ landscape is a landscape created from many of the same principles as the forest garden where, “Sequence and repetition, the multiplication and alternation of a few basic elements — the avenue, the clearing, the crossing, the tree — generate an experience that would have been characterized by an almost infinite multiplicity and variety.”⁵ In the in situ landscape, it is possible to consider the basic forest garden elements of avenue, clearing and crossing as analogous to the basic extraction elements of pipeline, well pad and seismic grid. This fractal similarity unlocks the potential to view extraction as a landscape act with relateable form, serving as inspiration for how to intervene within the in situ landscape.

By reinterpreting the motifs of the forest garden to the public for both research and interpretive benefit, the extraction landscape becomes a testing ground for reclamation strategies alongside an ongoing industrial program. This private landscape of capital and extraction is penetrated by public access that is able to observe from a distance and allows a critical eye to be shone on this landscape.

5 Di Palma, 200.

ACTIVE SAGD
CAMPING CATWALK

CONTAMINATED AREA
REMEDICATION
AND CATWALK

SEISMIC INTERPRETIVE TRAIL

TREE NURSERY
ZONE

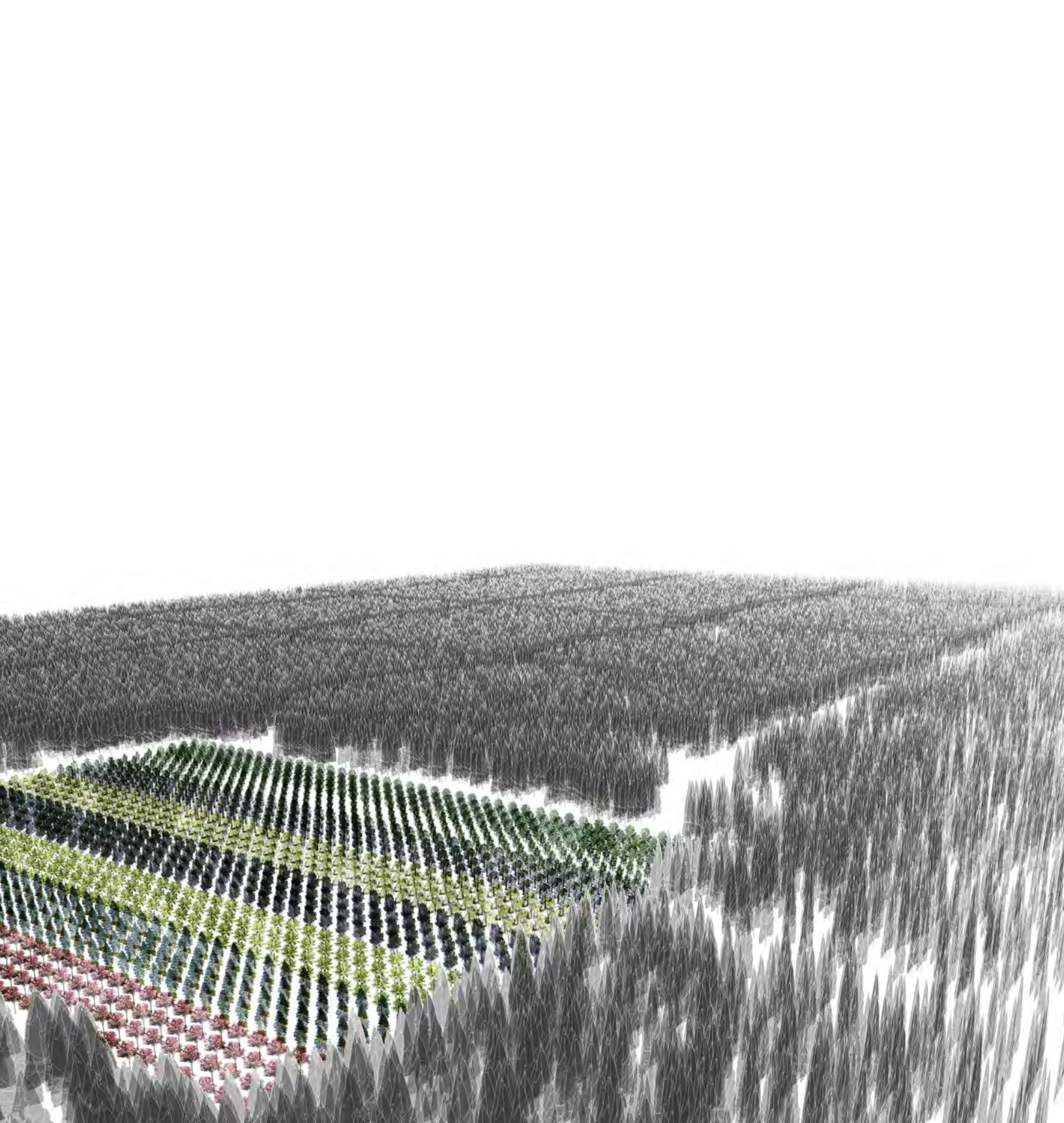




TREE MOSAIC CATHALL

TREE MOSAIC
STUDY ZONE

FUTURE FOREST
REVEGETATION
ZONE





SPECIAL RECLAMATION / CLEARING

As test well pads are reclaimed, decompacted and the pad layer removed, these sites become the locus of resilience farms, focused on developing the vegetation required to implement the reclamation program outlined in the Zone IB plan. These plantations shift in form from highly regimented agricultural planning to test plot mosaics and finally to replanted forest communities at the full scale of the pad. The planting strategy considers how resilience and assisted migration can be built into the hybrid landscape of the park to serve two functions. The first reflects the implementation of the de-fragmentation plan to improve the scale of interiority in the landscape. This strategy also serves as a didactic device where the success of certain species reflects the success of society's response to the climate crisis of the Anthropocene.

By utilizing assisted migration, the landscape can be interrogated to understand the shifting of ecology over time. The park can, therefore, perform as a research laboratory for the rest of the Parks Canada network, which will have to consider how these shifts impact every other park within the network.

FIG. 64.
TOP: SPECULATIVE RENDERING OF
PARKS CANADA STAFF INSPECTING
AND MAINTAINING A FUTURE
FOREST PLANTATION,

FIG. 65.
LEFT: FUTURE FOREST
NURSERY PLANTATION. LINEAR
ORGANIZATION REFLECTS THE
AGRICULTURAL NATURE OF THE
OPERATION IN THE PRELIMINARY
STAGE.



ABIES CONCOLOR

WHITE FIR



BETULA PAPYRIFERA

WHITE PAPER BIRCH



FRAXINUS PENNSYLVANICA

GREEN ASH



LARIX LARICINA

TAMARACK



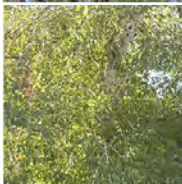
PICEA MARIANA

BLACK SPRUCE



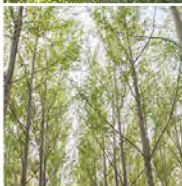
PINUS PONDEROSA

PONDEROSA PINE



POPULUS BALSAMIFERA

BALSAM POPLAR



POPULUS TREMULOIDES

TREMBLING ASPEN



QUERCUS MACROCARPA

BUR OAK

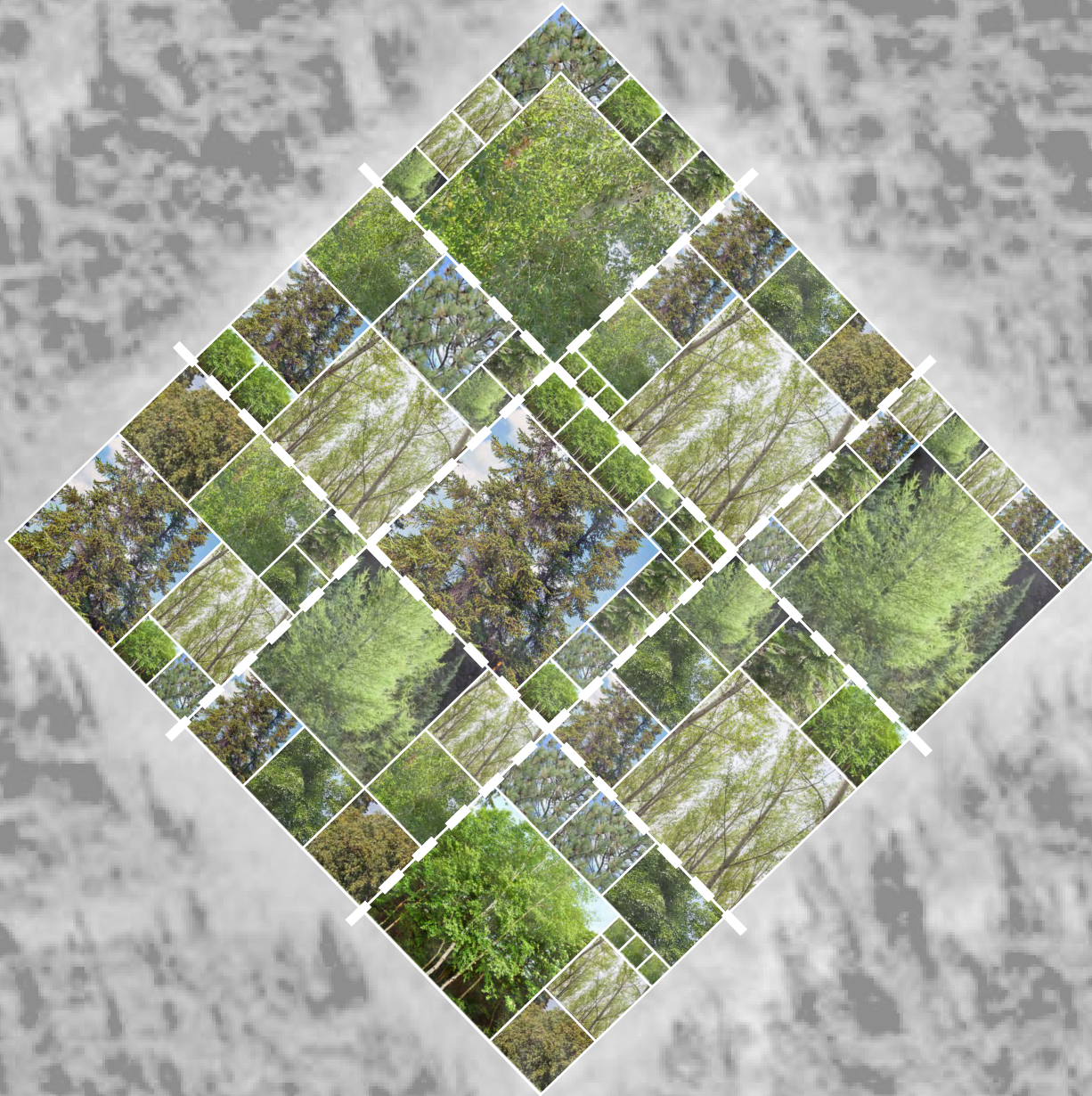
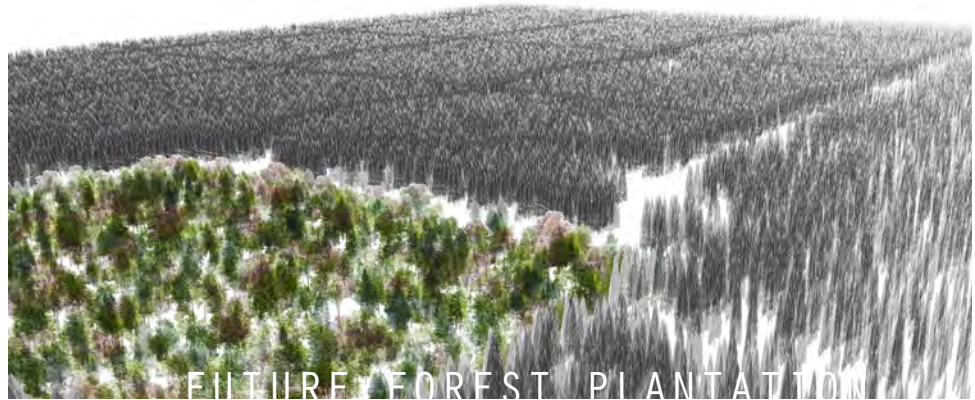


FIG. 66.

CONCEPTUAL FUTURE FOREST MOSAIC PLAN



177 M 10 20 30 40 50 100



SPECIES SELECTED TO ALLOW
FOR DISPARATE SCENARIOS

As the strategy is implemented beyond the testing well plots and implemented into the Zone II areas of the park, the landscape becomes a hybrid wilderness where the failures of certain plant types are offset by the success of others. These locations become the most resilient within the Boreal landscape of the park, and left to their own ecological process can begin to re-create the rest of the forest's adaptive capabilities to climate change.

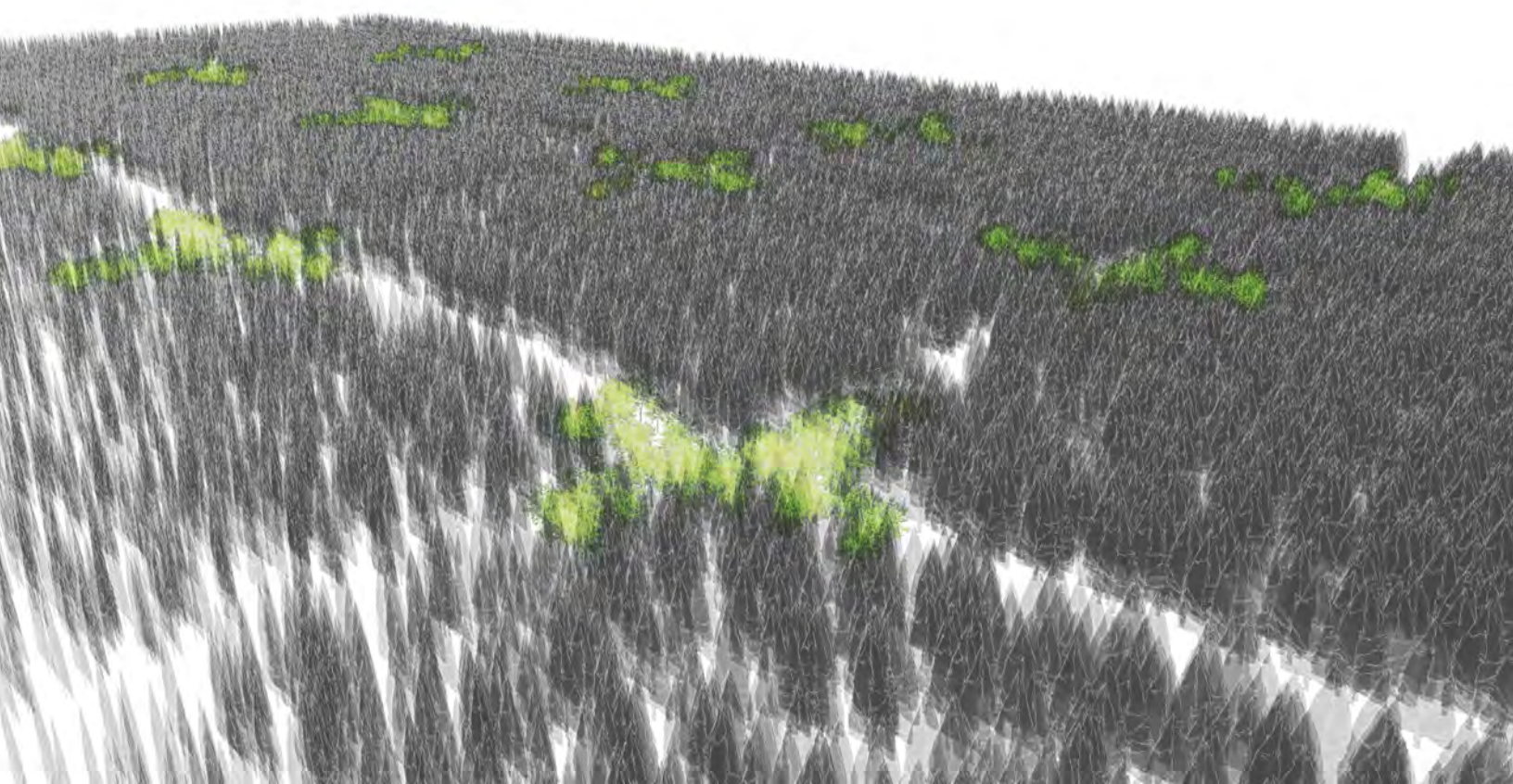
FIG. 67.

LEFT: FUTURE FOREST PLANTATION.
VARIOUS CLIMATE SCENARIO SPECIES
PLANTED TO APPROXIMATE FOREST
COMPOSITION

FIG. 68.

BELOW: SPECIES WITHIN THE FOREST
PLANTATIONS WILL EITHER SUCCEED
OR FAIL DEPENDING ON THE RATE THAT
CLIMATE CHANGE OCCURS,





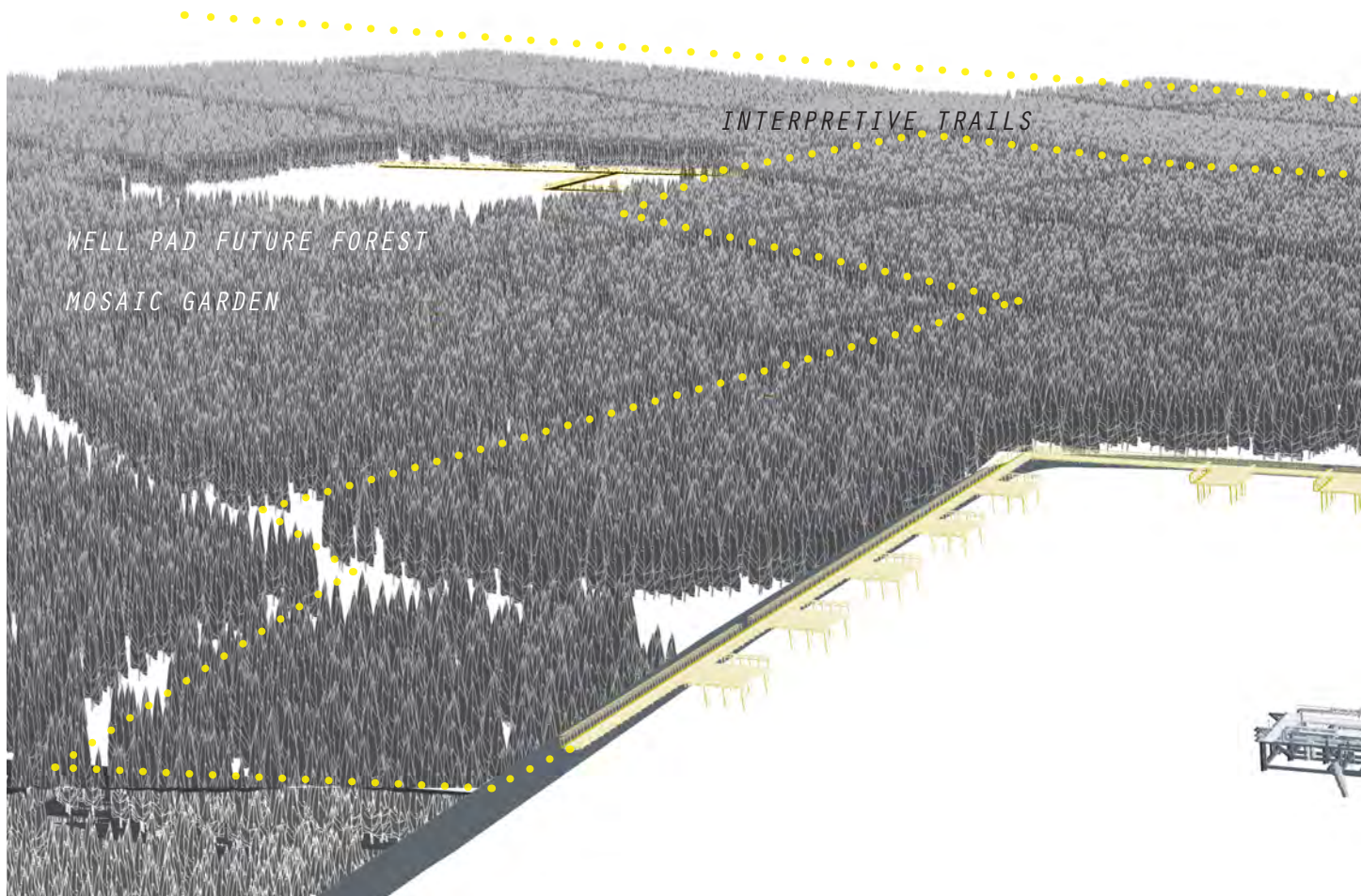
SPECIAL RECLAMATION / NODES

This strategy is also used in the process to defragment the landscape overrun by seismic and pipeline vectors. The strategy calls for targeting the intersections of seismic lines as first locations of remediative planting; corridor connectivity can be vastly reduced, de fracturing the landscape and providing greater caribou habitat intactness.

FIG. 69.
LEFT: REFORESTATION ALONG
SEISMIC TESTING LINES
WILL TARGET
INTERSECTIONS AS THE FIRST
STEP TO REDUCING CORRIDOR
PROLIFERATION WITHIN THE
BOREAL FOREST.

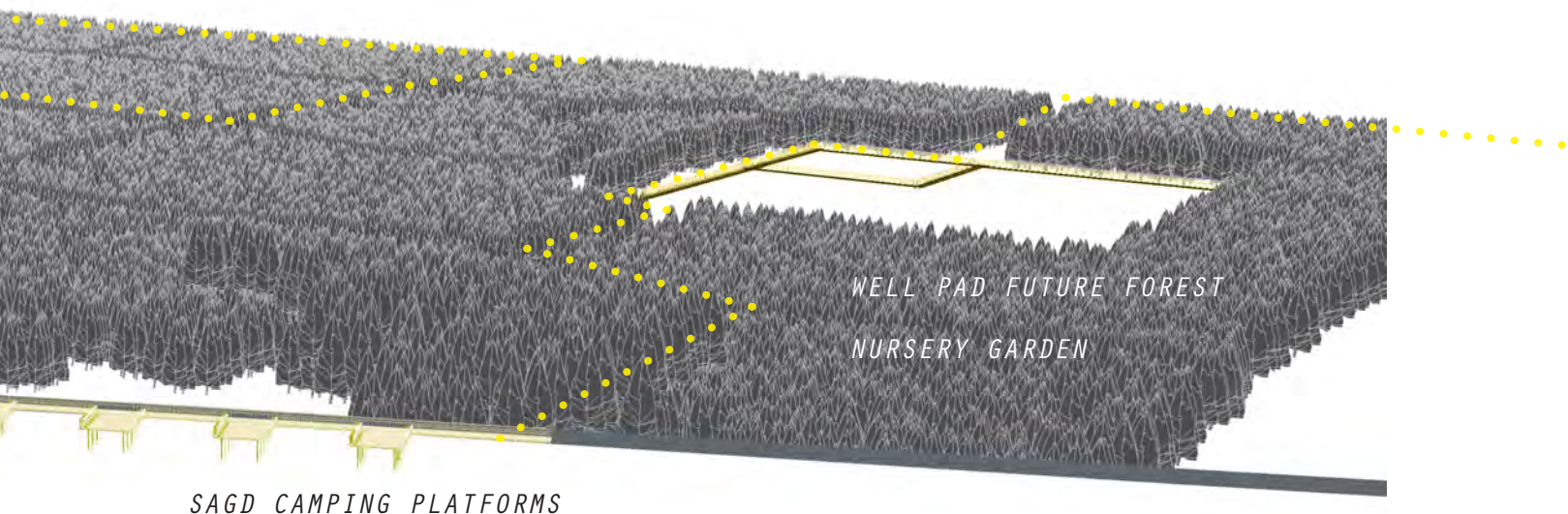
The implementation of a recreational program will expose this reality to the public by providing the potential for access in environments that are currently restricted. Increased access will afford a greater opportunity to understand, research, and question this landscape, providing for a more informed public discourse regarding Canada's environmental ethic.

The recreational interventions will require a new conception of formal and material relationships mediated by the landscape and the viewer. The typical park typology, the chalet or "mountain park" style of administrative and interpretive built assets does not reflect the new landscape enshrined by Region 40.



The proposed interpretive interventions should reflect both the industrial context of the Anthropogenic landscape and should highlight the hybridity of the re-created landscape. The materiality should comprise the use of steel catwalks within certain tree plantations highlighted for interpretation as well as the retaining of aggregate and geotextile materials for trail building areas within the recreational zones. In areas where camping is provided, the visitor is allowed to pierce the boundary of the well pad by extending sections of catwalk outwards into the pad area, creating a sense of interiority while maintaining the sense of separation.

The use of these motifs serves as a means to provide access into active areas and uses techniques of creating access to the sublime, this time the contemporary, technological sublime of the extractive landscape. Locating trails and built structures exclusively along the periphery of open areas creates a sense of separation between the viewer and the industrial landscape and heightens the sense of the dangers of the extractive act in the observer. This sense of remove also helps create the aesthetic distance necessary to contemplate the continuation of these extractive acts and the proliferation of their disturbance across the landscape.





FUTURE FOREST NURSERY











MOSAIC PLANTATION 2080
FIG. 73, RCP 8.5 AVOIDED





FIG. 74.

ACTIVE SAGD CAMPING

CONCLUDING THOUGHTS

Parks Canada remains an incredibly influential component in the construction of the Canadian identity, and the values that are instilled in people who visit these cherished parks help to shape a broader sense of responsibility for the environment. National parks have built up a wealth of cultural capital in this regard, and in the 21st century and onwards, the question is how that capital should be spent. Is it enough to stay the course and perpetuate only an ideal composition of how a society can treat its environment, or will a reality where anthropogenic disturbance has degraded much of the planet? By virtue of their storied existence, land that is defined as a national park becomes significant and is filled up with the narratives of a continuing legacy of protecting and valuing the environment. The parks are an incubator of ecological thought, but if they are to retain that influence, a new chapter must begin, because thinking ecologically can no longer exclude the realities of anthropogenic change to the environment.

The challenge of the Anthropocene is building the capacity for thinking as much about how we relate to a changing planet as how we have changed it. For Parks Canada to contribute in this regard, it needs to understand that applying the significance of its legacy to anthropogenic landscapes can change their meaning and significance to the Canadian environmental imagination. Selecting and developing national parks under the framework of Region 40 would allow Parks Canada to address the significance of our anthropogenic legacy as an equal part of our Canadian environmental legacy. By using the ideal vision that Parks Canada has developed over its history as a device to confront the reality of the Anthropocene, a fuller and possibly a more reconciliatory relationship to our environment can be revealed.

Developing this type of relationship to the environment has been a long-standing objective of the profession of landscape architecture, but often attempted only through site scale interventions. I think that the critical skills and capacity for building relationships with the environment that landscape architecture affords requires application at the broadest scales for that aspiration to become a reality. We can offer more than site scale design, we can and should be active in imagining alternate compositions of an organization such as Parks Canada.

Landscape architecture is uniquely suited to engage the questions posed by the Anthropocene because it operates at the intersection between culture and environment. This is the same intersection that Parks Canada and the role of the national park operate within. Encouraging a greater dialogue between the two areas of expertise could create a new reality where the aspirations of landscape architects to shape the dialogue of the culture / environment relationship are made possible at the national scale that Parks Canada provides. The evolving significance of the national park idea must consider and incorporate the necessity of hybridity in the ongoing relationship between humans and the environment as we move further into the Anthropocene.

LIST OF FIGURES

Note:

Photographs and drawings have been produced by the author, unless otherwise stated. All copyrights have been obtained, where required. Permission to use personal photographs has been granted and credit has been given, where required.

Fig. 01. The national parks of Canada, a critical component of Canada's protected areas.	
"Canada." Google Earth . 2017. November 15, 2017.	3
Fig. 02. Canada's anthroposphere: transportation and communications networks, extraction and forestry leases, and federal contaminated sites inventory. Generated in QGIS.	
<i>GIS files: CanVec_1M_CA_Transport, CanVec_250K_CA_ManMade, Canada_Forest_Tenures_2016, Federal Contaminated Sites Inventory</i>	11
Fig. 03. Representative diagram of spheres comprising the Earth System.	
Adapted from: Kleidon, "How Does The Earth System Generate And Maintain Thermodynamic Disequilibrium And What Does It Imply For The Future Of The Planet?"	
Fig.2. Edited in Adobe Illustrator.	12
Fig. 04. "Earthrise" 1968, Apollo Mission 8. Courtesy: NASA.	13
Fig. 05. Keeling data since 1960.	
Adapted from: "The Keeling Curve," Scripps Institution Of Oceanography.	
Edited in Adobe InDesign.	14
Fig. 06. The long view. Global carbon data since the industrial revolution.	
Adapted from: "The Keeling Curve," Scripps Institution Of Oceanography.	
Edited in Adobe InDesign.	14
Fig. 07. Current Ecoregions of Canada.	
Adapted from: Rizzo And Wiken, "Assessing The Sensitivity Of Canada's Ecosystems To Climatic Change." 7. Edited in Adobe Illustrator.	17
Fig. 08. Projected Ecoregions of Canada.	
Adapted from: Rizzo And Wiken, "Assessing The Sensitivity Of Canada's Ecosystems To Climatic Change." 7. Edited in Adobe Illustrator.	17
Fig. 09. Composite of Ecoregions exploring anticipated shift.	
Adapted from: Rizzo And Wiken, "Assessing The Sensitivity Of Canada's Ecosystems To Climatic Change." 7. Edited in Adobe Illustrator.	18
Fig. 10. National Parks of Canada. Edited in Adobe Illustrator.	33

Fig. 11. System Plan Natural Regions, Ecozones, Ecoregions. Generated in QGIS.	
<i>GIS files: Ecozones, Ecoregions</i>	42
Fig. 12. Composite of interrelationship between these classifications. Generated in QGIS.	
<i>GIS files: Ecozones, Ecoregions</i>	42
Fig. 13. The national park system plan, natural regions 1-39, including current national park locations.	
Adapted from: Parks Canada, <i>System Plan</i> , 5. Edited in Adobe Illustrator.	57
Fig. 14-16. Photographs. Topographic and vegetative characteristics of the Athabasca oil sands region.	70
Fig. 17-19. Photographs. Hints of the extraction landscape permeate the region.	72
Fig. 20-22. Photographs. Unreclaimed extraction landscapes proliferate throughout the region.	74
Fig. 23. Subsurface geology of the Athabasca deposit around Fort McMurray.	
Adapted from: Andriashek, Atkinson, “Buried Channels And Glacial-Drift Aquifers In The Fort McMurray Region, Northeast Alberta,” 13. Edited in Adobe Illustrator.	79
Fig. 24. Steam assisted gravity drainage well pairs. Generated in Sketchup.	83
Fig. 25. Representative image of the disturbance patterns imposed on the boreal landscape.	
Generated in Adobe Photoshop.	85
Fig. 26. Composite rendering of major oil infrastructures throughout Alberta. Generated in QGIS.	
<i>GIS files: ST37_Well_GCS_NAD83, ABMI_HF_Pipeline, ABMI_HF_Seismic Line</i>	86
Fig. 27. Alberta’s legacy of oil. Well constructions across the province 1930-2010. Generated in QGIS.	
<i>GIS files: ST37_Well_GCS_NAD83,</i>	88
Fig. 28. Well Pads Of Alberta. Generated in QGIS. <i>GIS files: ST37_Well_GCS_NAD83</i>	89
Fig. 29. Pipelines Of Alberta. Generated in QGIS. <i>GIS files: ABMI_HF_Pipeline</i>	90
Fig. 30. Seismic Cut Lines Of Alberta. Generated in QGIS. <i>GIS files: ABMI_HF_Seismic Line</i>	91
Fig. 31. Transect through the Athabasca landscape.	92
Oil sands Transect, Bing Maps, 56.199588, -111.201682. 2017, accessed November 20, 2017.	94
Oil sands Transect, Bing Maps, 56.200830, -111.063713. 2017, accessed November 20, 2017.	96
Oil sands Transect, Bing Maps, 56.202824, -110.991803. 2017, accessed November 20, 2017.	98
Oil sands Transect, Bing Maps, 56.207299, -110.876238. 2017, accessed November 20, 2017.	100
Oil sands Transect, Bing Maps, 56.204429, -110.732430. 2017, accessed November 20, 2017.	102
Fig. 32. Map: Athabasca In Context. Generated in QGIS.	
<i>GIS files: Key Wildlife and Biodiversity Zones, Aboriginal Lands, CanVec_1M_CA_Transport,</i> <i>CanVec_protected_areas</i>	110

Fig. 33. Map: Boreal Forest & Peatlands. Generated in QGIS.	
<i>GIS files: CanVec_wooded_area_2, Alberta Merged Wetland Inventory, Ecoregions</i>	112
Fig. 34. Map: Bitumen In Place. Generated in QGIS.	
<i>GIS files: ST98_2016</i>	114
Fig. 35. Map: Major Oil sands Stakeholders. Generated in QGIS.	
<i>GIS files: OilSands_Projects_Map_Data</i>	116
Fig. 36. Map: Project Statuses 2017. Generated in QGIS.	
<i>GIS files: OilSands_Projects_Map_Data</i>	118
Fig. 37. Map: Oil sands Production 2017. Generated in QGIS.	
<i>GIS files: OilSands_Projects_Map_Data</i>	120
Fig. 38. Map: Oil sands Development Footprint. Generated in QGIS.	
<i>GIS files: ST98_2016, ABMI_HF_Seismic Line, Canada_Forest Fire</i>	122
Fig. 39. Map: Contamination. Generated in QGIS.	
<i>GIS files: ST98_2016, ABMI_HF_Pipeline</i>	124
Fig. 40. Map: Fragmentation. Generated in QGIS.	
<i>GIS files: ST98_2016, ABMI_HF_Seismic Line, ABMI_HF_Pipeline, Caribou Range</i>	126
Fig. 41. Leasing patterns define the boundaries of a national park in the oil sands. Generated in QGIS.	133
Fig. 42. Representative diagram of the life-cycle of a mining project juxtaposed to the potential impact of climate change on the tree communities of the region.	135
Fig. 43. Industrial processes proliferate throughout the proposed park area. Generated in QGIS.	135
Fig. 44. Restoring habitat fragmentation will be a primary objective of a national park in the oil sands.	
Generated in QGIS.	137
Fig. 45. Zone 3 areas within Bitumen National Park. Generated in QGIS.	146
Fig. 46. Basic overlay process for development of zone. Generated in QGIS.	147
Fig. 47. Zone 2 areas within Bitumen National Park. Generated in QGIS.	148
Fig. 48. Basic overlay process for development of zone. Generated in QGIS.	149
Fig. 49. Zone 1 areas within Bitumen National Park. Generated in QGIS.	150
Fig. 50. Basic overlay process for development of Zone 1. Generated in QGIS.	151
Fig. 51. Woodland caribou.	152
Fig. 52. Speculative rendering of Parks Canada staff monitoring caribou within a hybrid pipeline right of way.	153
Fig. 53. Phasing scenario for the completion of the Zone 1 reclamation framework.	
Adapted from: Russell, Pendlebury, And Ronson, “Alberta’s Caribou: A Guide To Range Planning Vol.1: Northeast Alberta,” 31.	154

Fig. 54. Zone 4 areas within bitumen national park. Generated in QGIS.	156
Fig. 55. Representative area landscape plan implementation. Generated in QGIS. Edited in Adobe Photoshop.	158
Fig. 56. Collage: how will people be insert themselves into a national extraction landscape?	160
Fig. 57. Collage: the red chairs represent a signature Parks Canada promotional tool. Remediation landscapes become a photo opportunity.	164
Fig. 58. Digital collage; how can the landscape be used to create a contemplative experience of an active industrial process?	163
Fig. 59. Ecoprovince composition today. Adapted from: Rizzo And Wiken, “Assessing The Sensitivity Of Canada’s Ecosystems To Climatic Change.” 7. Generated in QGIS. Edited in Adobe Illustrator. <i>GIS files: CanVec_1M_CA_Transport, CanVec_250K_CA_ManMade, ABMI_HF_Mine Site</i>	168
Fig. 60. Ecoprovince composition 600 ppm scenario. Adapted from: Rizzo And Wiken, “Assessing The Sensitivity Of Canada’s Ecosystems To Climatic Change.” 7. Generated in QGIS. Edited in Adobe Illustrator. <i>GIS files: CanVec_1M_CA_Transport, CanVec_250K_CA_ManMade, ABMI_HF_Mine Site</i>	169
Fig. 61. Forest species change RCP 8.5 Scenario - Fort McMurray Environment Canada	170
Fig. 62. Forest species change Environment Canada.	172
Fig. 63. Comparative visual analysis between forest estates and in situ extraction landscapes is revealed. Adapted from, Di Palma, Vittoria. Wasteland: A History. New Haven: Yale University Press, 2014.	174
Fig. 64. Speculative rendering of Parks Canada staff inspecting and maintaining a future forest plantation. Created in Adobe Photoshop.	181
Fig. 65. Future forest nursery plantation. Created in Adobe Photoshop.	181
Fig. 66. Conceptual future forest mosaic plan. Created in Adobe Photoshop.	183
Fig. 67. Future forest plantation. Various climate scenario species approximate forest composition. Generated in Sketchup. Edited in Adobe Photoshop.	185
Fig. 68. Species within the forest plantations will either succeed or fail depending on the rate that climate change occurs. Generated in Sketchup. Edited in Adobe Photoshop.	185
Fig. 69. Reforestation along seismic testing lines. Generated in Sketchup. Edited in Adobe Photoshop.	187
Fig. 70. Future Forest Nursery. Generated in Sketchup. Edited in Adobe Photoshop.	190
Fig. 71. Mosaic Plantation 2020. Generated in Sketchup. Edited in Adobe Photoshop.	193
Fig. 72. Mosaic Plantation 2080. Generated in Sketchup. Edited in Adobe Photoshop.	195
Fig. 73. RCP 8.5 Avoided. Generated in Sketchup. Edited in Adobe Photoshop.	195

IMAGE COPYRIGHT PERMISSIONS

Fig. 04. AS8-14-2383, “Earthrise,” by Anders, William, Apollo Mission 8, NASA, 1968. Retrieved from https://www.nasa.gov/multimedia/imagegallery/image_feature_1249.html on November 23, 2017. Public Domain.

Fig. 51. “Woodland caribou of the Naosap Lake herd,” by LakeAthapap, May 31, 2014. Retrieved from https://commons.wikimedia.org/wiki/File:Woodland_Caribou_on_Holt_Lake,_Manitoba.jpg on November 23, 2017. Creative Commons Attribution-Share Alike 3.0 Unported.

BIBLIOGRAPHY

- Albrecht, Glenn. “Psychoterratica: Solastalgia,” 2013. <http://www.psychoterratica.com/solastalgia.html>.
- Andersen, Ross. “Nature Has Lost Its Meaning.” *The Atlantic*, November 30, 2015. <https://www.theatlantic.com/science/archive/2015/11/nature-has-lost-its-meaning/417918/>.
- Andriashek, L. D, N Atkinson, Alberta Energy and Utilities Board, and Alberta Geological Survey. “Buried Channels and Glacial-Drift Aquifers in the Fort McMurray Region, Northeast Alberta.” Edmonton: Alberta Energy and Utilities Board : Alberta Geological Survey, 2007. http://wayback.archive-it.org/2901/20111212222052/http://www.ags.gov.ab.ca/publications/ESR/PDF/ESR_2007_01.PDF.
- — —. Buried Channels and Glacial-Drift Aquifers in the Fort McMurray Region, Northeast Alberta. Edmonton: Alberta Energy and Utilities Board: Alberta Geological Survey, 2007. http://wayback.archive-it.org/2901/20111212222052/http://www.ags.gov.ab.ca/publications/ESR/PDF/ESR_2007_01.PDF.
- Asafu-Adjaye, John, Linus Blomqvist, Stewart Brand, Barry Brook, Ruth Defries, Erle Ellis, Christopher Foreman, David Keith, Martin Lewis, and Mark Lynas. “An Ecomodernist Manifesto,” April 2015. <http://www.ecomodernism.org/manifesto-english/>.
- “Assisted Migration.” Natural Resources Canada, June 27, 2013. <http://www.nrcan.gc.ca/node/13121>.

- Baumgardner, Neel G. "Waterton Lakes: The Business of Parks and Preservation in the North American Borderlands." *American Review of Canadian Studies* 44, no. 3 (July 3, 2014): 265–78. <https://doi.org/10.1080/02722011.2014.939418>.
- Berger, Alan, ed. *Designing the Reclaimed Landscape*. London; New York: Taylor & Francis, 2008.
- — —. *Drosscape: Wasting Land in Urban America*. 1st ed. New York: Princeton Architectural Press, 2006.
- Berger, John. *Ways of Seeing: Based on the BBC Television Series Directed by Michael Dibb. Reissued as part of the Penguin Design Series*. Penguin on Design. London: British Broadcasting Corporation, 2008.
- Berleant, Arnold. *Aesthetics of Environment*. Philadelphia: Temple Univ Press, 1995.
- "Bitumen pay thickness shape files, Figure R3.16," Alberta Energy Regulator, 2017, accessed October 12, 2017, <https://www.aer.ca/data-and-publications/statistical-reports/reserves-data>.
- Brand, Stewart. "Earth Monitoring: Whole Earth Comes into Focus." *Nature* 450, no. 7171 (December 6, 2007): 797–797. <https://doi.org/10.1038/450797a>.
- Burke, Edmund. *A Philosophical Inquiry into the Origin of Our Ideas*. Lanham: Start Publishing LLC, 2012. <http://rbdigital.oneclickdigital.com>.
- Byerly, Alyson. "The Uses of Landscape: The Picturesque Aesthetic and the National Park System." In *The Ecocriticism Reader: Landmarks in Literary Ecology*, edited by Cheryll Glotfelty and Harold Fromm. Athens: University of Georgia Press, 1996.
- Campbell, Claire. "The Wisdom of Our National Parks." *The Walrus* (blog), January 16, 2017. <https://thewalrus.ca/the-wisdom-of-our-national-parks/>.
- Campbell, Claire Elizabeth, ed. *A Century of Parks Canada, 1911-2011*. Canadian History and Environment Series 1. Calgary: University of Calgary Press, 2011.
- Canada. "Taking Action Today: Establishing Protected Areas for Canada's Future," March 2017.
- Canada National Parks Act (2000). <http://laws-lois.justice.gc.ca/eng/acts/N-14.01/>.
- Canada, and Natural Resources Canada. *Climate change and fire and insect disturbances in Canada's forest*. Ottawa: Natural Resources Canada, 2002. <https://www.nrcan.gc.ca/forests/fire-insects-disturbances/fire/13155>.
- Canadian Parks Service. "National Parks Management Planning Process Manual." Canadian Parks Service, 1985.

- Carr, Ethan. *Wilderness by Design: Landscape Architecture and the National Park Service*. Lincoln, Neb: University of Nebraska Press, 1998.
- Chakrabarty, Dipesh. "The Climate of History: Four Theses." *Critical Inquiry* 35, no. 2 (January 2009): 197–222. <https://doi.org/10.1086/596640>.
- Clare, Clancy. "Part of Jasper National Park to Close for Indigenous Hunt." *Edmonton Journal*, October 7, 2017. <http://edmontonjournal.com/news/local-news/indigenous-community-to-hunt-in-jasper-national-park-in-reconciliation-effort>.
- "Coral Reefs: Coral Bleaching What You Need to Know | The Nature Conservancy." Accessed November 24, 2017. <https://www.nature.org/ourinitiatives/urgentissues/oceans/coral-reefs/coral-reefs-coral-bleaching-what-you-need-to-know.xml>.
- Corner, James, and Alison Bick Hirsch. *The Landscape Imagination: Collected Essays of James Corner, 1990-2010*. First edition. New York: Princeton Architectural Press, 2014.
- Corner, James, and Alex S. MacLean. *Taking Measures across the American Landscape*. New Haven, Conn.: Yale Univ. Pr, 2000.
- Cronon, William, ed. *Uncommon Ground: Rethinking the Human Place in Nature*. New York, NY: Norton, 1996.
- Crutzen, Paul J. "Geology of Mankind." *Nature* 415, no. 6867 (January 2002): 23–23. <https://doi.org/10.1038/415023a>.
- Czerniak, Julia, George Hargreaves, and Harvard University, eds. *Large Parks*. New York : Cambridge, Mass: Princeton Architectural Press ; in association with the Harvard University Graduate School of Design, 2007.
- Di Palma, Vittoria. *Wasteland: A History*. New Haven: Yale University Press, 2014.
- Dramstad, Wenche E., James D. Olson, and Richard T. T. Forman. *Landscape Ecology Principles in Landscape Architecture and Land-Use Planning*. Cambridge, Mass.] : Washington, DC : [Washington, D.C. Harvard University Graduate School of Design; Island Press; American Society of Landscape Architects, 1996.
- Ellison, A. M. "The Suffocating Embrace of Landscape and the Picturesque Conditioning of Ecology." *Landscape Journal* 32, no. 1 (January 1, 2013): 79–94. <https://doi.org/10.3368/lj.32.1.79>.
- Esbjörn-Hargens, Sean, and Michael E. Zimmerman. *Integral Ecology: Uniting Multiple Perspectives on the Natural World*. 1. ed. Boston, Mass.: Integral Books, 2009.
- Fall, Juliet. *Drawing the Line: Nature, Hybridity, and Politics in Transboundary*

- Spaces*. Border Regions Series. Aldershot, England; Burlington, VT: Ashgate, 2005.
- “Federal Contaminated Sites Inventory,” Treasury Board of Canada, Version 10.7, 2017. <http://www.tbs-sct.gc.ca/fcsi-rscf/cen-eng.aspx?dataset=prov&sort=name>
- Fezer, Jesko, and Martin Schmitz, eds. *Lucius Burckhardt Writings: Rethinking Man-Made Environments: Politics, Landscapes & Design*. New York: Springer Wien, New York, 2012.
- Forman, Richard T. T. *Land Mosaics: The Ecology of Landscapes and Regions*. Cambridge; New York: Cambridge University Press, 1995.
- Galloway, Gloria. “Arctic Waters Get Long-Sought Protection after Ottawa, Inuit Group Reach Agreement.” *The Globe and Mail*, August 10, 2017. <https://www.theglobeandmail.com/news/politics/arctic-waters-get-long-sought-protection-after-ottawa-inuit-group-reachagreement/article35956671/>.
- Giot, Christophe, and Dora Imhof, eds. *Thinking the Contemporary Landscape*. First edition. New York: Princeton Architectural Press, 2017.
- Giot, Clive. *The Course of Landscape Architecture*. New York, NY: Thames & Hudson, 2014.
- Government of Canada, Natural Resources Canada. “Canada’s Plant Hardiness Site.” Accessed November 25, 2017. <http://planthardiness.gc.ca/>.
- “Great Acceleration - IGBP.” Text. International Geosphere-Biosphere Programme, 2015. <http://www.igbp.net/globalchange/greatacceleration.4.1b8ae20512db692f2a680001630.html>.
- Hamilton, Graeme “The Shady Past of Parks Canada: Forced out, Indigenous People Are Forging a Comeback.” *National Post* (blog), August 25, 2017. <http://nationalpost.com/news/canada/the-shady-past-of-parks-canada-forced-out-indigenous-people-are-forging-a-comeback>.
- Herrington, Susan. *On Landscapes. Thinking in Action*. New York: Routledge, 2009.
- Jackson, John Brinckerhoff. *Discovering the Vernacular Landscape*. New Haven: Yale Univ. Press, 1984.
- Jänicke, Martin. “Ecological Modernisation: New Perspectives.” *Journal of Cleaner Production* 16, no. 5 (March 2008): 557–65. <https://doi.org/10.1016/j.jclepro.2007.02.011>.
- Keiter, Robert B. “The National Park System: Visions for Tomorrow.” *Natural Resources Journal* 50, no. 1 (2010): 71–110.

- — —. *To Conserve Unimpaired: The Evolution of the National Park Idea*. Washington: Island Press, 2013.
- Kleidon, Axel. “How Does the Earth System Generate and Maintain Thermodynamic Disequilibrium and What Does It Imply for the Future of the Planet?” *Phil. Trans. R. Soc. A* 370, no. 1962 (March 13, 2012): 1012–40. <https://doi.org/10.1098/rsta.2011.0316>.
- Klein, Alice. “Adding Rocks to Oceans Could De-Acidify Water and Save Coral.” *New Scientist*. Accessed November 24, 2017. <https://www.newscientist.com/article/2087532-adding-rocks-to-oceans-could-de-acidify-water-and-save-coral/>.
- Kuo, Nae-Wen, and Yue-Hwa Yu. “An Evaluation System for National Park Selection in Taiwan.” *Journal of Environmental Planning and Management* 42, no. 5 (September 1999): 735–45. <https://doi.org/10.1080/09640569910975>.
- “Lawsuit Threatens to Shut down Kouchibouguac National Park.” *CBC News*. Accessed November 25, 2017. <http://www.cbc.ca/news/canada/new-brunswick/kouchibouguac-lawsuit-indigenous-title-1.4141840>.
- Levin, Dan. “Canada Legal Fight May ‘Destroy the Faith’ in First Nations Treaties.” *The New York Times*, November 5, 2017, sec. Canada. <https://www.nytimes.com/2017/11/05/world/canada/yukon-indigenous-treaties.html>.
- Liberal Party of Canada. “Real Change: A New Plan for Canada’s Environment and Economy.” Accessed November 25, 2017. <https://www.liberal.ca/realchange/real-change-a-new-plan-for-canadas-environment-and-economy/>.
- Lightbown, Vicki. “New SAGD Technologies Show Promise in Reducing Environmental Impact of Oil Sand Production.” *Oil, Gas, and Mining*, March 4, 2017. <https://www.oilgasandmining.com/volume1/issue2/91-v1n2-lightbown>.
- “List of Wells in Alberta Monthly Updates,” January 1, 2016. <https://www.aer.ca/data-and-publications/statistical-reports/st37>.
- Litteljohn, Bruce M., and Douglas H. Pimlott. *Why Wilderness: A Report on Mismanagement in Lake Superior Provincial Park*. Toronto: New Press, 1971.
- Malo, Sebastien. “Climate Change May Ground a Third of Aircrafts in Coming Decades-Study.” *Reuters*, July 13, 2017. <https://www.reuters.com/article/us-climatechange-airlines-study/climate-change-may-ground-a-third-of-aircrafts-in-coming-decades-study-idUSKBN19Y0ZO>.
- Marsh, William M. *Landscape Planning: Environmental Applications*. 2nd ed. New York: Wiley, 1991.

- McCarthy, Shawn, and Ivan Semeniuk. "Provinces Haven't Stopped Boreal Caribou's Decline, and Ottawa May Have to Intervene, Report Says." *The Globe and Mail*, October 31, 2017. <https://beta.theglobeandmail.com/news/national/caribou/article36776410/>.
- McClelland, Linda Flint. *Building the National Parks: Historic Landscape Design and Construction*. Baltimore, MD: Johns Hopkins University Press, 1998.
- McDermott, Vincent, "Resilient Fort McMurray Rolls with Relentless Boom and Bust Cycles." *Calgary Herald* (blog), September 27, 2017. <http://calgaryherald.com/business/energy/resilient-fort-mcmurray-rolls-with-relentless-boom-and-bust-cycles>.
- McHarg, Ian L. *Design with Nature*. 25th anniversary ed. New York: Wiley, 1992.
- Milligan, Brett. "Corporate Ecologies." *Journal of Landscape Architecture* 5, no. 1 (March 2010): 6–23. <https://doi.org/10.1080/18626033.2010.9723427>.
- Morton, Timothy. *Dark Ecology: For a Logic of Future Coexistence*. Wellek Library Lectures in Critical Theory. New York: Columbia University Press, 2016.
- — —. *Hyperobjects: Philosophy and Ecology after the End of the World*. Posthumanities 27. Minneapolis: University of Minnesota Press, 2013.
- — —. *The Ecological Thought*. Harvard University Press paperback ed. Cambridge, Mass.: Harvard University Press, 2012.
- Nelson, Trisalyn, Nicholas Coops, Michael Wulder, Liliana Perez, Jessica Fitterer, Ryan Powers, and Fabio Fontana. "Predicting Climate Change Impacts to the Canadian Boreal Forest." *Diversity* 6, no. 1 (March 3, 2014): 133–57. <https://doi.org/10.3390/d6010133>.
- "Oil Sands." Alberta Energy Regulator. Accessed November 25, 2017. <https://www.aer.ca/about-aer/spotlight-on/oil-sands>.
- "Oil Sands Projects," Alberta Environment and Parks, 2017. <http://osip.alberta.ca/map/>
- Panel on the Ecological Integrity of Canada's National Parks, ed. *Unimpaired for Future Generations? Conserving Ecological Integrity with Canada's National Parks / Panel on the Ecological Integrity of Canada's National Parks*. Ottawa: The Panel, 2000.
- Parks Canada, ed. *National Parks System Plan*. 3rd ed. Ottawa: Parks Canada, 1997.
- — —, ed. *Parks Canada Guiding Principles and Operational Policies*. Ottawa: Parks Canada, 1994.
- Parks Canada, and Canadian Parks Council, eds. *Principles and Guidelines for*

- Ecological Restoration in Canada's Protected Natural Areas*. Gatineau, Québec: National Parks Directorate, Parks Canada Agency, 2008.
- "Pipeline Safety." Alberta Energy Regulator. Accessed November 25, 2017. <https://www.aer.ca/about-aer/spotlight-on/pipeline-safety>.
- Purdy, Jedediah. "After Nature." Youtube. Accessed November 25, 2017. <https://www.youtube.com/watch?v=Kz1B84-3qdw>.
- — — *After Nature: A Politics for the Anthropocene*. Cambridge, Massachusetts: Harvard University Press, 2015.
- Renner, Nausicaa. "The New Nature." Text. *Boston Review*, January 4, 2016. <http://bostonreview.net/forum/jedediah-purdy-new-nature>.
- Riahi, Keywan, Shilpa Rao, Volker Krey, Cheolhung Cho, Vadim Chirkov, Guenther Fischer, Georg Kindermann, Nebojsa Nakicenovic, and Peter Rafaj. "RCP 8.5 — A Scenario of Comparatively High Greenhouse Gas Emissions." *Climatic Change* 109, no. 1 (August 13, 2011): 33. <https://doi.org/10.1007/s10584-011-0149-y>.
- Rizzo, Brian, and Ed Wiken. "Assessing the Sensitivity of Canada's Ecosystems to Climatic Change." *Climatic Change* 21, no. 1 (May 1992): 37–55. <https://doi.org/10.1007/BF00143252>.
- Rocky Mountains Park Act, (1887). <http://parkscanadahistory.com/publications/rocky-mountains-park-act.htm>.
- Russell, Tara, Danielle Pendlebury, and Alison Ronson. "Alberta's Caribou: A Guide to Range Planning Vol.1: Northeast Alberta." Edmonton, Alberta: Canadian Parks and Wilderness Society, 2016. http://cpawsnab.org/uploads/CPAWS_Guide_to_Caribou_Range_Planning_Vol_1_NE_Herds.pdf.
- Schlesinger, Bill. "Carbon Capture and Storage (CCS)." *Citizen Scientist* (blog), July 4, 2017. <https://blogs.nicholas.duke.edu/citizenscientist/carbon-capture-and-storage-ccs/>.
- Scott, Daniel, Roger Suffling, Parks Canada, University of Waterloo, and Canada, eds. *Climate Change and Canada's National Park System: A Screening Level Assessment = Le Changement Climatique et Le Réseau Des Parcs Nationaux Du Canada: Une Évaluation Préliminaire*. Ottawa: Parks Canada, 2000.
- Searle, D. Richard. *Phantom Parks: The Struggle to Save Canada's National Parks*. Henderson Book Series, no. 29. Toronto: Key Porter Books, 2000.
- Smithson, Robert, and Nancy Holt. *The Writings of Robert Smithson: Essays with Illustrations*. New York: New York University Press, 1979.

- Soverel, Nicholas O., Nicholas C. Coops, Joanne C. White, and Michael A. Wulder. "Characterizing the Forest Fragmentation of Canada's National Parks." *Environmental Monitoring and Assessment* 164, no. 1–4 (May 2010): 481–99. <https://doi.org/10.1007/s10661-009-0908-7>.
- "Stratospheric Aerosol Injection (Climate Engineering)." *Wikipedia*, November 24, 2017. [https://en.wikipedia.org/w/index.php?title=Stratospheric_aerosol_injection_\(climate_engineering\)&oldid=811853443](https://en.wikipedia.org/w/index.php?title=Stratospheric_aerosol_injection_(climate_engineering)&oldid=811853443).
- "The Anthropocene: An Update." GeoQ. Munich: The European Geosciences Union, December 2014.
- "The Keeling Curve." The Keeling Curve. Accessed November 24, 2017. <https://scripps.ucsd.edu/programs/keelingcurve/>.
- "The Location of Oil Sands - Oil Sands - Alberta's Energy Heritage." Alberta Culture and Tourism, 2017. <http://history.alberta.ca/energyheritage/sands/origins/the-geology-of-the-oil-sands/the-location-of-oil-sands.aspx>.
- Thede, Amy K., Wolfgang Haider, and Murray B. Rutherford. "Zoning in National Parks: Are Canadian Zoning Practices Outdated?" *Journal of Sustainable Tourism* 22, no. 4 (May 19, 2014): 626–45. <https://doi.org/10.1080/09669582.2013.875549>.
- Treib, Marc. *Austere Gardens: Thoughts on Landscape, Restraint, & Attending*, 2016.
- Tweed, William C. *Uncertain Path: A Search for the Future of National Parks*. Berkeley, Calif.; London: University of California Press, 2011.
- VanderMeer, Jeff. *Area X: The Southern Reach Trilogy*. Toronto: HarperCollins. 2015.
- Wandesforde-Smith, Geoffrey. "Bracketing Braverman: Thinking and Acting for Wildlife Conservation after Nature." *Journal of International Wildlife Law & Policy* 19, no. 2 (April 2, 2016): 176–87. <https://doi.org/10.1080/13880292.2016.1167476>.
- "Wild Bison Calves Born in Banff National Park 'a Huge Step' to Reintroduction." *CBC News*, April 25, 2017. <http://www.cbc.ca/news/canada/calgary/bison-calves-banff-wild-1.4085012>.
- "Wilderness | Definition of Wilderness." *Merriam-Webster*. Accessed November 25, 2017. <https://www.merriam-webster.com/dictionary/wilderness>.
- Woynillowicz, Dan, Chris Severson-Baker, Marlo Reynolds, and Pembina Institute for Appropriate Development. *Oil Sands Fever: The Environmental Implications of Canada's Oil Sands Rush*. Drayton Valley, Alta.: Pembina Institute, 2005.
- Xu, Bin, and Melanie Bird. "Assessing Peatland Restoration Success to Meet Alberta's

Peatland Reclamation Criteria.” Final Report for AUPRF Project. Peace River, Alberta: NAIT Boreal Research Institute, December 15, 2015.

“Yellowstone National Park.” *Wikipedia*, November 13, 2017. https://en.wikipedia.org/w/index.php?title=Yellowstone_National_Park&oldid=810190846.

Yosemite Grant Act, § 48 (1864). <https://www.nps.gov/featurecontent/yose/anniversary/timeline/in-1864/index.html>.

Young, Leslie. “Open Data: Alberta Oil Spills 1975-2013.” *Global News*, June 7, 2013. <https://globalnews.ca/news/622513/open-data-alberta-oil-spills-1975-2013/>.

METADATA

ABMI Human Footprint Inventory for 2012 conditions (Version 3)

Originator: Alberta Biodiversity Monitoring Institute, University of Alberta
 Publication_Date: 2012
 Title: Human Footprint Inventory for 2012
 Geospatial_Data_Presentation_Form: vector digital data
 Publication_Place: Edmonton, Alberta
 Publisher: Alberta Biodiversity Monitoring Institute
 Online_Linkage: <http://www.abmi.ca/home/data-analytics/da-top/da-product-overview/GIS-Land-Surface/HF-inventory.html>

ABMI Human Footprint Inventory for 2012 conditions (Version 3) from the Alberta Biodiversity Monitoring Institute was used, in whole or part, to create this product. More information on the Institute can be found at: <http://www.abmi.ca>.

Abstract:

The ABMI defines Human Footprint (HF) as: the temporary or permanent transformation of native ecosystems to support residential, recreational or industrial land uses. Under this definition, HF includes the geographic extent of areas under human use that either have lost their natural cover for extended periods of time (alienating HF; e.g., cities, roads, agricultural land, and surface mines) or whose natural cover is periodically reset to earlier successional conditions by industrial activities (successional HF; e.g., cut blocks and seismic lines). The Alberta Biodiversity Monitoring Institute (ABMI) tracks the status and trends in HF across the province of Alberta. The ABMI Human Footprint Inventory for 2012 conditions (Version 3) is a GIS polygon layer that describes the spatial distribution of HF across the province of Alberta up to the year 2012, where each polygon indicates a type of HF (Table 1).

Title:Aboriginal Lands - CANADA [(FRA)Terres autochtones - CANADA]

Date:2016-01-06 revision; révision

Edition: 2.69

Organisation name: Natural Resources Canada, Earth Sciences Sector, Surveyor General Branch
[(FRA)Ressources naturelles Canada, Secteur des sciences de la Terre, Direction de
l'arpenteur général]

Presentation form: mapDigital; carteNumérique

GeoBase - Aboriginal Lands of Canada [(FRA)GéoBase - Terres autochtones du Canada]

Abstract:

The Aboriginal Lands product consists of polygon entities that depict the administrative boundaries (extent) of lands where the title has been vested in specific Aboriginal Groups of Canada or lands which were set aside for their exclusive benefit. More specifically it includes the following lands: 1) Indian Reserves that include: 1.1) Surrendered lands or a reserve, as defined in the Indian Act. This definition excludes Indian Settlements and Indian Communities. 1.2) Sechelt lands, as defined in the Sechelt Indian Band Self-Government Act, chapter 27 of the Statutes of Canada, 1986. 2) Land Claim Settlement Lands - Lands created under Comprehensive Land Claims Process that do not or will not have Indian Reserve status under the Indian Act. They include: 2.1) Category IA land or Category IA-N land, as defined in the Cree-Naskapi (of Quebec) Act, chapter 18 of the Statutes of Canada, 1984. Category 1B and category II Lands are excluded from this definition. 2.2) Settlement land, as defined in the Yukon First Nations Self-Government Act, and lands in which an interest is transferred or recognized under section 21 of that Act. Only Yukon First Nations Settlement Lands, which were surveyed and the survey plan recorded, are included in the dataset. 2.3) Inuit Owned Lands (IOL) as defined in the Agreement between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada given effect and declared valid by the Nunavut Land Claims Agreement Act. It includes all parcels that have been surveyed and those that do not require a survey (this includes the islands). Survey plans may not all be recorded in the CLSR at this time. 2.4) Gwich'in Lands as defined in the Gwich'in Comprehensive Land Claim Agreement, given effect and declared valid by the Gwich'in Land Claim Settlement Act. 2.5) Inuvialuit Lands as defined in the Western Arctic (Inuvialuit) Claims Settlement Act. 2.6) Sahtu Lands as defined in The Sahtu Dene and Métis Comprehensive Land Claim Agreement given effect and declared valid by the Sahtu Dene and Métis Land Claim Settlement Act. All parcels are included but not all survey plans are recorded in the CLSR at this time. 2.7) Tlicho lands, as defined in the Tlicho Agreement, given effect and declared valid by the Tlicho Land Claims and Self-Government Act. 3) Indian Lands that include: 3.1) Lands in the Kanesatake Mohawk interim land base, as defined in the Kanesatake Interim Land Base Governance Act, other than the lands known as Doncaster Reserve No. 17.

Purpose:

Provide a national coverage and promote the use of a common geometric representation for Aboriginal Lands in Canada. This data set is not to be used for defining boundaries. Administrative decisions should be based on legal documents and legal survey plans.

Alberta Merged Wetland Inventory

Originator: Alberta Environment and Parks, Government of Alberta

Publication_Date: 2016

Title: Alberta Merged Wetland Inventory

Geospatial_Data_Presentation_Form: vector digital data

Publication_Place: Edmonton, Alberta

Publisher: Alberta Environment and Parks, Government of Alberta

Online_Linkage: [https://extranet.gov.ab.ca/srd/geodiscover/srd_pub/LAT/FWDSensitivity/](https://extranet.gov.ab.ca/srd/geodiscover/srd_pub/LAT/FWDSensitivity/KeyWildlifeAndBiodiversityZones.zip)

KeyWildlifeAndBiodiversityZones.zip

Abstract:

This dataset is produced for the Government of Alberta and is available to the general public. Please consult the Distribution Information of this metadata for the appropriate contact to acquire this dataset. Note that the Alberta Merged Wetland Inventory product replaces the previously released Alberta Canadian Wetland Classification System (CWCS) Merged Wetland Inventory data from November 6, 2013 and the Alberta Merged Wetland Inventory July 15, 2014 and July 26, 2016.

The Alberta Merged Wetland Inventory depicts wetlands within the province of Alberta, Canada for the period 1998 to 2015 classified to the five major classes in the Canadian Wetland Classification System (CWCS). These five major classes include bog, fen, marsh, swamp and shallow open water. For the purposes of this inventory, shallow open water includes all open water. The Alberta Merged Wetland Inventory is a generalized, merged product of 33 component wetland inventories that utilized different types of source data from different years, different data capture specifications and different classifications. Considerable variation in the level of detail and accuracy is present in this dataset. Accuracy assessments have been included where available but it should be noted that the geoprocessing applied to the data may have introduced additional error. All of the polygons have been assigned both a CWCS class and an extent. The extent identifies the component wetland inventory project area. At the present time, wetland data are not available for the entire province. There are data gaps along the eastern slopes and in Wood Buffalo National Park. An overedge exists along portions of the provincial boundary.

Canada_Forest_Tenures_2016

Shapefile

Title: Canada_Forest_Tenures_2016

Publication date: 2016-11-22

Presentation formats: digital map

Responsible Organization's name: Global Forest Watch Canada

Contact's role: originator

Contact information

Address: 116 Albert St, Suite 300, Ottawa, Ontario, K1P 5G3, CA

e-mail: info@globalforestwatch.ca?subject=Canada_Forest_Tenures_2016

Online Resource Location www.globalforestwatch.ca

Summary:

This spatial dataset of forestry tenures across Canada was prepared by Global Forest Watch Canada. It is made up provincial and territorial datasets to give a picture of the areas of potential forest activity across Canada.

Description:

This dataset shows the extent of active forestry tenures across Canada in 2016. For this dataset we consider “forest tenure” as an agreement between an industrial forest user and provincial government made for the purposes of extraction of timber from a defined geographic area. These concessions, issued by provincial and territorial governments, allow for forestry activities and management on provincial/territorial crown lands. This includes Forest Management Agreements and Timber Permits issued for specific management units, where available.

Credits:

Data compilation was done by Global Forest Watch Canada, using provincial and territorial government data sources. Data was obtained from the provincial government sources. Specific sources are listed in the resource lineage. User should check with government sources for use restrictions and limitations. Data sources used are publicly available - More accurate and detailed data may be used by government departments. The following jurisdictions provide their data under an open licence, other jurisdictions do not list use limitations.

British Columbia - <http://www2.gov.bc.ca/gov/content/governments/about-the-bc-government/databc/open-data/open-government-license-bc>

Alberta - <https://open.alberta.ca/licence>

Ontario - <https://www.ontario.ca/page/open-government-licence-ontario>

New Brunswick - http://geonb.snb.ca/documents/license/geonb-odl_en.pdf

Nova Scotia - <http://novascotia.ca/opendata/licence.asp>

CanVec Series. Natural Resources Canada. CanVec Series: Ottawa, Ontario. 2015.

Originator: Natural Resources Canada

Publication_Date: May 18, 2015

Title: CanVec Series

Geospatial_Data_Presentation_Form: vector digital data

Publication_Place: Ottawa, Canada

Publisher: Natural Resources Canada

Online_Linkage: <http://ftp.maps.canada.ca/pub/nrcan_rncan/vector/canvec/>

Current as of 2015

Abstract:

CanVec is a digital cartographical reference product produced by Natural Resources Canada.

It originates from the best available data sources covering Canadian territory, offers quality topographical information in vector format and complies with international geomatics standards.

CanVec is a multi-source product coming mainly from the National Topographic Data Base (NTDB), the Mapping the North process conducted by the Canada Center for Mapping and Earth Observation (CCMEO), the Atlas of Canada data, the GeoBase initiative and the data update using satellite imagery coverage (e.g. Landsat 7, Spot, Radarsat, etc). CanVec contains more than 60 topographical features organized into 8 themes: Transport Features, Administrative Features, Hydro Features, Land

Features, Man-Made Features, Elevation Features, Resource Management Features and Toponymic Features.

Caribou Range

Originator: Alberta Environment and Parks, Government of Alberta

Publication_Date: 201212

Title:Caribou Range

Geospatial_Data_Presentation_Form: vector digital data

Publication_Place: Edmonton, Alberta

Publisher: Alberta Environment and Parks, Government of Alberta

Other_Citation_Details: Fish and Wildlife Division

Online_Linkage: https://extranet.gov.ab.ca/srd/geodiscover/srd_pub/LAT/FWDSensitivityCaribouRange.zip

Abstract:

This dataset is produced for the Government of Alberta and is available to the general public. Please consult the Distribution Information of this metadata for the appropriate contact to acquire this dataset.

This dataset is comprised of the provincial Caribou (*Rangifer tarandus caribou*) Range distribution data. The boundaries are derived upon the known ranges of Caribou herds, as determined through historical information, the movements of collared animals (telemetry) and aerial surveys. This new map has been used to communicate the extent of caribou range in the province for important initiatives such as the Alberta cabinet approved Woodland Caribou Policy for Alberta, and the Federal Recovery Strategy for both boreal and southern mountain woodland caribou. This caribou range map will be adopted as the land-use referral map for all land-use applications on April 1, 2013. Beginning April 1, 2013 projects that have received an EPEA approval using the updated Caribou Range map, and all other land use and forestry applications, will use the updated Caribou Range map for required disposition applications.

Purpose:

This dataset provides the general public, industrial operators and government departments information regarding the location of caribou ranges. Specific operating conditions apply to caribou ranges

Supplemental_Information:

Caribou range distributions have been endorsed by Alberta Environment and Parks, Government of Alberta.

Key Wildlife and Biodiversity Zone, Alberta Environment and Parks, Government of Alberta, Edmonton, Alberta, 2010.

Originator: Alberta Environment and Parks, Government of Alberta

Publication_Date: 2010

Title: Key Wildlife and Biodiversity Zones

Geospatial_Data_Presentation_Form: vector digital data

Publication_Place: Edmonton, Alberta

Publisher: Alberta Environment and Parks, Government of Alberta

Online_Linkage: [https://extranet.gov.ab.ca/srd/geodiscover/srd_pub/LAT/FWDSensitivity/](https://extranet.gov.ab.ca/srd/geodiscover/srd_pub/LAT/FWDSensitivity/KeyWildlifeAndBiodiversityZones.zip)

KeyWildlifeAndBiodiversityZones.zip

Abstract:

This dataset is produced for the Government of Alberta and is available to the general public. Please consult the Distribution Information of this metadata for the appropriate contact to acquire this dataset. The Key Wildlife and Biodiversity Zone is a combination of key wildlife habitat from both uplands and major watercourse valleys. The basis of this zone was determined using major river corridors, valley topography, valley slope breaks and ungulate winter densities. The Key Wildlife and Biodiversity Zone is intended to prevent loss and fragmentation of habitat; prevent short and long-term all-weather public vehicle access; prevent sensory disturbance during periods of thermal or nutritional stress on wildlife; and prevent the development of barriers to wildlife corridors (e.g., stream crossings). Note that this layer is a consolidation of previous Key Ungulate Areas, Key Ungulate Winter ranges, and Class C - Key Wildlife and Watercourse areas.

Purpose:

To provide the general public, industrial operators and government departments information regarding the location of Key Wildlife and Biodiversity zones. Specific operating conditions apply to this zone.

Supplemental_Information:

Key Wildlife and Biodiversity zone delineations have been endorsed by Alberta Environment and Parks, Government of Alberta. Small spatial topological corrections were applied to the dataset in August 2013. An additional small adjustment (removal of a small area) near Rainbow Lake was made in February 2014. In 2015, there were minor changes to the boundary around the Notikewin, Whitemud, Keg, Bear, and Meikle-Botha Rivers in the Lower Peace since the initial coverage did not encompass both sides of these rivers. The publication date and the time period of content date remains 2010.

