UNIVESRITY OF OKLAHOMA

GRADUATE COLLEGE

SURFACING OIL: THE OIL INDUSTRY AND ENVIRONMENTAL KNOWLEDGE IN THE 20TH CENTURY UNITED STATES

A THESIS

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

Degree of

MASTER OF ARTS

By

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Norman, Oklahoma
2023

SURFACING OIL: THE OIL INDUSTRY AND ENVIRONMENTAL KNOWLEDGE IN THE 20TH CENTURY UNITED STATES

A THESIS APPROVED FOR THE

DEPARTMENT OF HISTORY OF SCIENCE, TECHNOLOGY, AND MEDICINE

BY THE COMMITTEE CONSISTING OF

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Acknowledgements

No thesis is written alone. I've had the pleasure and privilege to be able to meet so many outstanding people who have shaped this thesis in one way or another.

Many thanks to my committee: Dr. Suzanne Moon, Dr. Pete Soppelsa, and Dr. Robert Lifset. Dr. Moon has the uncanny knack of giving me perfect advice, just as I realize I need it. Dr. Soppelsa and I have juggled laughter and intense conversations for hours, both of which played a role in my writing. Dr. Lifset gave me an incredible crash course in oil history that helped me paint a more thorough picture of the questions I had. Thanks to all of you for the support and feedback that has improved this paper immensely.

Graduate school is often lonely, but it doesn't have to be. Many thanks to my fellow cohort – Bryce Beasley, Percy Rottinghaus, and Mario Ramirez-Arrazola – as well as the other HSTM grad students who make the 6th floor a home – Rebecca Marcolina, Caden Testa, Goutham Sukumaran and Kristi Raffa. Thanks to Katie Hester – the first person I knew from Oklahoma - for sharing laughs, comedy shows, and concerts since 2019.

My community outside of the university has been instrumental in my thinking about this thesis and why it matters. My friends in Red Dirt Collective and the Oklahoma Graduate Workers Collective remind me that this work is not an individual endeavor, but a collective one.

Without dozens of librarians and archivists, this thesis would not have been possible. Angela Schmidt from the University of Alaska – Fairbanks sent digitized film when I was unable to make it to Fairbanks; Dr. JoAnn Palmeri from OU's History of Science collections provided wonderful support, reading suggestions, and research ideas; Jackie Reese and Tyler Franklin from OU's Western History Collections helped me polish my ideas during my summer fellowship in 2022, and many WHC student assistants helped find and process the materials: Grace Frost, Catori Roberts, Griffin Williams, Rachel Roberts, Misha Kutepov, Jennevieve Scott, Megan Green, and Melissa Weiss. And of course, thanks to the many librarians and student workers at Bizzell Memorial Library, especially in the Inter-library Loan Department.

Special thanks to my mom, Patches Slane, my aunt, Victoria Slane, and my late grandpa, Robert Slane, who have supported my dreams for years and sometimes from thousands of miles away. Thanks also to Mike and Melinda Cochran, who have welcomed me into their home, easing my homesickness with such kindness.

A thousand thank you's to Bryton Cochran, who has provided critical feedback throughout the drafting process. More times than I can count, he's pulled my head out of the weeds to see the beauty of the prairie and the plains. For that and more, I am eternally grateful.

And finally, thanks to Ladybug, who made the journey to Oklahoma with me and kept me company during my many late night writing sessions.

Abstract

In the 20th century United States, the oil industry expanded internationally, extracting in new environments with new technologies. Throughout this period, contemporary environmental knowledge shaped the oil industry's perspective on oil extraction and its consequences. In this thesis, I aim to show how the oil industry has used and informed environmental knowledge, such as ecology and marine biology, to argue for certain kinds of production and to defend their practices against critics. This thesis examines three different case studies of the oil industry grappling with the nature of oil: the conservation movement of the early 20th century, Cold War ecological research on the North Slope, and the naturalization of oil via natural oil seep research in California and Rigs-to-Reefs programs in the Gulf of Mexico in the 1960s and 1970s. In these places, the oil industry's relationship with the environment reaffirmed settler colonial power and questioned the division of nature and technology.

PROLOGUE:

The relationship of oil and the environment has followed me to various homes. Oil rigs dot the Southern Illinois landscape that I was raised in. At night, the pumpjacks still creak steadily, joining the bugs and the birds in the rural soundscape. Our county economy is utterly dependent on the refinery and the Illinois Basin where the oil lies. When I spent a semester in Copenhagen, my trust in Scandinavian sustainability was crushed when I learned about the Baltic Pipeline and Norway's investment in oil. Now, in Oklahoma, the oil landscape is more obvious than ever. Oil built this university. Even my department, the History of Science, Technology, and Medicine, was created through a donation by Everette Lee DeGolyer, a celebrated geophysicist who spent twenty years directing the American Petroleum Institute.[1] The buildings I have classes in, the department and resources that I rely on, and the money that allows me to do this work all comes from oil money. It has completely shaped the environmental and social landscape in which I reside and work.

As I write this, the climate crisis — no longer just climate change — is unfolding. Two-thirds of Pakistan was underwater in the summer of 2022, when I began research for this thesis in earnest. Globally, river levels keep dropping, and glaciers keep melting. Fires rage. I cannot realistically write a history of oil extraction, ecological science, and the relationship of technology and nature without addressing this. And I cannot morally write one without incorporating it. My questions and arguments are informed by the fact that fossil fuel extraction

[1] He also found one of the largest oil fields in the world, Portrero del Llana (no. 4), in 1909 with the Mexican Eagle Petroleum Company, served as an assistant deputy for the Petroleum Administration for War from 1942-1943, and led a mission of the Petroleum Reserves Corporation to the Middle East shortly after his assistant deputyship. Petar Markovski and Suzanne Moon, "Everette Lee DeGolyer and Geology Students Mapping in the Arbuckle Mountains, Oklahoma, 1905." Technology and Culture 52, no. 1 (2011): 127–30. http://www.jstor.org/stable/23020459; Joan J. Perez, "DeGolyer, Everette Lee," Handbook of Texas Online, Texas State Historical Association, accessed July 17, 2023, https://www.tshaonline.org/handbook/entries/degolyer-everette-lee.

and burning has caused and will continue to cause damage to the people of this planet, namely those with the least responsibility for it. Fossil fuel extraction, as part of larger capitalist and imperialist structures, fuels its own injustices, as evidenced by the increased rate of Missing and Murdered Indigenous Women near oil camps.[2] Colossal fossil fuel use harms people and the environment through pollution, waste, and the impacts of climate change - though there are a select few who have overseen this long historical process.

This global extraction project is primarily based on stolen land. I am a white settler academic in North America who grew up in oil country and witnessed the consequences of extraction on the environment; but, I cannot speak for the Indigenous communities that have been harmed by extraction. My goal in this paper is to explain how the oil industry has naturalized the extraction process, as well as crude oil at the Earth's surface, through environmental and ecological language — a process that promotes settler colonial violence. My hope is that this thesis sheds light on how the intertwined forces of oil, settler colonialism, and knowledge-making influence the contemporary world. What is at stake here is more than a master's thesis — it is to play one part in revealing the way extraction and injustice has been embedded in our world through imperialist and capitalist institutions.

[2] Julia Stern, "Pipeline of Violence: The Oil Industry and Missing and Murdered Indigenous Women," *Immigration and Human Rights Law Review* (blog), May 28, 2021, https://lawblogs.uc.edu/ihrlr/2021/05/28/pipeline-of-violence-the-oil-industry-and-missing-and-murdered-indigenous-women/.

INTRODUCTION:

In September 1972, the Louisiana-Arkansas Division of the Mid-Continent Oil & Gas Association held their annual meeting at the Fairmont-Roosevelt Hotel, just off of Canal Street in New Orleans. In a room full of oil executives, C.L. Blackburn, the vice president of the Southern E&P Region of Shell Oil, spoke about the history and future of offshore oil production — less than twenty-four hours after an enormous offshore lease sale.[3] Though excited about future development, Blackburn noted that their work was not over. While offshore rigs increased production (with the added bonus of being out of sight), they had lost favor in the eyes of the public. Environmental concerns about offshore oil had escalated just a couple years earlier when a blowout in the Santa Barbara Channel made national news. Birds and fish, covered in crude oil and washing up on the beach, horrified those in Santa Barbara and across the nation. It was in this context that Blackburn announced to his audience, "We're going to have to be better environmentalists than those who oppose us."[4]

Blackburn's charge sounds strange to a 21st century ear. Oil companies are not well known for being environmentally conscious, especially in the age of climate crisis. The fears of oil disasters became more concerning after Santa Barbara with the high profile spills of Exxon Valdez (1989) and Deepwater Horizon (2010) in US waters. And yet, throughout all of this, oil has seeped into the fabric of our lives. Plastics, petrochemicals, and the car-centric infrastructure and culture of the United States makes oil impossible to forget, though the crude itself is invisible to many consumers. Oil is often extracted in rural places, or if it is extracted in a city

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[3] C.L. Blackburn, "Offshore: Past, Present, and Future, " *Annual meeting of the LA-ARK division of the Mid-Continent Oil & Gas Association*, Sept. 13, 1972, 1. Cities Service Oil & Gas Collection, Box 30, Folder 2. Western History Collections, University of Oklahoma Libraries, Norman, Oklahoma.
[4] Blackburn, 11.

like Los Angeles, the derricks are hidden.[5] The commodification and invisibility of oil can obscure the fact that oil is a natural resource that has, for thousands of years, seeped onto the surface of the planet. It is not just a fuel locked underground for humans to extract — it is a product of life, transformed by millions of years of geologic pressure. Métis anthropologist Zoe Todd has explored the philosophical dimensions of the idea that oil is former life, describing the oil in Alberta as "ancient fossil kin" rather than fossil fuels.[6] She questions the geologic definitions that western science has attributed to oil, instead framing oil as a distant relative being weaponized by a modern industrial society. It is in this line of thinking — of oil being a product of the biotic world (in western scientific terms) — that drives my investigations into the relationship between oil and nature.

Though crude oil rests underground, once it is brought to the surface (by natural pressures and fissures or by technologically mediated extraction), it enters a new biotic world. In return, the biotic world has learned to live with oil — or in the case of humans, learned to harness the power of oil. But what is the relationship of oil extraction to the rest of the living world? And as the relationship between oil and life becomes more pronounced through oil spills and ecosystem altering technologies, how has the oil industry invested in environmental knowledge? How does this play out in the context of the settler colonial nation home to multiple multi-national oil corporations, the United States? In this thesis, I examine how the oil industry consistently used and shaped environmental thought throughout the 20th century. In the early 20th century, oil executives turned to a conservation ethic, inspired by Progressive-era conservationism, that sought to conserve resources for wise national use. Control of natural resources like oil

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[5] Zoie Matthew, "4 Oil Wells Hidden in Plain Sight in L.A.," *Los Angeles Magazine*, Feb. 5, 2018. https://www.lamag.com/citythinkblog/hidden-oil-wells/

[6] Zoe Todd, "Fossil Fuels and Fossil Kin: An Environmental Kin Study of Weaponised Fossil Kin and Alberta's So-Called "Energy Resources Heritage," *Antipode* (Nov. 8, 2022): 4.

reaffirmed government power while also defining the environment in terms of production. After World War II, the discipline of ecology soared in popularity. The field of arctic ecology formed simultaneously with North Slope oil development, sharing a common patron of the US Navy. The North Slope, I argue, was transformed into an envirotechnical regime of oil and knowledge production that reaffirmed settler colonial control over Indigenous lands, though not without resistance. Towards the middle and later half of the 20th century, as oil spills made national news and environmental activism reached new heights, oil executives and industry professionals questioned the definition of pollution itself. In California and the Gulf, this meant investing in natural oil seep research and Rigs to Reefs programs that redefined crude as a natural part of the marine environment and redefined oil technologies as the key to ecological improvement. In all of these instances, I argue, nature was redefined by the oil industry, as they co-constructed nature and technology to naturalize both the crude brought to the Earth's surface, and the oil extraction process itself. In using and shaping environmental thought, the oil industry tapped into the power of defining nature that settler colonialism depends on.

Historiography

Situated within frameworks of envirotech and settler colonial studies, this thesis contributes to ongoing conversations among historians of science and technology, environmental history, and oil history. What this thesis offers is a new perspective on the intersection of oil history and the history of science, with a focus on environmental knowledge. Rather than viewing the oil industry and environmental scientists as opposing forces, I connect them with settler colonial logics of land use and knowledge creation. At the heart of this thesis lie questions about how extraction and science have come to define the modern industrial world.

Within the history of science, oil history connects neatly with the history of geology. Given that modern oil exploration falls within the domain of the geosciences, this makes sense. However, oil exploration was not always under the purview of scientists. Brian Frehner's *Finding Oil: The Nature of Petroleum Geology, 1859–1920* straddles history of science and technology and oil history, examining how oil exploration transitioned into a scientific process.[7] It was a process encouraged by oil men like Henry Doherty, who employed geologists and geophysical methods to find crude oil rather than rely on vernacular knowledge of prospectors. This process, as Frehner argues, is more than just the story of the creation of a scientific discipline. Rather, the transformation of oil exploration into a scientific process reflected the power of scientists and oil workers in defining nature. This too, is what this thesis explores. The power to define nature is apparent both in scientific research and oil extraction, collaborating as branches of settler colonial power. Henry Doherty appears here too, encouraging conservation of oil through scientific means.

For the oil industry, science informs extractive practices and technologies, but it has also been used to deflect attention away from the failures of those practices and technologies. In *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*, Naomi Oreskes and Erik Conway argue that oil industry weaponized uncertainty and consensus making in science to seed doubt about the reality of global warming.[8] Oil companies were able to take advantage of this because, as Oreskes and Conway argue, "What counts as knowledge are the ideas that are accepted by the fellowship of experts."[9] This thesis

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[7] Brian Frehner, *Finding Oil: The Nature of Petroleum Geology, 1859-1920* (Lincoln, Nebraska: University of Nebraska Press, 2016).
[8] Naomi Oreskes and Erik M. Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming* (New York: Bloomsbury, 2010).
[9] Oreskes and Conway, 269.

provides examples of oil companies funding their own scientific research, identifying experts to enter the scientific fellowship and promote research that argued oil was not as harmful as the public believed. In sponsoring environmental research that has been cited by institutions like the National Research Council, the oil industry has not only seeded doubt of scientific consensus through rhetorical means but also through scientific channels.

This was not the first time oil companies had invested in environmental knowledge for corporate benefit. Decades before, the oil industry drew on the conservation ethic of the 1920s and 1930s — inspired heavily by management of natural resources like water and timber — to maximize efficiency in the production process. At the federal level, supported by the likes of President Theodore Roosevelt and first head of the US Forest Service, Gifford Pinchot, conservation was meant to manage national natural resources wisely. Here, I draw on Samuel Hays's *Conservation and the Gospel of Efficiency* to examine this period. While Hays' argument that conservation was a top down affair and that environmentalism was a postwar phenomenon has been rightfully critiqued by historians, the relationship between conservation and efficiency still applies here. Whether the natural resource was fresh water, forests, or oil — all were incorporated into programs of conservation that valued efficiency to prevent exorbitant physical and economic waste. However, these various forms of conservation also reflect a larger system at work: settler colonialism. The goal of settler colonialism, as outlined by people like oilman and senator, Robert Kerr, is to obtain land and resources, then maintain power over them. Settlers had continued moving west through the United States for hundreds of years, but by the dawn of the 20th century there was hardly any more land left for them to "discover." At that point, control over resources became the focus.

To take control of land, settlers utilized what Aileen Moreton-Robinson calls "possessive logics." She uses the term possessive logics to "denote a mode of rationalization . . . that is underpinned by an excessive desire to invest in reproducing and reaffirming the nation-state's ownership, control, and domination." She specifies that, "White possessive logics are operationalized within discourses to circulate sets of meanings about ownership of the nation, as part of commonsense knowledge, decision making, and socially produced conventions."[10] Oil extraction is one practice that reaffirms state (and corporate) ownership of land, as the products are considered necessary for national progress. The perceived benefits of oil extraction for the environment are defined through scientific research and the redefinition of land in western scientific terms. Science, then, can be used by settlers to redefine what counts as beneficial use of natural resources, and further, what counts as nature. One of the main points this thesis contributes to existing literature is an in-depth understanding of the partnership of oil extraction and scientific research as branches of settler colonialism. Rather than looking at them separately, I attempt to bring them together, showing how they feed off of each other, while simultaneously feeding the settler colonial structure that supports them both.

To understand the relationship between science and colonialism, I draw from Linda Tuhiwai Smith's *Decolonizing Methodologies: Research and Indigenous Peoples.* There, she explores the multifaceted relationship between research and colonialism, noting that research is "a significant site of struggle between the interests and ways of knowing of the West and the interests and ways of resisting of the other."[11] All across what we call North America today, landscapes were renamed and altered through settler colonial power. On the North Slope of

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[10] Aileen Moreton-Robinson, *The White Possessive: Property, Power, and Indigenous Sovereignty* (Minneapolis, Minnesota: University of Minnesota Press, 2015), xii.

[11] Linda Tuhiwai Smith, *Decolonizing Methodologies: Research and Indigenous Peoples* (London and New York: Zed Books Ltd; Dunedin, New Zealand: University of Otago Press, 1999), 2.

Alaska, ecological science was key to the struggle, as it informed both industrial development and the resistance to that development. Arctic ecology and the solidification of scholarly networks through laboratory and field work "enabled local scientific interests to be organized and embedded in the colonial system."[12] In the Gulf and off the coast of California, where early natural oil seep research took place, the question of settler colonial control was not as prominent. However, the lack of any reference to local Indigenous knowledge demonstrates the power of settler colonialism. Scientists like Kenneth Landes and Dale Straughan naturalized crude in marine environment, never questioning or including Indigenous knowledge like some scientists in the Arctic. Rather, the entire debate took place between two settler institutions: institutional science and the oil industry. The knowledge of local Indigenous people about natural oil seeps and their land rights were made invisible by settler colonial logics that determined, long before the Santa Barbara spill, that their knowledge was not legitimate.

To maintain this settler colonial power over extraction — in the face of environmental backlash and resource management concerns — the oil industry often intentionally blurred the boundary between nature and technology. To understand the complexities of the relationship between nature and technology on the North Slope, I draw on the insights of Sara Pritchard within the field of envirotech, specifically her concepts of envirotechnical landscapes and envirotechnical regimes. Envirotechnical landscapes contain traces of both nature and technology, evidenced by the miles of pipelines crossing the permafrost. Here, nature and technology are interwoven into one landscape that supports an ecosystem and a technological system. Envirotechnical regimes incorporate those landscapes as well as the "institutions, people, ideologies, [and] technologies . . . that together define, justify, build, and maintain a particular

[12] Tuhiwai Smith, 8.

envirotechnical system as normative."[13] The North Slope, during the Cold War, was transformed into an envirotechnical regime of oil and knowledge production through material changes to the landscape from the oil industry and US Navy (pipelines, gravel roads, buildings, airports, etc.) and the creation of abstract scholarly networks and the field of arctic ecology. These aspects of the envirotechnical regime were powered by settler colonial logics of domination that insisted Indigenous communities did not use natural resources for the benefit of the nation. Though, as many scientists would later recall, Indigenous knowledge was crucial to their research success.

In bridging the history of science and technology, oil history, environmental history, envirotech, and settler colonial studies, this thesis examines industrial extraction and modern science as they work together to reinforce the United States as a settler colonial superpower. This story, written in Oklahoma, discusses four separate areas of oil production in the United States: the Mid-Continent region (primarily consisting of Oklahoma, Kansas, and Texas), the Alaskan Arctic, the coast of Southern California, and the Gulf of Mexico. Like oil itself, the story moves through the diverse geographies dictated by geologic processes spanning millions of years. These old geographies of carbon now shape current political and cultural orders.

Combining a settler colonial analysis of extraction with an envirotechnical examination of industrial landscapes shows us how the oil industry has contributed to the maintenance of settler colonial power in North America. By redefining what nature is and who can own or develop it, oil companies have assisted the US government in maintaining power over stolen land during the 20th century. Throughout the thesis, oil appears in various contexts. To distinguish between oil below and at the surface, I will refer to it as "crude" while it is underground and simply "oil" once it has been extracted or seeped onto the surface. Chapter 1

[13] Sara Pritchard, *Confluence: The Nature of Technology and the Remaking of the Rhône* (Cambridge: Harvard University Press, 2011), 23.

begins in the 1920s and 1930s, as the oil industry adopted petroleum conservation in the Mid-Continent region (reflecting the larger conservation ethic of the period) to manage resource production and support national security. Chapter 2 moves to the Arctic during the Cold War, as Alaska became the new oil frontier. Oil exploration on the North Slope happened concurrently with the development of arctic ecology, and oil companies would then use the knowledge produced by scientists in the Arctic to naturalize oil extraction within the ecosystem. Chapter 3 moves into the marine environment, investigating the impact of the 1969 Santa Barbara Oil Spill on understandings of natural oil seeps in the marine environment and the development of Rigs to Reefs programs in the Gulf of Mexico that integrated oil technologies into the ecosystem. In all of these cases, science and technology are shown to be compatible with, and comparable to, natural processes.

CHAPTER 1: CONSERVATION IN THE MID-CONTINENT

Introduction

In February 1926, Henry Doherty, founder of the Cities Service Company, presented a statement to the Federal Oil Conservation Board entitled, "The Petroleum Problem As I See It." In this statement, he argued that oil was being pumped too quickly and erratically, leaving crude wasted in the ground or leaking around the drilling rig. He worried that the United States would run out of oil, or at least, they would not have a ready supply should another Great War occur. World War I, still fresh in the public mind, had catapulted oil to the international stage as an indispensable natural resource, and the United States had a lot of it.

Doherty was one of the few oil executives who openly promoted the idea of oil conservation. Cities Service operated in the Mid-Continent oil fields, a region stretching across

Louisiana, Arkansas, Texas, Oklahoma, and Kansas that was home to some of the most productive oil and gas fields of the time.[14] It was here that conservation arose as a legitimate approach to oil production, as policies were enacted and tested first in the Oklahoma fields.[15] On a technical level, this form of conservation sought to prevent waste of crude underground and aboveground while also extracting and processing crude efficiently to increase total yields.[16] Economically, conservation served to stabilize the market by limiting overproduction, though critics were concerned with potential price manipulation and government overreach.[17] Oil conservation practices would ensure the fields produced as much oil as possible, simultaneously tapping into national fears of energy security and the larger conservation ethic of the time. Doherty, described as a "pioneer" of conservation by his peers and historians, fought an uphill battle against an extractive framework that incentivized hasty drilling practices.[18]

This push for petroleum conservation occurred during the same decades (1900–1940) as the conservation movement, spearheaded by the likes of Gifford Pinchot and Theodore Roosevelt. Concerns over resources rose around the turn of the century, and by the 1912

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[14] Harold F. Williamson, Ralph L. Andreano, Arnold R. Daum, and Gilbert C. Klose, *The American Petroleum Industry: The Age of Energy 1899-1959* (Evanston, Illinois: Northwestern University Press, 1963), 303.
[15] J. Stanley Clark, *The Oil Century: From the Drake Well to the Conservation Era* (Norman, OK: University of Oklahoma Press, 1958), 148.
[16] Stuart E. Buckley, ed., *Petroleum Conservation*, (Dallas, Texas: E.J. Storm Printing Company, 1956), 6.
[17] Gerald Nash, *United States Oil Policy, 1890-1964: Business and Government in Twentieth Century America* (Pittsburgh, PA: University of Pittsburg Press, 1968), 94.
[18] Norman Nordhauser described Doherty as a pioneer in his 1973 article about the origins of Federal Oil Regulation. *Petroleum Conservation*, edited by Stuart E. Buckley, was also sponsored by the Henry L. Doherty Memorial Fund. Norman Nordhauser, "Origins of Federal Oil Regulation in the 1920's," *Business History Review* 47, no. 1 (Spring 1973): 54; Doherty himself maintained this narrative in his writing: Henry L. Doherty, *The Petroleum Problem As I See It*, Statement to the Federal Oil Conservation Board (Washington D.C., February 10, 1926); Henry L. Doherty, *Suggestions for Conservation of Petroleum by Control of Production,* 131st meeting of the American Institute of Mining and Metallurgical Engineers (New York: February 18, 1925) Cities Service Oil & Gas Collection, Box 64, Folder 20. Western History Collections, University of Oklahoma Libraries, Norman, Oklahoma; Others have described this story in: *Petroleum Conservation*, edited by Stuart E. Buckley; *New York Times,* "Henry L. Doherty, Oil Man, Dies at 69," December 27, 1939. ProQuest Historical Newspapers; A Cities Service brochure with no date also describes him as such. "Cities Service Gas Company." Cities Service Oil & Gas Collection, Box 77, Folder 15. Western History Collections, University of Oklahoma Libraries, Norman, Oklahoma.

presidential election, conservationism had become a national conversation.[19] Conservation of natural resources, notably timber and water, relied on government control of national lands, such as National Parks, National Forests, and National Monuments. This allowed the federal government to control what resources were developed rather than corporations.[20] Those concerned with how nature was being developed at that time are often categorized by historians into two groups: preservationists and conservationists. Preservationists, popularly represented by John Muir, insisted that certain environments should be left alone, devoid of any human traces. Conservationists like Pinchot, however, believed in a scientific and technological management of natural resources.[21] The preservationists differed from the conservationists as they were largely more concerned with environmental aesthetics and prevention of development as opposed to wise and efficient use of resources.[22] Both conservationism and preservationism drew on an environmental consciousness that "reflected elements of settler colonialism."[23] Though these two groups of people disagreed on whether nature should be industrially developed, they had a common interest in maintaining the power to define nature and people's relationship to it.

In the 21st century, environmentalists and the oil industry are often pitted against each other, as if they occupy different ends of a spectrum of environmental care. In this arrangement, the evil oil industry sits on one side and the good environmentalists on the other. This arrangement appears to come from the deep intertwining of environmentalism and the science of

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[19] Ian Tyrrell, *Crisis of the Wasteful Nation: Empire and Conservation in Theodore Roosevelt's America* (Chicago, IL: University of Chicago Press, 2015), 6. ProQuest Ebrary.
[20] Tyrrell, 261.
[21] Samuel P. Hays, "From Conservation to Environment: Environmental Politics in the United States Since World War Two," *Environmental Review* 6, no. 2 (Autumn 1982): 16.
[22] Robert D. Lifset, *Power on the Hudson: Storm King Mountain and the Emergence of Modern American Environmentalism* (Pittsburgh, PA: University of Pittsburgh Press, 2014), 3.
[23] Dorceta E. Taylor, *The Rise of the American Conservation Movement: Power, Privilege, and Environmental Protection* (Durham: Duke University Press, 2016), 384.

ecology that has developed since the 1960s.[24] From this modern environmentalist perspective, those who are committed to protecting the environment are usually opposed to industrial developments (like oil exploration) that disrupt and harm ecosystems. Just a few decades earlier, the preservationists and conservationists concerned with nature, as well as oil conservationists, all had a vested interest in the power of the US settler colonial state. Settler colonial logics underpin the history of American environmental consciousness (seen here in the story of conservationism and preservationism) and oil extraction. By examining the historical similarities between these contemporary adversaries, this chapter will show how settler colonialism informs both extractive industries and the people seeking to protect the environment from overexploitation.

Conservation Defined

The basic components of the conservation ethic — efficiency, the elimination of waste, and scientific/technological solutions — are apparent in both conservationism and oil conservation. Waste and efficiency are two key terms that proponents from each group used often. Waste can broadly be understood as the loss of something, with an implication that the loss could have been prevented. Efficiency ties into waste, as it describes the ideal process through which waste is reduced. To be efficient is to minimize waste. And to both the oil industry and the conservationists, the best way to minimize waste and increase efficiency was through scientific and technological solutions. Conservation, then, most often refers to the "wise use" of resources,

[24] For more about this process, see Etienne Benson, *Surroundings: A History of Environments and Environmentalisms* (Chicago and London: University of Chicago Press, 2020).

often to rein in reckless extraction. However, in the United States, settlers had a stronger claim over what constituted "wise use" as the self-proclaimed stewards of the land.[25]

Henry Doherty stressed the importance of reducing waste in his public appeals to oil conservation. In a 1924 speech to the National Petroleum Marketers' Association, he argued, "It is our duty to see that such oil as is produced shall be put to its most beneficial use for the whole of society, and this can only be done by intensified sales which by natural laws create price levels which will drive the wasteful user of oils to other cheaper and more abundant fuels."[26] Wasting oil with inefficient retrieval methods and rushed extraction resulted in less final product for market, and, to Doherty, it was the responsibility of oil companies to prevent this. However, since this was not possible under the rule of capture, the state needed to be involved. Oklahoma defined waste in the 1915 Oil Conservation Statute as the "ordinary meaning" in addition to "economic waste, underground waste, surface waste, and waste incident to the production of oil or petroleum in excess of transportation or market facilities of reasonable market demands."[27] By the 1920s and 1930s, there were three different meanings for the term waste: "the loss of an irreplaceable natural resource," "the use of more labor and materials than necessary to get the desired economic result," and "a lower order of use" of petroleum products.[28] While waste could be interpreted in many different ways, the general sentiment was that something had been lost, and the loss could have been prevented. And the broad consensus amongst oil executives was that the current method of oil production was wasteful.[29]

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[25] Eric Alden Smith and Joan McCarter, eds., *Contested Arctic: Indigenous Peoples, Industrial States, and the Circumpolar Environment* (Seattle and London: University of Washington Press, 1997), xviii.
[26] Henry L. Doherty, *Some Fundamental Facts Concerning the Petroleum Industry*, address to the National Petroleum Marketers' Association, Cleveland, OH, 1924. Cities Service Oil & Gas Collection, Box 64, Folder 20. Western History Collections, University of Oklahoma Libraries, Norman, Oklahoma.
[27] The ordinary meaning is not specified. Williamson et al., 322.
[28] Williamson et al., 553.
[29] John G. Clark, Energy and the Federal Government: Fossil Fuel Policies, 1900-1946 (Urbana and Chicago, IL: University of Illinois Press, 1987), 151.

However, many of Doherty's colleagues were not concerned about waste because they were convinced of an unlimited petroleum supply beneath the earth.[30] In September 1925, the American Petroleum Institute (API), an oil industry trade association, released a report in which they stated: "Waste in the production, transportation, refining and distribution of petroleum and its products is negligible."[31] However, given that concerns about waste had become industry-wide arguments, this statement presented a distorted view of petroleum wastes. Many people in the oil industry agreed that waste existed, but whether or not they thought it needed to be regulated at the state or federal level was another issue. In these cases, the concern was not waste itself, but the idea that the federal government would manage production.

No oil executive would disagree with the fact that recovering more product had an economic benefit. Instead, industry critiques of oil conservation often came from concerns over federal control, existing capture policies, and conflicts between large companies and independent producers. The existing policy — rule of capture — encouraged hasty drilling because a person owned oil only *after* it had reached the surface.[32] Thus, rule of capture disincentivized leaving oil in the ground. To those who promoted the rule of capture, the real waste was not drilling for it. However, the reckless drilling practices to capture that oil led to "intolerable conditions" in the oil fields, as the lack of infrastructure and demand could not support the supply. [33] Many Oklahoma oil producers of the 1910s and 1920s — such as independent oil producer Wirt Franklin — supported conservation to remedy those conditions. The state of Oklahoma was the

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[30] Doherty notes early in this statement, "Those in the petroleum business who disagree with my views represent that we have an adequate supply for the future and that there are no wastes." Doherty, *The Petroleum Problem As I See It,* 1.
[31] Williamson et. al., 317-318.
[32] Brian C. Black, *Crude Reality: Petroleum in World History*, 2nd ed. (Lanham, Maryland: Rowman & Littlefield, 2014), 41.
[33] Kenny Franks argues that in 1914, the Independent Producers League called for petroleum regulation through conservation to end the "intolerable conditions" in the Oklahoma oil fields. Kenny A. Franks, *The Oklahoma Petroleum Industry* (Norman, OK: University of Oklahoma Press, 1980), 139.

first to enact an oil conservation law in 1915, and when the conservation debates reached the federal level, Oklahoma oil executives were well represented in the debates.[34]

Some independent producers, such as Oklahoma oil executive E.W. Marland, believed concerns about waste were a cover for the real goal of conservation: increased profits for larger, integrated companies.[35] The idea that conservation would benefit larger producers (aided by a fear of monopolization) reached the federal level, as historian Gerald Nash noted in *United States Oil Policy, 1890–1964*. President Coolidge — who broadly was in favor of conservation policies, having been influenced by Doherty — was also concerned that if large companies had the "legal authority to make voluntary agreements restricting production, they could easily manipulate prices."[36] Other independent producers supported conservation with a caveat. They favored state regulations over federal regulations, though few producers outright opposed conservation policies entirely.[37] In the late 1920s, Marland believed that independent producers would still hold influence to direct state level conservation regulations, and he shared this suggestion with the API in 1926.[38] In a 1933 meeting of the API, independent producers and some large companies opposed an idea that gave the authority to issue drilling permits to the federal government, while also giving the government the power to fix "production quotas and minimum prices."[39] Curiously, Wirt Franklin — at the time, president of the Independent Oil Producer's Association — supported the measure.[40] In a tumultuous era of overproduction,

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[34] Franks, 141.
[35] Erich W. Zimmerman, *Conservation in the Production of Petroleum: A Study in Industrial Control*, Petroleum Monograph Series, vol. 2 (New Haven, Connecticut: Yale University Press; London, UK: Oxford University Press, 1957), 3.
[36] Nash, 84, 93.
[37] Nash, 96.
[38] Nash, 96.
[39] Nash, 135.
[40] Nash, 135; Kenny Franks notes that "When Franklin spoke in support of federal regulation to the IPAA, he was shouted down." Franklin had also been a supporter of conservation at the state level in Oklahoma during the 1910s. Franks, 174.

severe price fluctuations, and monopoly busting, critics of conservation saw it as another strategy to reduce the power of oil companies in favor of federal control. However, Gerald Nash argues that by the mid-1930s, "state or federal laws to enforce conservation measures — unit agreement, drilling and pressure laws — were generally welcomed by responsible producers."[41] A solution to concerns over federal regulation was the Interstate Oil Compact (IOC), approved in August 1935. The main goal of this compact, signed by officials from Oklahoma, Texas, California, New Mexico, Arkansas, Colorado, Illinois, Michigan, and Kansas, was to prevent the waste of oil voluntarily.[42] Though there was a lack of unanimity for how conservation should be implemented (or whether it should be at all), there was enough support for efficient oil production from large and independent companies to implement conservation in some form.

While some oil executives distrusted federal control, Doherty used it to his advantage. Norman Nordhauser argued in "Origins of Federal Oil Regulation in the 1920s," that there is more to Doherty's conservation argument than expressed in his statement to the Federal Oil Conservation Board. Nordhauser noted that, although Doherty was considered a "pioneer of oil conservation," he had not always supported government regulation to conserve oil.[43] A shift occurred after California oil entered the market in the early 1920s.[44] A fifty percent decline in profits from 1920 to 1923 served as motivation for Doherty to change his mind.[45] Government regulations for petroleum conservation could confront the massive amounts of oil produced in California, ensuring the Mid-Continent maintained profitable production. Reducing the number of necessary wells — a conservation tactic proposed by Doherty — would benefit large fields

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[41] Nash, 147.
[42] Nash, 151; Critics of the IOC believed it too had the potential to be a monopoly, which the official agreement disputed. Franks, 176-77.
[43] Norman Nordhauser, "Origins of Federal Oil Regulation in the 1920's," *Business History Review* 47, no. 1 (Spring 1973): 59.
[44] Nordhauser, 58.
[45] Nordhauser, 59.

like the Mid-Continent while putting crowded fields like the Los Angeles Basin at a disadvantage.[46] Thus, petroleum conservation was a political and economic strategy with an environmental foundation.

To address physical waste, Doherty spearheaded a conservation tactic known as unitization. Under unitization, oil producers jointly operated a pool "as efficiently and economically as possible for the maximum recovery."[47] Oil in the ground does not act in accordance with terranean property laws; a pool could stretch under the properties of multiple individuals. Under rule of capture, any individual could drill into an oil pool, extracting as much as they could, as fast as they could. If a neighbor did not want the oil extracted for whatever reason, they could not do much to stop the production or its consequences. From a production standpoint, Doherty argued that this method led to unnecessary well drilling, as well as the waste of other resources like natural gas and helium that are often found near oil.[48] While he insisted that the point of conservation was to reduce physical waste, the economic waste associated with overproduction was also a major concern. Economic waste included the waste of money, labor, and materials during the production process.[49] In this sense, the goal of conservation was to reduce the costs (or waste) of operating more wells than were needed to extract oil, especially when the supply outpaced the demand. So while Doherty lamented the waste of product, others lamented wasting money on labor and materials for unprofitable production. Those concerned with economic waste sought conservation measures to control overproduction, while those concerned with physical waste desired more efficient forms of production.[50] Instead of

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[46] Nordhauser, 61.
[47] Buckley, 281.
[48] *New York Times*, "Henry L. Doherty, oil man, dies at 69."
[49] Robert E. Hardwicke, "Oil-Well Spacing Regulations and Protection of Property Rights in Texas," *Texas Law Review* 31, no. 2 (Dec. 1952): 111.
[50] Daniel Yergin describes the relationship between economic and physical waste in the East Texas fields. Producers that wanted to cut production to prevent economic waste used arguments about physical waste to avoid legislative

disorganized drilling and retrieval that resulted in various forms of waste, Doherty sought an orderly and efficient oil extraction process based on the application of geologic principles.[51]

Even though oil conservation is an economic concern about waste rather than an environmental one, the concern for crude as a natural resource does reflect an environmental ethic of extraction. Oil is part of the environment, and Doherty made this connection clear in his writings. In his 1926 statement "The Petroleum Problem As I See It," he argued, "All of our troubles spring from the fact that we have been trying to work under different laws from those which govern all other property, and unlike any other laws except those which pertain to wild birds and wild animals. What has happened to our wild birds and wild animals is rapidly happening to our petroleum."[52] Doherty made a similar note about wild birds and wild animals a year earlier in an address to the American Institute of Mining and Metallurgical Engineers and in a 1924 address to the National Petroleum Marketers' Association.[53] In the late 19th century, there was a legislative push to federally protect birds, as many species were at risk of extinction from sport hunting and the demand for bird feathers.[54] Doherty's direct comparison between wildlife and oil conservation, using a known concern of bird extinction, connects the concerns over physical waste of crude with the "waste" of overhunting and environmental destruction. The consistent inclusion of the wild birds and animals in Doherty's public addresses suggests that

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troubles. Daniel Yergin, The Prize: The Epic Quest for Oil, Money, and Power (New York, NY: Simon & Schuster, 1991), 249.

[51] Brian Frehner, *Finding Oil: The Nature of Petroleum Geology, 1859-1920* (Lincoln, Nebraska: University of Nebraska Press, 2011), 14. https://doi.org/10.2307/j.ctt1df4h28.

[52] Doherty, *The Petroleum Problem As I See It*, 6.

[53] The pamphlet reads: "We are now under laws which are different from those that pertain to any other property or product from property, except those pertaining to wild birds and to wild animals, and what has happened to our wild birds and wild animals is rapidly happening to our petroleum reserves. Complete extinction of our wild birds and wild animals has been prevented in many cases only by restrictions as to marketing and by the use of "closed seasons," but no one as yet has advocated even "closed seasons" for petroleum." He goes on to describe open seasons, comparing the search for and extraction of oil and gas to hunting. Doherty, *Suggestions for Conservation of Petroleum by Control of Production*, 3.

[54] Taylor, 189-90.

oil's relationship to the environment was useful to his arguments for conservation. A fervor for conservationism erupted in the 1920s and 1930s, so Doherty's use of environmental rhetoric connected his conservation goals of the oil industry with broader concerns about the protection of nature.[55]

The commitment to conservation demonstrated by Doherty reproduced the conservation ethic that historian Samuel P. Hays called "the gospel of efficiency." While conservation had originally referred specifically to flood water storage, by 1908 it indicated "efficiency in the development and use of all resources."[56] Action had been taken at the federal level, as Roosevelt directed public land acquisitions and policy making through the Public Lands Commission, created in 1903, to ensure smooth resource development from a central, federal committee.[57] The most efficient way to conserve resources was to ensure that one party owned them all – the United States government. Though Samuel Hays argued that conservation of this era was a top-down affair from scientists and the federal government, the origins of oil conservation actually lie more with Oklahoma independent oil producers who wanted to prevent larger companies from dominating the market with overproduction.[58] Oil conservation and the conservation of other natural resources both strived for efficiency and wise use of the environment through a stewardship model of resource management. Notably, left out of any of these conversations were the Indigenous communities whose homes held these resources.

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[55] Samuel P. Hays, *Conservation And The Gospel Of Efficiency: The Progressive Conservation Movement, 1890–1920* (Pittsburgh, Pennsylvania: University of Pittsburgh Press, 1959), 141.
[56] Hays, *Conservation and the Gospel of Efficiency*, 123.
[57] Hays, *Conservation and the Gospel of Efficiency,* 68.
[58] Samuel P. Hays, "From Conservation to Environment: Environmental Politics in the United States Since World War Two," *Environmental Review* 6, no. 2 (Autumn 1982): 17.; Brian Frehner, "From Creekology to Geology: Finding and Conserving Oil on the Southern Plains, 1859-1930," (PhD diss., University of Oklahoma, 2004), 198.

The Settler Colonial Connection

In addition to concerns about waste and efficiency, conservationism of the early 20th century reflected a land ethic defined by settler colonialism.[59] Settler colonialism refers to a "structure of exogenous domination in which Indigenous inhabitants of a territory are displaced by an outside population from an imperial center."[60] This displacement is driven by the settlers' desire for land.[61] Michael Simpson goes further, framing this desire for the certain materials of the land (in his case, bitumen from the Athabasca Tar Sands) as a machine. He argues, "The resource desiring machine propelled the extension of the settler colonial state's modes of resource governance further into Indigenous territories, further producing resources and resource coveting subjects."[62] Understanding land as the primary target of settler colonial desire, the connection between preservationists, conservationists, and the oil industry becomes clearer. From the settler state perspective, natural resources needed to be conserved and developed to maintain state power over the land acquired from Indigenous peoples. These three groups — preservationists, conservationists, and oil executives — disagreed on if (and how) the land was to be altered and developed, but they agreed on the fact that *they* should be the ones to manage it. There were no calls to give the land back to indigenous people; rather the primarily white settlers

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[59] For more about the connection between settler colonialism and national parks, see Dorceta Taylor, *The Rise of the American Environmental Movement*; Robert Vranich, "Beyond Preservation and Use: National Parks and Settler Colonialism in Western Canada, 1880s-1930s," *Prairie History* 10 (Spring 2023): 5–19; Subhankar Banerjee and Finis Dunaway, "Beyond Fortress Conservation: Postcards of Biodiversity and Justice," *Environmental History* 28, no. 1 (January 2023): 180–207, https://doi.org/10.1086/722771; Lauren Eichler and David Baumeister, "Hunting for Justice," *Environment and Society* 9, no. 1 (September 2018): 75–90, https://doi.org/10.3167/ares.2018.090106.
[60] Paul Berne Burow, Samara Brock, and Michael R. Dove, "Unsettling the Land: Indigeneity, Ontology, and Hybridity in Settler Colonialism," in *Indigenous Resurgence*, ed. Jaskiran Dhillon, Decolonialization and Movements for Environmental Justice (Berghahn Books, 2022), 59. https://doi.org/10.2307/j.ctv2vr8tm0.7.
[61] Burow, Brock, and Dove, "Unsettling the Land," in Dhillon, *Indigenous Resurgence*, 59; Patrick Wolfe, "Settler Colonialism and the Elimination of the Native," *Journal of Genocide Research* 8, no. 4 (December 2006): 388; Jen Preston, "Racial Extractivism and White Settler Colonialism: An Examination of the Canadian Tar Sands Mega-Projects," *Cultural Studies* 31, no. 2/3 (March 2017): 354. https://doi.org/10.1080/09502386.2017.1303432.
[62] Michael Simpson, "Resource Desiring Machines: The Production of Settler Colonial Space, Violence, and the Making of a Resource in the Athabasca Tar Sands," *Political Geography* 74 (October 1, 2019): 3, https://doi.org/10.1016/j.polgeo.2019.102044.

and descendants of settlers believed they had the authority to determine how, when, and why the land was developed.

The settler quest for resources and land can be understood through the concept of the logic of elimination. This logic, as defined by Patrick Wolfe, seeks to replace Indigeneity with an economic and cultural settler hegemony.[63] Wolfe argues that this logic of elimination is based on territory, as "Territoriality is settler colonialism's specific, irreducible element."[64] To take land from indigenous hands, settlers claimed ownership over a wilderness that was, by their definition, empty. In redefining the land based on settler conceptions of property and nature, settlers worked to eliminate Indigenous conceptions of the land and peoples' relationships to it. Audra Simpson and Andrea Smith argue in the introduction to *Theorizing Native Studies* that "Land is not a commodity owned by Native peoples; land is part of an active relationship with Native peoples in multiple and complex ways."[65] Settler colonialism sought to eliminate this relationship and replace it with a new political state based on the acquisition of territory and the resources therein.

Extraction, then, serves the settler colonial state by legitimizing and encouraging settler development of the land. As Macarena Gómez-Barris argues, "Before the colonial project could prosper, it had to render territories and peoples extractible."[66] The things that could be extracted were then transformed into resources and commodities. To do this, Michael Simpson argues, "the settler colonial state employed technologies of mapping, surveying, and the production of

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[63] Wolfe, 390.
[64] Wolfe, 388.
[65] Audra Simpson and Andrea Smith, eds. *Theorizing Native Studies (*Durham, North Carolina: Duke University Press, 2014), 21. https://doi.org/10.1215/9780822376613.
[66] Macarena Gómez-Barris, *The Extractive Zone: Social Ecologies and Decolonial Perspectives* (Durham and London: Duke University Press, 2017), 5.

geological knowledge that re-storied the world as resources."[67] Oil that had come from natural oil seeps — used for years by various Indigenous communities and settlers for medicinal purposes[68] — was transformed into a resource and a commodity. In the United States, oil is a primary driver of continued extraction due to its importance for the national and global economy.

The conservationism of this era saw settlers seeking control over the management of these resources. During the early days of oil conservation in Oklahoma, independent oil prospectors sought oil conservation to not only fight against larger oil corporations, but also to prevent non-white property holders from gaining extractive wealth and power.[69] Mark Boxell connects Oklahoma oil conservation and settler politics by drawing attention to Oklahoma politician Wash Hudson. Hudson, a state representative and founding member of the Tulsa Ku Klux Klan, co-authored a bill about oil conservation to support independent oil producers after the 1915 Cushing Field overproduction.[70] However, not all independent oil producers were supported. Indigenous and Black land owners who found oil on their lands were forced into a "guardianship" in which white people controlled the oil produced on their allotments.[71] Allotment refers to the "federally backed scheme to educate Natives in the traditions of economic individualism and cultural liberalism, to force Indigenous peoples to, as one historian puts it, learn the 'whitening culture of capitalism.'"[72] In Oklahoma, this took the form of land allotments that promoted individual private property. Allotment forced Indigenous peoples into the settler economic system, and in Oklahoma, that included the oil extraction business. It was

[67] He specifically writes about the case study of the Athabasca tar sands but given the historic connection of US and Canadian settler colonialism, this characterization can be transferred to the US context. Simpson, 3.
[68] Mark Boxell, "From Native Sovereignty to an Oilman's State: Land, Race, and Petroleum in Indian Territory and Oklahoma," *The Journal of the Gilded Age and Progressive Era* 20, no. 2 (April 2021): 218.
[69] Boxell, 216.
[70] Boxell, 225.
[71] Boxell, 217.
[72] Boxell, 217.

through this legal requirement that white settlers could wield power over Oklahoma oil lands and over the Native people whose land contained that oil. Ideally, allotment fought monopolies by prioritizing individual property owners, but white settlers did not want Indigenous and Black individuals gaining power through oil extraction wealth.

When nonwhite people did gain wealth through oil, white settlers fought to delegitimize their claims. After oil was found on the allotment of Sarah Rector, a 10-year old Black Creek, the *Kansas City Star* wrote about the situation "with animosity and factual inaccuracies that served to paint Rector as especially backward, placing her beyond the boundaries of social acceptability and declaring her and her race unfit to possess oil wealth."[73] Rector, however, was one of the few non-white landowners to hold on to her newfound wealth. In maintaining power over oil through local, primarily white political channels, white settlers sought a variety of legal paths to manage oil production and the wealth it generated.

How the environment came to be used is based partially on how settlers perceived the landscape in the first place. Preservationists, though opposed to extraction and development of protected wild lands, did seek the power to define wild spaces. William Cronon argues that wilderness, as a human construct, has held multiple definitions. In the early 20th century, wilderness referred to the "pristine sanctuary where the last remnant of an untouched, endangered, but still transcendent nature."[74] Going back further to the eighteenth century, wilderness was conceptualized as "'deserted,' 'savage,' 'desolate,' 'barren; — in short, as 'waste.'"[75] Within a few centuries, the landscapes of the United States transformed was desolate spaces to desirable ones. However, the wilderness was desired due to the lack of human

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[73] Boxell, 228.
[74] William Cronon, "The Trouble with Wilderness; or, Getting Back to the Wrong Nature," in *Uncommon Ground: Rethinking the Human Place in Nature*, William Cronon, ed. (New York: W. W. Norton & Co., 1995), 69.
[75] Cronon, 70.

influence. In creating wild places to be preserved, the Indigenous communities who called these places home were removed through genocidal practices.[76] Thus, the preservation of wildlife depended on policing of the land by wardens to maintain an environment free of people.[77] In this way, preservationists engaged the logic of elimination to replace Native sovereignty with federal control. Additionally, this perspective of wilderness was entangled with the national concern of the "vanishing frontier," made famous by Frederick Jackson Turner. Dorceta Taylor argues, "As the frontier was vanishing, movements to establish national parks, wilderness, and wildlife sanctuaries gained momentum. Hence, enshrining the remaining frontier was an essential step in protecting one of the nation's most cherished creation myths."[78] The frontier was the creation of settlers moving west into wild lands. In protecting this vision of the frontier, preservationism also protected the national myths of settler colonialism in the west.

While preservationists sought to protect these "pristine" areas, extractive industries saw them as untapped potential. Fencing off the wilderness — whether indefinitely or until it was ready for resource development — justified settler colonial expansion. Within the United States and Canada, national parks are defined as part of the North American Model of Wildlife Conservation. Lauren Eichler and David Baumeister argue that "the model not only excludes certain groups but also contributes to environmental injustice via its legitimization of settler colonialism."[79] This legitimization takes the form of eliminating Indigenous peoples from the

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[76] Mark David Spence, *Dispossessing the Wilderness: Indian Removal and the Making of the National Parks* (Oxford and New York: Oxford University Press, 2000), 4. https://doi.org/10.1093/acprof:oso/9780195142433.002.0003.

[77] For more about the relationship between conservation of animals and policing, see Dorceta Taylor, *The Rise of the American Environmental Movement* (Durham, North Carolina: Duke University Press, 2016), especially chapter 7, "Blaming Women, Immigrants, and Minorities for Bird Destruction," and Karl Jacoby, *Crimes Against Nature: Squatters, Poachers, Thieves, and the Hidden History of American Conservation* (Berkeley and Los Angeles, CA: University of California Press, 2014).

[78] Taylor, 353.

[79] Eichler and Baumeister, 76.

land to obtain the authority in deciding what happens to that land. To develop the land, conservationists prioritized "a rational and scientific method of making basic technological decisions through a single, central authority."[80] That authority for these decisions came from the US government, which controls the public lands conservationists sought to develop. But, as Eichler and Baumeister argue, "Claiming that nonhuman animals, plants, and land are 'resources' implies that the primary relationship between humans and the world is one in which humans, existing apart from the world, dominate, extract, and consumer the world for their benefit."[81] Thus, at the core of resource management as promoted by conservationism is the belief that the materials should be extracted and used, whether the original inhabitants of the land agreed or not. Key to settler colonial power is control of resources. Whether it is federally controlled public land or private land controlled by individual settlers, the purpose of settler colonialism is dispossession. While preservationists did not want to develop the land, they still sought control over defining it. Conservationism, however, presupposed that resources from the land were meant to be developed in some fashion. The power to develop these resources lay with the US government, which continues to hold the power to issue permits for extraction on certain national lands today.[82]

Politicians continued drawing connections between conservation and the legitimacy of the US settler state well into the 20th century. In his autobiographical book, *Land, Wood, and Water*, Robert Kerr, Oklahoma senator and founder of the Kerr-McGee oil corporation, identified management of the titular resources as key to his election, to the success of his region, and to the

[80] Hays, *Conservation and the Gospel of Efficiency*, 271.
[81] Eichler and Baumeister, 80.
[82] "Oil & Gas Extraction," Big Thicket, National Preserve, Texas, National Park Service, accessed June 30, 2023. https://www.nps.gov/bith/learn/nature/oil-extraction.htm

formation of the United States.[83] In the preface to the book, he expressed hope that the book "would interest the average citizen in conservation."[84] He believed that "the story of conservation is replete with drama . . . Man's struggle to cope with his environment is packed with suspense. He has succeeded to the degree that he has controlled and used the 'land, wood, and water.'"[85] Kerr's focus on control is noteworthy. He later noted that "Land was the lure for the early settlers and the tide of immigrants that rolled across the primitive wilderness of American for nearly three hundred years. . . Ownership of the land was the anchor of the American Revolution."[86] Emphasizing the importance of land for settlers, Kerr's perspective on conservation reflects his background as an oil man and descendent of settlers while also serving as evidence for the key argument regarding settler colonial theory and land explained by Patrick Wolfe and others. Kerr inherited the belief that ownership of the land is connected to how it is developed for human productivity, and he promoted this stewardship conservation model.

To add depth to its settler colonial identity, oil was also often connected to national identity. Shortly after World War I, oil became associated with US military power. For the next two decades, oil executives argued for the national importance of oil. Doherty argued in 1926 that "Petroleum is our most important munition of war."[87] Oil fueled military activity; without it, the US military would be at a disadvantage. As Williamson et al., argue, "From a national point of view the conservation movement was clearly desirable for it resulted in a more orderly use of a precious resource of finite supply."[88] A consistent supply of oil would provide the energy and power to supply ships, vehicles, airplanes, and other industrial technology necessary for the

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[83] Robert S. Kerr, *Land, Wood, and Water*, Malvina Stephenson and Tris Coffin, eds. (New York: Fleet Publishing Corporation, 1960), 14.
[84] Kerr, 14.
[85] Kerr, 14.
[86] Kerr, 60-61.
[87] Doherty, *The Petroleum Problem As I See It*, 5.
[88] Williamson et al., 565.

United States to fight another war. In 1939, oil companies began seriously preparing for that war.[89] Doherty would not see the United States' entrance into World War II, dying in December 1939 from bronchial pneumonia.[90] But, the concern for oil conservation that he spearheaded however, lived on. In an address at the 24th Annual Meeting of the American Petroleum Institute (API) in 1943, Ralph K. Davies, Deputy Petroleum Administrator for War, encouraged oil companies to efficiently extract oil through cooperative conservation measures. Rather than competing for the oil pool, he requested the API adopt "the most liberal spirit possible . . . in arranging for joint or unit operation."[91] Invoking the same nationalistic rhetoric Doherty's ethic originally used, Davies assured the API that the result would be "the greatest good for the Nation, for the State, and, in my opinion, for the operators themselves."[92] Collaboration and conservation, Davies argued, would provide the best possible chance for victory. The importance of oil for the war effort led to it becoming a marker of national identity and international power.

Conclusion

The two decades before World War II saw major changes in the oil industry as companies dealt with unstable markets, overproduction, and lack of demand. While there were always critics of conservation and the government oversight that came with it, during the Great Depression some oil executives believed that federal regulation was the only option to prevent the collapse of the industry.[93] However, when the war came, the major integrated companies

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[89] Jones, *Statement of W. Alton Jones.*
[90] *New York Times*, "Henry L. Doherty, oil man, dies at 69."
[91] Ralph K. Davies, "Address by Ralph K. Davies, Deputy Petroleum Administrator for War, before the 24th annual meeting of the American Petroleum Institute." *24th Annual Meeting of the American Petroleum Institute.* Chicago, Illinois, November 10, 1943. Wirt Franklin Papers Box 49, Folder 10. Western History Collections, University of Oklahoma Libraries, Norman, Oklahoma.
[92] Davies, 5.
[93] Franks, 173.

gained more power, and the independents struggled.[94] Postwar, the demand for oil skyrocketed quickly, especially for the gasoline to drive automobiles across the United States.[95] The oil industry, having collaborated for national interests during wartime, wanted to ease back into a competitive market with less federal oversight after 1945.

Henry Doherty's focus on oil conservation in the interwar period was not a response to environmental degradation as we associate with conservation today; rather, it was an economic decision to prevent physical and economic waste. However, he did use environmental rhetoric (alongside concerns for national energy security) to promote conservation regulation. To enact these conservation measures, he emphasized scientific and technological improvements for efficient capture and the prevention of waste. The 1920s and 1930s represented a time when national resource management, including the protection and/or wise use of resources like water and oil, shared similar arguments of eliminating waste and boosting efficiency. Though preservationists and conservationists are remembered for their clashes, they shared a common thread of settler colonial power. The language and logic of settler colonialism influenced the oil industry as well. On the surface, the oil industry explored frontiers and heralded pioneers. The rhetoric of settler colonialism made heroes out of oil prospectors, scientists, and field workers – the pioneers of the 20th century. On a deeper level, the extractive economy in which the oil industry operates continues to serve the interests of settlers seeking resources and power. But, oil is not only a material force used for corporate and government land claims. It has now seeped into daily life — the clothes we wear and the packaging for our food are made of it, and the miles of highways that act as the backbone of the United States. Oil has become a cultural force,

[94] Clark, 388.
[95] Yergin, 409.

reinforcing the legitimacy of the US settler colonial state by shaping the way we see and interact with the world.[96]

CHAPTER 2: Oil and Ecological Knowledge Production in the Alaskan Arctic

Introduction

While the Mid-Continent field was booming in the early 1900s, oil companies continued looking for crude in new places. World War I marked a turning point in the history of oil; after that war, the United States Navy sought new oil reserves that could be available for exploration should the urgent need for oil rise again. In northern Alaska, oil had been spotted by white settlers as early as 1917, though local Iñupiat communities had known about the seeps long before.[97] These oil seeps were reason enough to investigate the potential for production.[98] In 1923, President Warren Harding established Naval Petroleum Reserve No. 4 (NPR-4) on the arctic coastal plain, the area between the Brooks Range and the Arctic Ocean also known as the North Slope.[99] This reserve of over 37,000 square miles would keep the area within government control, preventing private companies from developing the site.[100]

Some preliminary investigations in the 1920s produced knowledge about the plains, wetlands, tundra, and geologic structures underneath, but it would not be until after World War II that petroleum exploration began in earnest.[101] The oil exploration program for NPR-4, called Pet

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[96] For more about the relationship between oil and culture, see Ross Barrett and Daniel Worden, eds. *Oil Culture* (Minneapolis, Minnesota and London, UK: University of Minnesota Press, 2014). JSTOR Ebooks.
[97] John F. Schindler, "Naval Petroleum Reserve No. 4 and the beginnings of the Arctic Research Laboratory (ARL)," *Fifty More Years Below Zero: Tributes and Meditations for the Naval Arctic Research Laboratory's First Half Century at Barrow, Alaska,* (Calgary, Alberta and Fairbanks, Alaska: Arctic Institute of North America, 2001), 29.
[98] John C. Reed*, Exploration of Naval Petroleum Reserve No. 4 and Adjacent Areas Northern Alaska, 1944-53 Part 1, History of the Exploration,* Geological Survey Professional Paper 301 (Washington, D.C.: US Government Printing Office, 1958), 21.
[99] Reed, *Exploration of Naval Petroleum Reserve No. 4 and Adjacent Areas Northern Alaska,* 7.
[100] Schindler, 29.
[101] Reed, *Exploration of Naval Petroleum Reserve No. 4 and Adjacent Areas Northern Alaska*, 3.

4, ran from 1944–1953. Although petroleum was not found in pools viable for extraction, Pet 4's base camp justified other operations in the Arctic. In 1946, the Office of Naval Research (ONR) proposed an arctic research laboratory that would benefit from the existing oil camp infrastructure. Pet 4's base camp thus served as the stage oil exploration and scientific research in the Alaskan Arctic. Two warehouses and a Quonset hut were set aside for the laboratory, named the Arctic Research Laboratory and later the Naval Arctic Research Laboratory (NARL).[102] The renovation of these three buildings for scientific study marked the beginning of 33 years of arctic environmental research that sought to understand how this cold, remote ecosystem functioned. To settler scientists (and many people in the temperate and tropical zones), the arctic was a desolate place. In the beginning, some ecologists would describe it as having little species diversity, calling it a fragile or vulnerable ecosystem. But to the Navy and the oil industry, this was a rich landscape holding the key to national defense.

The partnership between oil companies and government interests drove the development of an envirotechnical regime on the North Slope, committed to oil production and knowledge production. Sara Pritchard defines envirotechnical regimes as "the institutions, people, ideologies, technologies, and landscapes that together define, justify, build, and maintain a particular envirotechnical system as normative."[103] The envirotechnical regime of the North Slope consists of the oil and scientific landscapes and infrastructures (laboratories, pipelines, gravel roads and pads, buildings, etc.) supported by settler colonial possessive logics. This regime enshrined oil production as a normative and natural — though technologically mediated

[102] Reed, *Exploration of Naval Petroleum Reserve No. 4 and Adjacent Areas Northern Alaska,* 79.
[103] Sara B. Pritchard, *Confluence: The Nature of Technology and the Remaking of the Rhône* (Cambridge: Harvard University Press, 2011), 23.

— part of the arctic ecosystem. At the same time, research from the laboratory and field sites redefined the arctic landscape from the settler perspective.

How the arctic environment was defined scientifically played a key role in the way the envirotechnical regime was justified on the North Slope. Arctic ecology in its early years would define the arctic environment as a fragile, vulnerable environment based on the diversity/stability hypothesis. This hypothesis suggested that more species diversity in an ecosystem led to a more stable ecosystem. The Arctic was considered less stable because of its lack of species diversity, especially compared to the tropics.[104] However, the oil industry was able to use language consistent with systems ecology to promote resource management on a broad scale by diminishing the importance of local disturbances and categorizing oil as a natural part of a larger arctic system. These new scientific perspectives were supported, in part, by the oil industry itself. The industry played a material role in the development of the field of arctic ecology by providing the base camp and technology needed for scientists to survive and do their work, while also providing evidence of environmental damage studied by scientists at the laboratory.

That these institutions and infrastructures could be developed on the North Slope in the first place is a reflection of settler colonial possessive logics. Aileen Moreton-Robinson describes possessive logics as "a mode of rationalization, rather than a set of positions that produce a more or less inevitable answer, that is underpinned by an excessive desire to invest in reproducing and reaffirming the nation-state's ownership, control, and domination."[105] The primary motivator for the settler colonial state is land. Investment in scientific research and oil production for national progress provided the rationale for US government ownership and control of how land was used

[104] Stephen Bocking, "Science and Spaces in the Northern Environment," *Environmental History* 12, no. 4 (2007): 881.
[105] Aileen Moreton-Robinson, *The White Possessive: Property, Power, and Indigenous Sovereignty* (Minneapolis, Minnesota: University of Minnesota Press, 2015), xii. https://www.jstor.org/stable/10.5749/j.ctt155jmpf.

in the region. The production of "new" scientific knowledge (some of which was heavily influenced by Indigenous knowledge) and the eventual discovery of a giant oil field would reaffirm the settler state's control over the area. Using possessive logics that suggested settlers would put the environment to beneficial use, settlers on the North Slope redefined it as a space of oil and knowledge production.

Today, what was the Naval Arctic Research Laboratory houses Iḷisaġvik College in the town of Utqiagvik — in 1947, this place was known as Barrow. From roughly 1947–1980, this landscape housed the creation of two fields: an oil field and scientific field. Pet 4 operated until 1953, and then after a few years of dry wells, the Prudhoe Bay oil field was discovered in 1968. Arctic ecology, still in its infancy post war, would blossom here. Basic scientific research ranging from geology and oceanography to marine ecology and plant biology took place at this laboratory. In an ecosystem simultaneously considered desolate and rich, scientists and oil companies saw potential in the landscape to achieve their goals of knowledge production and oil extraction. Understood through the lens of settler colonialism, the relationship between oil exploration and ecological research is complimentary, rather than conflicting. Ecological research and oil prospecting seem irreconcilable today because the consequences of oil production, such as oil spills, have negatively impacted the places and species ecologists seek to study. But, during the Cold War, the research at NARL and the exploration of NPR-4 worked together to legitimize the actions of the settler colonial state on the North Slope. As Patrick Wolfe famously argues in "Settler Colonialism and the Elimination of the Native," "Settler colonizers come to stay: invasion is a structure not an event."[106] On the North Slope, oil extraction and science worked together, creating both the physical structure of a laboratory, base

[106] Patrick Wolfe, "Settler Colonialism and the Elimination of the Native," *Journal of Genocide Research* 8, no. 4 (December 2006): 388.

camp, and industrial technologies as well as abstract structures of knowledge making and extraction. These structures built the envirotechnical regime of oil and knowledge production on the North Slope of Alaska that continues to direct land use policies today.

Connecting NARL and Pet 4

The Alaskan arctic was considered a "new frontier" for scientific research in the postwar period, and settler language permeated discussions of science in Alaska. Laurence Irving, the first director of NARL in a 1948 issue of *Science*, said, "Scientific exploration at the Arctic frontiers, where natural forces are strong and clear, can guide the domestic operations of science in lines leading realistically forward."[107] Kirtley F. Mather stated in his 1951 opening session address to the Second Alaska Science Conference, "You are in on the ground floor, so to speak. You are still pioneers in a rich, new land. You are blazing trails in a region that has only begun to be developed."[108] At the same conference, territory governor Ernest Gruening, argued that Alaska Natives "[dwell] eternally among untold bounties of nature, knows them not, and puts them to no beneficial use."[109] This argument, in addition to replicating racist stereotypes of Indigenous people, justified the study and extraction of Alaska's natural resources by white settlers. To him, scientists and white settlers were the ones that would be able to study and use the resources efficiently. In geologist John C. Reed's talk at that conference, he drew attention to oil exploration, acknowledging the "tremendous amount" of geologic research undertaken through

[107] Laurence Irving, "Arctic Research at Point Barrow, Alaska," *Science* 107, no. 2777 (Mar. 19, 1948): 285.
[108] Kirtley F. Mather, "Installation of Alaska Division, A.A.A.S.," paper presented at *Science in Alaska 1951: Proceedings of the Second Alaska Science Conference, Alaska Division*, American Association for the Advancement of Science (Mt. McKinley National Park, Alaska, September 4-8, 1951): 5.
[109] Ernest Gruening, "The Political Ecology of Alaska," paper presented at *Science in Alaska 1951: Proceedings of the Second Alaska Science Conference, Alaska Division*, American Association for the Advancement of Science (Mt. McKinley National Park, Alaska, September 4-8, 1951): 8.

Pet 4.[110] In 1951, these scientists and politicians stated clearly what they perceived the role of science to be in Alaska: one of discovery, situated in the settler colonial rhetoric of the frontier.

The Alaskan arctic was not only a unique biome for scientists to study. Its location with respect to the U.S.S.R. was of utmost importance to national security. And, since World War I, oil was itself a new source of national security. Ships increasingly relied on oil, so the Navy needed a consistent supply. The geographic location of Alaska coupled with its natural resources interested the Navy, so they continued to explore the petroleum reserve well after World War II ended. Arctic Contractors, or ARCON, ran the base camp, providing food, lodging, clothing, and transportation.[111]

With the plan to explore the petroleum reserve set in place, scientists like Moses C. Shelesnyak recognized the existing infrastructure for oil operations would benefit a research operation. The Arctic environment does not make oil extraction and transportation easy, so research about the environment was needed to extract materials including oil, coal, and other precious minerals from the North Slope. Workers needed to know how the arctic environment functioned, how they could adapt to the harsh conditions, and how traditional oil operations could be adjusted to the climate. Shelesnyak, a physiologist who studied human reproduction, described in a 1945 memo the need for "a fundamental understanding of the North country and the exploitation of natural circumstances rather than combatting them in an effort to maintain 'temperate-zone' behavior patterns."[112] As head of the Environmental Biology branch of the ONR, Shelesnyak (alongside Irving and other biologists) steered the science produced at the

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[110] John C. Reed, "The Physical Sciences in Alaska; Past, Present and Future," paper presented at *Science in Alaska 1951: Proceedings of the Second Alaska Science Conference, Alaska Division*, American Association for the Advancement of Science (Mt. McKinley National Park, Alaska, September 4-8, 1951): 48.
[111] Irving, 285.
[112] John C. Reed and Andreas G. Ronhovde, *Arctic Laboratory: A History (1947-1966) of the Naval Arctic Research Laboratory at Point Barrow Alaska* (Washington, D.C.: Arctic Institute of North America, 1971), 32.

laboratory in the early years towards physiology and human ecology.[113] By 1951, Dr. Louis Quam of the Geography Branch (Earth Sciences Division) commanded the ONR's Arctic Research Program.[114] The ONR's research goals in the arctic had broadened to include a host of questions about the physical environment rather than the living environment, and the National Science Foundation took an active role in funding arctic biological research.[115] The Navy wanted research about "permafrost, soils, microclimate, beach and near-shore forms and processes, radio propagation, magnetism, sea ice, acoustics, and oceanography" which would support "naval problems of trafficability, construction, logistics, survival, rescue, and . . . amphibious, undersea, surface and air operations."[116] As the ONR's research agenda shifted towards geographic and geological questions, the original biological focus diminished.

NARL was one of the first ONR projects, and the increase in US government support of basic research brought scientists from various disciplines on board. In "Historical Perspectives on the Naval Arctic Research Laboratory, 1965 to 1980," biologist Gary Laursen, marine scientist John J. Kelley, and botanist Steven L. Stephenson argue that "the mission of the NARL was to provide all facilities and services for accommodating and accomplishing programs of basic and applied research that contributed to successful Navy operations in US arctic regions and environments."[117] These "successful Navy operations" included finding significant quantities of oil. The quest for basic research came from the postwar government science program designed

[113] The Environmental Biology branch was assumed under the Medical Science Division of the ONR. Reed and Ronhovde, 36.
[114] Maxwell E. Britton, "The Role of the Office of Naval Research and the International Geophysical Year (1957-58) in the Growth of the Naval Arctic Research Laboratory," in *Fifty More Years Below Zero: Tributes and Meditations for the Naval Arctic Research Laboratory's First Half Century at Barrow, Alaska*, ed. David W. Norton (Calgary, Alberta and Fairbanks, Alaska: Arctic Institute of North America, 2001), 65-66.
[115] Reed and Ronhovde, 165.
[116] Reed and Ronhovde, 166.
[117] Gary A. Laursen, John J. Kelley, and Steven L. Stephenson, "Historical Perspectives on the Naval Arctic Research Laboratory, 1965 to 1980," in Norton, *Fifty More Years Below Zero,* 245.

by Vannevar Bush, outlined in his report, "Science: The Endless Frontier." Bush argued fervently for investment in basic research to generate "new knowledge" of the world rather than answering specific questions for military purposes — the focus of World War II era science.[118] Bush's argument, framed by the settler colonial language of the frontier, suggested that scientific progress was necessary for the "healthy, prosperity, and security as a nation in the modern world."[119] The spirit of basic science benefitted society at large, but because military organizations like the ONR hosted the research operations, they had oversight over what science would be funded in the first place.

To successfully operate in the Arctic, the Navy needed physiological studies to explore the consequences of working in a cold climate. People cannot do the same level of work in a harsher climate, and machinery does not work the same at forty degrees below zero as it does at forty degrees above zero. In a 1948 article published in the journal *Science,* Shelesnyak described the need for "fixed" Arctic field stations, noting the importance of "studying the influence of physical and biological factors upon the function of man and machine."[120] The programs and machines Shelesnyak referred to were not just part of laboratory operations but also oil operations at nearby Pet 4. This influx of scientific research and the formation of fixed field stations in the arctic can be understood as part of the process of settler acquisition of land. Linda Tuhiwai Smith argues, "The establishment of military, missionary or trading stations, the building of roads, ports and bridges, the clearing of busy and the mining of minerals all involved processes of marking, defining, and controlling space."[121] Building an oil camp and a

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[118] Vannevar Bush, *Science: The Endless Frontier* (Washington, D.C: US GPO, 1945), 7. https://www.nsf.gov/od/lpa/nsf50/vbush1945.htm
[119] Bush, 4.
[120] M.C. Shelesnyak, "Arctic Research Laboratory, Office of Naval Research, Point Barrow, Alaska." Science 107, no. 2777 (March 19, 1948): 283.
[121] Linda Tuhiwai Smith, *Decolonizing Methodologies: Research and Indigenous Peoples* (London and New York: Zed Books Ltd; Dunedin, New Zealand: University of Otago Press, 1999), 52.

government laboratory redefined the space within the terms of the settler colonial state, and the knowledge and oil produced there reaffirmed settler control as the key to scientific and economic progress.

In literature written by NARL scientists and workers, the exact research interests of the oil industry with respect to NARL research are rarely discussed. But what is emphasized repeatedly is the key role Arctic oil interests played in keeping the laboratory open. The Pet 4 project provided infrastructure and labor such as an airstrip, construction of housing and laboratories, a sewage line, and maintenance personnel to keep the laboratory running smoothly.[122] In *Exploration of Naval Petroleum Reserve No. 4 and Adjacent Areas Northern Alaska, 1944–53*, John C. Reed lists activities supported by Pet 4 that were related and not related to the project. NARL is listed under its former name, the Arctic Research Laboratory, as not related. However, shortly after this list, Reed describes the laboratory as "one of the most important supported activities."[123] Thus, there was a material connection between the oil production and knowledge production based in shared space, infrastructure, and labor. These shared elements formed the material basis of the envirotechnical regime.

In a remote Arctic climate, typical construction and energy capabilities were limited. Therefore, multiple organizations had to share space and infrastructure. David W. Norton, former NARL ecologist, recalled that "Non-scientist tenants of the NARL complex included UIC Construction, Spenard Builders' Supply, Barrow Gasfields Operations and Maintenance, Barrow Technical Services, and Bowhead Transportation."[124] Extractive industries require skilled

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[122] Other activities Pet 4 took care of that kept NARL running were "receiving gasoline, messing and billeting, receiving and transportation of freight, local transportation by aircraft and tracked vehicles." Reed, *Exploration of Naval Petroleum Reserve No. 4 and Adjacent Areas Northern Alaska*, 111, 133, 160, 177.
[123] Reed, *Exploration of Naval Petroleum Reserve No. 4 and Adjacent Areas Northern Alaska,* 182.
[124] David W. Norton, "Down Through Time: Editor's Introduction," in Norton, *Fifty More Years Below Zero,* 4.

electricians, welders, drivers, construction workers, cooks, pilots, and technicians of all kinds to create a space that allows for oil to be extracted, stored, and then transported to its next location. These workers were part of the "on the ground" team that built the envirotechnical regime, as their skills were necessary for the success of oil exploration and scientific research. Their jobs exist to construct and maintain the systems of extraction and production of both oil and knowledge. Cooks provided food, construction workers built roads and an airport to connect the remote Arctic to urban centers farther South, and various technicians kept machines, like oil derricks and heating systems, operating. At Utqiagvik, oil and scientific operations shared space, infrastructure, and labor to maintain a successful operation for all parties.

In some cases, technologies were also shared between institutions or people. Leftover oil infrastructure became a tool for scientific research in a project by George MacGinitie, under contract at the time with Johns Hopkins University. For this project (the duration of which he was also NARL's scientific director), he used oil drums as markers and traps for his ecological research.[125] Additionally, the shot holes left behind by petroleum exploration were used by G.R. and Elizabeth MacCarthy to make thermoprofiles for his permafrost research.[126] In this case, MacCarthy did not make the holes himself, but the research he conducted benefitted from the oil industry's changes to the landscape. Thus, oil exploration informed ecological knowledge by providing geological knowledge of the abiotic world and evidence of ecological damage, but the oil technology itself also played a role. The oil drums and shot holes left behind on the North Slope simultaneously provided a physical reminder of the envirotechnical regime being made.

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[125] G.E. MacGinitie, "Distribution and Ecology of the Marine Invertebrates of Point Barrow, Alaska," *Smithsonian Miscellaneous Collections* 128, no. 9 (November 30, 1955): 5, 88; Richard K. Nelson, *Alaskan Eskimo Exploitation of the Sea Ice Environment* (Fort Wainwright, Alaska: Arctic Aeromedical Laboratory, 1966), 49.
[126] Reed and Ronhovde, 102-103.

After Pet 4 closed in 1953 due to lack of viable oil pools, the University of Alaska and the Air Force took over management of NARL. The following year, Ted Mathews, an engineer who worked with ARCON throughout the Pet 4 project, became NARL's new director.[127] Up to this point, the directors had been practicing scientists. Hiring Mathews created a new connection between the oil industry and scientific research on the North Slope. Stephen Bocking and Daniel Heidt argue in *Cold Science: Environmental Knowledge in the North American Arctic During the Cold War*, "These relations between strategic and non-strategic research reflected how scientific, military, and civilian communities maintained close ties in the Arctic, while sharing in the role of science as a marker of the state's presence."[128] Though the oil industry, ecologists, and the Navy had different goals for the knowledge produced at NARL, they all shared a common thread of US government support. And, although the research at NARL was framed as basic science by the ONR, science was a crucial part of the Arctic colonization process.[129] In answering basic questions about the arctic ecosystem, scientists redefined the landscape in Western scientific practices of mapping, renaming, and knowledge production that upheld settler colonial knowledge structures and provided insight for the oil industry and Navy as to what areas could be developed for corporate or state interests. The science produced on the North Slope was a product of various government and corporate investments, made possible by the Navy and oil industry's original interest in oil extraction.

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[127] John C. Reed, "The Story of the Naval Arctic Research Laboratory," *Arctic* 22, no. 3 (Sept., 1969): 181.
[128] Stephen Bocking and Daniel Heidt, *Cold Science: Environmental Knowledge in the North American Arctic During the Cold War* (London and New York: Routledge, 2019), 8.
[129] Andrew Stuhl, *Unfreezing the Arctic: Science, Colonialism, and the Transformation of Inuit Lands* (Chicago and London: University of Chicago Press, 2016), 3, 13.

Arctic Ecology and Oil

Though research from many disciplines was taking place at NARL, almost all of these various disciplines informed the burgeoning field of arctic ecology, which sought to study the arctic biome's animate and inanimate features. Some of the ecological studies at NARL progressed the field of systems ecology (a field spearheaded by Howard and Eugene Odum)[130] that frames ecosystems in terms of "flows of energy and materials."[131] One of the elements that makes the Arctic a unique biome was its perceived fragility. As Stephen Bocking explains in "Science and Spaces in the Northern Environment," the argument for arctic fragility came from two ideas: that the arctic ecosystem had few species, and that fewer species meant less stability.[132] According to ecologists like William Pruitt, the fragility of the arctic could be demonstrated materially through the damage caused by trucks and aircraft to the land and the animals.[133] Ruts from truck wheels remained after many years, damaging the permafrost and its vegetation.[134] In this way, oil exploration informed scientific understanding of arctic ecology by providing evidence of for the diversity/stability hypothesis popular at the time.[135] The damages caused by trucks and aircraft were a result of oil exploration work, which changed the land for economic benefit before the ecological research had been conducted. In the 1970s, Imperial Oil published articles in their company magazine admitting to the environmental harm while also detailing how they planned to remedy the tundra.[136]

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[130] Paul Warde, Libby Robin, and Sverker Sörlin, *The Environment: A History of the Idea* (Baltimore: Johns Hopkins University Press, 2018), 63. https://doi.org/10.1353/book.99575.
[131] Benson, 123.
[132] Bocking, 881.
[133] Bocking, 881.
[134] Rachel Kilsdonk, "Tundra," *Imperial Oil Review*, February 1970. Cities Service Oil and Gas Collection, Box 52, Folder 1. Western History Collections, University of Oklahoma Libraries, Norman, Oklahoma.
[135] Bocking, 881.
[136] Kilsdonk, "Tundra"; "Researching the Arctic Environment," *Imperial Oil Review* no. 5, 1972. Cities Service Oil and Gas Collection, Box 52, Folder 1. Western History Collections, University of Oklahoma Libraries, Norman,

While scientists like John Reed considered the history of oil and arctic research to be intertwined, Arctic scientists were never a monolith. Some ecologists disagreed outright with the prioritization of ecological research pertaining to oil. In 1962, William Pruitt criticized John Reed's suggestion for further cooperation between oil companies and ecologists, arguing, "Research aimed at understanding the northern biosphere is far more pressing than research furthering extractive activities."[137] Pruitt continued, "We need stations for basic biological and environmental research to allow us first to gain more of an understanding of general life processes."[138] While oil may have led a new wave of scientists to the Arctic, Pruitt did not believe science should stay so tied to the industry. An interesting difference here are their respective institutional alliances – Reed worked with the government, specifically the USGS, while Pruitt was employed at the University of Alaska before his controversial firing.[139]

Ecologists in the arctic interpreted the environment in various and sometimes conflicting ways. Community ecologists studied the interdependent nature of the biotic and abiotic worlds.[140] This type of research, associated with US ecologists of the 1920s and 1930s, focused on an individual ecosystem such as a wetland. Systems ecology broadened the scope of ecology to include flows of energy and materials across various ecosystems, guided by a framework that was inspired by the technological developments of computer science and engineering. [141] The

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Oklahoma; "Arctic Pipe Line Research," *Imperial Oil Review* no. 1, 1973. Cities Service Oil and Gas Collection, Box 52, Folder 1. Western History Collections, University of Oklahoma Libraries, Norman, Oklahoma.

[137] William O. Pruitt, Jr., "Reply to the Commentary by Dr. John C. Reed," *Arctic* 15, no. 3 (Sept. 1962): 238.

[138] Pruitt, Jr., 238.

[139] Pruitt was fired by the University of Alaska for his opposition to Project Chariot, a plan by the United States Atomic Energy Commission to create a harbor in Western Alaska with nuclear weapons. Pruitt, alongside Dr. Leslie Viereck and Dr. Don Foote worked on the project to examine what ecological effects could occur. The University of Alaska later awarded him an honorary doctorate, and the Alaska State Legislature honored him and Dr. Leslie Viereck with "special citations" for "holding strong to [their] principles." "Obituary for Dr. William O. Pruitt, Jr.," *Winnipeg Free Press*, December 19, 2009, http://www.wilds.mb.ca/taiga/tbsobit.html.

[140] Warde, Robin, and Sörlin, 78-79.

[141] Warde, Robin, and Sörlin, 63.

diversity/stability concept, associated with community ecology, faded in the 1970s as new studies suggested diversity and stability were not as closely related as previously thought. The evidence of infrastructure damage of trucks was relegated to "local disturbances" that could be dealt with through "environmental assessment and management"[142] rather than being viewed as damage to environmental stability. The shift to seeing damage as disturbances suggested that local disturbances involving oil (such as a spill) would not impact the ecosystem at large. The oil industry capitalized on these various interpretations of arctic ecology to frame crude as "natural" in the arctic, and its extraction as a harmless practice.

The established perception of oil as "naturally occurring" from seeps provided a comparison for the oil industry to consider industrial extraction *part of* the arctic environment. The systems ecology approach benefitted the oil industry because within this ecological framework, oil became another natural material flowing through the system. In the eyes of the oil industry, their work of oil extraction was like the natural process of seepage, just technologically mediated – much like how a water well is a technological mediation of a natural spring. Oil spills, clearly not on the scale of seeps, could be considered failures of technology and management as opposed to an unnatural pollutant.

Within the envirotechnical regime, ecological knowledge helped redefine nature within the Arctic ecosystem and the technological system of oil extraction. In the 1970s, oil companies such as Imperial Oil and Cities Service would capitalize on these ideas, promoting the idea that oil infrastructure belonged in the ecosystem through maps and articles in their company magazines. Imperial Oil, a Canadian company, published a map in a 1973 edition of their company magazine that situated oil rigs and wildlife into one environment spanning across

[142] Bocking, 882.

Alaska and Yukon Territory.[143] The map accompanied an article that described the ecological research Imperial Oil was investing in that would inform their pipeline construction practices. The article states, "By the end of 1973, $50 million will have been spent researching ways to construct and operate pipe lines in harmony with the northern environment."[144] In researching the Arctic ecosystem, Imperial Oil was investigating a way to harmoniously integrate oil technology and the environment, thus blurring the line between nature and technology. This union, supported by ecological research, created an envirotechnical landscape that naturalized oil extraction in the ecosystem and reinscribed settler colonial knowledge structures in Northern Alaska.

Arctic Ecology and Indigenous Knowledge

During the same period of oil exploration from the 1940s to the 1960s, the practice of arctic science changed – though its political function stayed the same. Laursen, Kelley, and Stephenson argued that "prior to the establishment of NARL in 1947, scientific analysis of these and other arctic paradoxes were at best sporadic. 'Colonial science' was conducted by non-residents who took the information south."[145] An example of this kind of extractive scientific practice is Lloyd Spetzman's study of the vegetation on the Arctic slope, which he did during the summers of 1946-1951.[146] After collecting data during the summer, he returned to the University of Minnesota to process and write about his findings. Spetzman also detailed the relationship between his research and Naval oil exploration:

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[143] "Arctic Pipe Line Research," 4-5.
[144] "Arctic Pipe Line Research," 2.
[145] Laursen, Kelley, and Stephenson, "Historical Perspectives on the Naval Arctic Research Laboratory, 1965 to 1980," in Norton, *Fifty More Years Below Zero,* 244.
[146] Lloyd A. Spetzman, "Vegetation on the Arctic Slope of Alaska," *Exploration of the Naval Petroleum Reserve No. 4 and Adjacent Areas, Northern Alaska, 1944-53*, Geological Survey Professional Paper 302-B (Washington, D.C.: US GPO, 1959): 19.

> "Since 1945 much of the interior of the Arctic Slope has been explored botanically in reconnaissance manner during the United States Navy's geologic exploration of Naval Petroleum Reserve No. 4; the U.S. Geological Survey participated in that program as a cooperating agency, and the present report is a byproduct of that cooperative effort. Exploration parties traveled by small airplanes on skis, floats, or wheels; by amphibious tracked vehicles (weasels), which can cross rivers as well as hills; and by folding boats, by means of which travel started near the mountain front and continued down many of the major rivers to the Arctic Ocean. Several supply and transportation centers, such as Point Barrow, Umiat, and Barter Island, were established by the Navy, from which one could fly to the most remote part of the Arctic Slope in a few hours."[147]

The style of research Spetzman used — summer field work in Alaska followed by writing and processing work in the lower 48 — would fade as NARL became a year-round site of scientific research. In addition to getting more research time, scientists believed they were improving upon the old "colonial science" by immersing themselves in the environment year round. In the eyes of these scientists, by maintaining residency and forming a community at Barrow, they were drawing a distinction between their research practice and what they considered to be poor scientific practice of the colonial period. This shift was perceived as an improvement for scientific research; it demonstrated a commitment to the Arctic by staying there and setting up physical communities, social webs, and histories. Through this immersive experience, they believed they could draw a deeper (and thus, better) understanding of the Arctic environment. But the government support necessary for colonial science remained.

Of course, they did not come to this knowledge alone, and many scientists recognized this at length in the edited volume *Fifty More Years Below Zero*. However, in most scientific articles published at the time, local Iñupiat workers like Simon Paneak, Pete Sovalik Sr., and the Brower family are not credited with scientific discoveries. Pete Sovalik, Sr. worked with NARL scientists for over twenty-five years. Max C. Brewer and John F. Schindler noted that Sovalik "knew the animals and their habits so well that at one time he captured a live lynx with only a

[147] Spetzman, 19.

piece of fish net. On other occasions, he captured rabid foxes alive, for observation, without the use of either a trap or gun."[148] In sharing his knowledge about arctic animals and their habitats, Sovalik instructed "a whole generation of young scientists in how to observe and interpret nature, and how to survive in the Arctic."[149] And, according to Brewer and Schindler, four men of the Brower family supplied most of the "arctic bird specimens, collections of birds' eggs, and mammal study skins" used in US science museums.[150] Laurence Irving recalled Simon Paneak, a guide from Anaktuvuk Pass and cousin of Sovalik, keeping records "that marked the seasonal cycles of birds and other animals. . . . Simon knew the nature of these phenomena, and he discreetly evaluated the perspicuity and accuracy of all accounts."[151] Irving did list Paneak as a co-author in some articles, which William R. Dawson described as "unprecedented."[152] The expertise of these men was crucial to the production of ecological knowledge and the survival of scientists on the North Slope, though rarely credited by their contemporaries. Their knowledge did not just inform the scientists at NARL — it was transmitted to other institutions through publications and personal correspondence of scientists, shaping the development of arctic ecology as an institutional discipline.

The description of an all-year, immersive scientific research program characterizes a *settler colonial* style institution that perpetuated the legitimacy of US government institutions on the North Slope.[153] Linda Tuhiwai Smith argues, "The production of knowledge, new

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[148] Max C. Brewer and John F. Schindler, "Introduction to Alaska's Original Naturalists," in Norton, *Fifty More Years Below Zero,* 9.
[149] Brewer and Schindler, "Introduction to Alaska's Original Naturalists," in Norton, *Fifty More Years Below Zero,* 9.
[150] Brewer and Schindler, "Introduction to Alaska's Original Naturalists," in Norton, *Fifty More Years Below Zero,* 9.
[151] Laurence Irving, "Simon Paneak," *Arctic* 29, no. 1 (1976): 58–59. http://www.jstor.org/stable/40508719.
[152] William R. Dawson, "Laurence Irving: An Appreciation," *Physiological and Biochemical Zoology* 80, no. 1 (2007): 18. http://137.229.114.19/files/uajourney/IrvingAppreciation.pdf.
[153] For more about settler colonialism in the Arctic, see Eric Alden Smith and Joan McCarter, eds., *Contested Arctic: Indigenous Peoples, Industrial States, and the Circumpolar Environment* (Seattle and London: University of Washington Press, 1997).

knowledge, and transformed 'old' knowledge, ideas about the nature of knowledge and the validity of specific forms of knowledge, became as much commodities of colonial exploitation as other natural resources."[154] The production of knowledge on the North Slope occurred both in the fields (alongside oil work) and in the laboratory. The laboratory, then, functioned as a settler colonial institution that provides a structure for non-native settlers to maintain a presence on state territory, and a place for the production, transformation, and extraction of knowledge to occur. Non-native scientists and workers from outside Barrow settled into government purchased housing for government research and extraction purposes. What Arctic scientists saw as an improvement in the social practice of their scientific research — staying put in the Arctic rather than flying home every winter — was simultaneously a perpetuation of settler colonial control of the North Slope. These buildings and social networks, too, provided material evidence of an envirotechnical regime of knowledge production.

However, the scientists themselves perceived the project as much more integrated with Iñupiaq knowledge and practices rather than extractive. The manner in which the knowledge was produced and its legacy reveals the complexities of knowledge-making in a settler colonial landscape. Indigenous knowledge was crucial to the success of the laboratory and the scientists knew that. In *Fifty More Years Below Zero* and various articles by NARL scientists, men such as Harry Brower, Peter Sovalik, Simon Paneak, and Kenneth Toovak Sr. are credited as collaborators and producers of ecological knowledge. The Brower family is especially prominent, as ecologist Robert Rausch, biologist Tom Albert, machinist Ned Manning, and arctic ecologist Maxwell E. Britton, among others, all thanked various members of that family for sharing their environmental knowledge that made the difference between life and death for

[154] Tuhiwai Smith, 59.

visiting scientists.[155] But, these men were never listed as co-authors and were rarely credited for their intellectual support.

Genuine relationships between scientists and Inupiat produced an integrated Indigenous and institutional scientific knowledge of the North Slope. However, the final product of decades of knowledge-making rests in a Western scientific paradigm and was extracted to academic institutions across the continental United States. Although the Arctic Research Consortium of the United States remembers this history fondly, the landscape was intensely shaped by settler colonial relations.[156] Archaeologists picked apart mounds, ecologists redefined the natural world within the paradigm of Euro-American environmental thought, and geologists provided the knowledge of how much oil could be extracted for use by the military and corporations — not for the locals. Even though the scientists see their legacy of Indigenous and non-Indigenous collaboration as favorable, the pivotal arctic research produced at the laboratory cannot be separated from the oil and government interests that prompted it in the first place. The science produced at NARL justified the existence of government institutions for the sake of basic science, while also producing the knowledge necessary for the envirotechnical landscape to function.

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[155] Maxwell E. Britton, "The Role of the Office of Naval Research and the International Geophysical year (1957-58) in the Growth of the Naval Arctic Research Laboratory," in Norton, *Fifty More Years Below Zero,* 69; Robert L. Rausch, "An Overview of Early Research on Small Mammals in Arctic Alaska," in Norton, *Fifty More Years Below Zero,* 81; Albert to John Kelley, July 31, 1997, in Norton, *Fifty More Years Below Zero,* 331; Mather to John J. Kelley, May 30, 1997, in Norton, *Fifty More Years Below Zero,* 460; "Ned Manning," Project Jukebox, University of Alaska – Fairbanks, Elmer E. Rasmuson Library, https://jukebox.uaf.edu/p/3568. John F. Schindler, "Maxwell E. Britton (1912-2004)," *Arctic* 57, no. 4 (December 2004): 436. https://journalhosting.ucalgary.ca/index.php/arctic/article/view/63579/47515

[156] Benjamin M. Jones, "Celebrating 75 Years of Arctic Research Utqiaġvik, Alaska," Arctic Research Consortium of the United States, https://www.arcus.org/witness-the-arctic/2023/2/highlight/2#.Y-_aRgDuvYU.twitter

An Environmental Breaking Point

In the late 1960s, oil companies reaped the reward of decades of unfruitful oil exploration in the Arctic. 1968, the giant Prudhoe Bay pool was discovered by the Atlantic Richfield Corporation and Humble Oil.[157] This find spurred new interest in research in Arctic Alaska. Laursen, Kelley, and Stephenson argued that "with the 1969 oil 're-discovery,' and the completion of the new and modern NARL lab building that same year, interest in Arctic environment research was peaking."[158] However, concern about the environment was also reaching a precipice.

Not quite a year later and 2,880 miles from Barrow, rapid pressure build up caused a blowout on Tract 402 at the base of Union Oil's new Platform A in the Santa Barbara Channel.[159] Eleven days of spillage during January and February coated the Santa Barbara channel. On March 21, 1969, President Nixon inspected some of the damage and addressed public concern about the spill. In addition to speaking on the specific California setting of the spill (and his personal connection to the area), he also connected Santa Barbara to the larger national project of resource management:

> "It is sad that it is necessary that Santa Barbara has to be the example that had to bring this to the attention of the American people, but what is involved is something much bigger than Santa Barbara; what is involved is the use of our resources of the sea and the land in a more effective way and with more concern for preserving the beauty and the natural resources that are so important to any kind of society that we want for the future."[160]

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[157] John C. Reed, "Reminiscences: The Arctic Institute in the 1960s," *Arctic* 40, no. 4 (Dec., 1987): 248.
[158] Laursen, Kelley, and Stephenson, "Historical Perspectives on the Naval Arctic Research Laboratory, 1965 to 1980," in Norton, *Fifty More Years Below Zero,* 248.
[159] Union Oil was the group operator for the tract, comprised of 4 total oil companies: Union Oil, Texaco, Mobil Oil, and Gulf Oil. Robert L. Klaus, "In the Case of Santa Barbara, Part 1: The Situation," *Our Sun*, Summer 1969. Cities Service Oil and Gas Collection, Box 51, Folder 4. Western History Collections, University of Oklahoma Libraries, Norman, Oklahoma.
[160] Richard Nixon, "Remarks Following Inspection of Oil Damage at Santa Barbara Beach," March 21, 1969, online by Gerhard Peters and John T. Woolley, *The American Presidency Project.* https://www.presidency.ucsb.edu/node/239715

Concern about environmental pollution had reached the national stage, and the Santa Barbara oil spill served as one of the catalysts to push environmental protection in popular culture. The government had been pressured into doing something about environmental pollution, and in 1970, the Environmental Protection Agency (EPA) was founded.

For oil companies, the spotlight on environmental damage caused by their technological failure compelled them to respond. To prove their environmental commitment, some oil companies highlighted the naturalness of oil by drawing attention to natural oil seeps. In the Summer 1969 edition of Sun Oil's *Our Sun* magazine, the magazine's editor Robert L. Klaus depicts his visit to Santa Barbara with picturesque color photos, commenting on the state of the beach as of late June and early July of 1969. He suggested that the response to Santa Barbara was overblown. He believed it to be an emotional reaction to an event that was not as environmentally damaging as the national press coverage suggested. In a conversation with Dr. Carleton Scott of Collier Carbon (a subsidiary of Union Oil),[161] Klaus emphasized the importance of natural seeps, similar to those on the North Slope. He recalls the history of oil seeps Southern California, eventually arguing, "If naturally seeped oil is not unusual in this area, neither is oil produced by man."[162] A year later, the Spring 1970 edition of *Our Sun* published an article by geologist Donald W. Weaver which further argued that the Santa Barbara seeps were "considered to be tens of thousands of years old."[163] By arguing that these seeps were a natural process and common to the area, Klaus's editorial draws from an ecological perspective, one that oil companies would solidify throughout the 1970s. In 1972, William Sweet Jr., an oceanographer at Texas A&M University, found a dozen natural oil and gas seeps in the Gulf of

[161] C.B. Scott and H.O. Folkins, "Petroleum Coke Processing," *Journal of Metals* 24 (July 1972): 29.
[162] Klaus, 11.
[163] Donald W. Weaver, "Santa Barbara: An Overview," *Our Sun* (Spring 1970): 24.

Mexico. Multiple Texas newspapers picked up the story.[164] The idea that the oil and tar appearing on the beaches could be a natural phenomenon was so influential that eleven oil companies — Atlantic Richfield, Chevron, Cities Service, Conoco, Gulf, Humble, Marathon, Mobil, Phillips, Sun, and Tenneco — provided funding for Sweet to continue researching natural seeps.[165]

Between the high-profile oil spills of Torrey Canyon (1967) and Santa Barbara (1969) sat the discovery of Prudhoe Bay. With this historic discovery, knowledge of the arctic ecosystem was in high demand. The next step was to determine a transport system from the North Slope to the lower 48 states that would do little environmental harm. But the relationship between ecologists and oil companies weakened. For decades, oil exploration in the Arctic had supported ecological research. When environmental concerns rose in public consciousness, oil companies were prepared with ecological knowledge that placed crude — originally from underground — within the surface ecosystem, rather than as an outside pollutant. Sara Pritchard notes in *Confluence*, "'regime' implies resistance from within and without."[166] When the envirotechnical regime of North Slope oil was threatened by resistance from Indigenous and environmental activists, the oil industry used ecological knowledge to argue for the naturalness of crude on the surface and the naturalness of its extraction on the North Slope.

Land use is much different now than it was, especially since the passing of the Alaska Native Claims Settlement Act (ANCSA) in 1971 and the Alaska National Interest Lands

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[164] "Pollution Source Found," *San Antonio Express*, August 19, 1972; "A&M Readies Renewed Oil Study in Gulf Area," *Dallas Morning News*, January 5, 1972; "Brownsville Area Tar Seep Source," *Dallas Times Herald*, January 12, 1972; "Tar Lumps in Gulf Found To Be Natural," *Beaumont Enterprise*, January 14, 1972. Cities Service Oil and Gas Collection, Box 18, Folder 5. Western History Collections, University of Oklahoma Libraries, Norman, Oklahoma.

[165] "Tar Lumps in Gulf Found To Be Natural," *Beaumont Enterprise*, January 14, 1972. Cities Service Oil and Gas Collection, Box 18, Folder 5. Western History Collections, University of Oklahoma Libraries, Norman, Oklahoma.

[166] Pritchard, 23.

Conservation Act (ANILCA) in 1980.[167] NPR-4, now called the National Petroleum Reserve, continues to be an intersection of ecological and oil interests today. More recently, ConocoPhillips' Willow Project in the northeast corner of NPR-A was announced in January 2017, and on March 14, 2023, President Joe Biden approved the project, with some stipulations on the number of acres and drilling pads attached.[168] ConocoPhillips insists that the project is "designed to have minimal impact to the subsistence lifestyle of Alaska Native residents in the area and to the environment,"[169] though environmentalist and Indigenous organizations have publicly opposed the project, citing climate concerns, environmental degradation, and health risks. Some North Slope leaders, however, see the project as a revenue stream to support future renewable energy and subsistence projects.[170] This continued tension between the idea of a fragile arctic environment and a manageable arctic ecosystem is the product of ecological knowledge developed by scientific, government, indigenous, and corporate interests decades ago. The envirotechnical regime of oil and knowledge production created during the Cold War continues to exert settler colonial pressure over land use today.

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[167] ANILCA set aside 104 million acres of land for federal conservation, and ANCSA set aside 44 million acres for Native economic development and required 80 million acres be selected for federal conservation control, among other provisions. Stephen Haycox, Battleground Alaska: Fighting Federal Power in America's Last Wilderness (Lawrence, Kansas: University Press of Kansas, 2016), 2, 9. Stephen Haycox, "Battleground Alaska: Antistatism and Environmental Protection in America's Last Wilderness," *Western Historical Quarterly* 48, no. 2 (Summer 2017): 121.

[168] Ella Nilsen, "Biden Administration Approves Controversial Willow Oil Project in Alaska, Which Has Galvanized Online Activism," *CNN*, March 14, 2023. https://www.cnn.com/2023/03/13/politics/willow-project-alaska-oil-biden-approval-climate/index.html

[169] ConocoPhillips Alaska, *Willow* (Anchorage, Alaska: ConocoPhillips Alaska Media and Advertising, January 2023): 2. https://static.conocophillips.com/files/resources/23copa013-willow-fact-sheet-v5-final.pdf

[170] James Brooks, "Alaska House Votes Unanimously to Support Willow Oil Project." *Alaska Beacon*, February 20, 2023. https://alaskabeacon.com/2023/02/20/alaska-house-votes-unanimously-to-support-willow-oil-project/

CHAPTER 3: SANTA BARBARA AND BEYOND

> "At the same time, it can be seen that nature is not so fragile as many may think . . . that the [oil industry and the environment] not only co-exist, but, in the final analysis, contribute to the mutual benefit of each other. Perhaps this is the legacy of Santa Barbara."
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> - "Santa Barbara Revisited," *Cities Service Today*[171]

Introduction

The discovery of oil in Prudhoe Bay (1968) and the Santa Barbara oil spill (1969) served as a prelude to a decade defined by oil crises and heightened environmentalism in the United States.[172] Media attention on Santa Barbara, in particular, inspired quick federal action on environmental protection in the early 1970s,[173] as horrific photos of oil-soaked birds and seals appeared nationwide in newspapers and magazines.[174] Public opinion turned away from the oil industry, and just a few short years later, the United States entered an energy crisis. In the early 20th century, an oil gusher symbolized prosperity. But by 1969, the oil gushing out of Platform A in the Santa Barbara Channel represented an environmental crisis caused by industrial technology.

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[171] The ellipses appear in the original text, and there is no author listed for the article. "Santa Barbara Revisited," *Cities Service Today*, January 1981, 7. Cities Service Oil and Gas Collection, Box 77, Folder 6. Western History Collections, University of Oklahoma Libraries, Norman, Oklahoma.

[172] See Joachim Radkau's *The Age of Ecology* for more information about the 1970s as a special decade for environmentalism. Joachim Radkau, *The Age of Ecology*, Boston and New York: Polity Press, 2014.

[173] The National Environmental Policy Act and two water pollution bills passed Congress within four years after the spill. The Environmental Protection Agency (EPA) was also established in 1970, partially in response to the Santa Barbara spill. Teresa Sabol Spezio, "Rising Tide: The Santa Barbara Oil Spill and Its Aftermath." Ph.D., University of California, Davis: 5-6. Accessed September 13, 2022. http://www.proquest.com/docview/937029623/abstract/7C5CA00CC02A4AB4PQ/1.
A few years later in 1972, Nixon signed the Marine Protection, Research, and Sanctuaries Act, the Marine Mammal Protection Act, the Coastal Zone Management Act, and the Clean Water Act. In 1973, the Endangered Species Act was passed by Congress. Kathryn Morse, "There Will Be Birds: Images of Oil Disasters in the Nineteenth and Twentieth Centuries." Journal of American History 99, no. 1 (June 1, 2012): 124–34. https://doi.org/10.1093/jahist/jar651.

[174] Morse, 131. Other publications Morse references about Santa Barbara includes newspapers (*Boston Globe, Los Angeles Times, Washington Post*, and the *New York Times*) and magazines (*Time*, *Newsweek*). Morse, 129-131.

In the 1970s, the oil industry dealt with environmental and political crises in quick succession. A few years after the Santa Barbara spill, as the Nixon Administration expanded environmental regulation, Arab states of the Organization of the Petroleum Exporting Countries (OPEC) restricted oil exports to the United States to protest US support of Israel.[175] The 1973-74 embargo led to renewed interest in North Slope oil, and within a month, the US government approved the construction of the Trans-Alaska Pipeline from Prudhoe Bay to Valdez.[176] The pipeline had been held up by environmental regulations for four years,[177] but in the end, national concerns about energy independence overrode the environmentalists' dreams of preserving the North Slope.[178] These crises of the 1970s were connected by a surge in energy demand that disrupted both the environmental and political worlds.[179]

This chapter argues that, in the aftermath of multiple high profile oil spills, the oil industry harnessed ecological knowledge to naturalize crude's existence at the surface as well as its extraction. In response to environmental concerns, they cited oil technology and infrastructure as technological fixes for natural environmental pollution.[180] One of the key environmental concepts referenced in naturalization arguments was the idea of wilderness. Environmentalism in

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[175] Tyler Priest, "Shifting Sands: The 1973 Oil Shock and the Expansion of Non-OPEC Supply," in *Oil Shock: The 1973 Crisis and Its Economic Legacy*, ed. Elisabetta Bini, Giuliano Garavini and Federico Romero (London, Dublin, and New York: Bloomsbury Academic, 2023), 118. ProQuest Ebrary.

[176] United States Congress, "Trans-Alaska Pipeline Authorization Act (Public Law 93-153)" (U.S. Government Publishing Office, August 17, 1990): 1-2. https://www.govinfo.gov/app/details/COMPS-5339. Priest, "Shifting Sands," 125.

[177] Peter A. Coates, *The Trans-Alaska Pipeline Controversy: Technology, Conservation, and the Frontier* (Fairbanks, Alaska: University of Alaska Press, 1993), 241.

[178] Caleb Wellum has argued that concerns over energy conservation actually brought ecological and national concerns about together. However, in the context of oil production, national energy needs overrode the environmentalist opposition to oil development, as in the case for the Trans-Alaska Pipeline. Caleb Wellum, "'A Vibrant National Preoccupation': Embracing an Energy Conservation Ethic in the 1970s," *Environmental History* 25, 1 (January 2020): 85.

[179] Robert Lifset, "Environmentalism and the Electrical Energy Crisis," in *American Energy Policy in the 1970s* (Norman, Oklahoma: University of Oklahoma Press, 2014), 295. ProQuest Ebrary.

[180] Spills include: *Torrey Canyon* (1967), Santa Barbara (1969*), Delian Apollon* (1970), and San Francisco Bay (1971). Kathryn Morse, "There Will Be Birds: Images of Oil Disasters in the Nineteenth and Twentieth Centuries," *Journal of American History* 99, no. 1 (June 1, 2012): 124–34, https://doi.org/10.1093/jahist/jar651.

the 1970s relied heavily on the concept of pristine wilderness, outlined (from a legal standpoint) in the 1964 Wilderness Act. This idealized wilderness was devoid of humans and their industrial technologies. To the oil industry, however, the environment was meant to be enhanced through human development. The environmental stewardship rhetoric of the oil industry countered the prevailing environmentalist view of pristine environments by stressing how technologies (especially their own) altered the environment for human and ecological benefit.

At stake in these representations of oil and the environment was the meaning of pollution. The attempt to naturalize crude and its extraction at the Earth's surface through ecological research and ecosystem creation primarily addressed the site of extraction. Naturalizing oil happens the moment it leaves the geologic world and enters the biotic one. There's no question that crude is "natural" hundreds or thousands of feet underground. But when it reaches the surface, its status is called into question. Is it a pollutant? Is it part of the ecosystem? Where do we place oil in the biosphere? Part of this questioning comes from the method of extracting oil. The obvious difference between natural oil seeps and offshore oil platforms is the role of technology. In the Gulf, people build rigs that draw oil to the surface. These rigs mediate the natural process of oil seepage, but on a massive scale. This technological mediation combined with the extractive nature of oil production suggests that oil does not belong in the surface world. But, as oil executives argued, oil did seep to the surface, entering the biotic world anyway. In the 1970s, the oil industry capitalized on these unanswered questions to deflect attention away from their technological mistakes, redirecting attention towards their perceived coexistence of oil production and environmental care.

This chapter examines two practices that exemplify this ecological push back: natural oil seep research (financed largely by oil companies) and Rigs-to-Reefs programs. To assuage

widespread fears about the environmental damage of oil production, the oil industry relied on scientific authority and technological optimism for their arguments about the coexistence of oil and the environment. Research about natural oil seeps increased in the 1970s specifically as a response to the geography and magnitude of oil pollution from the Santa Barbara blowout. Oil companies used ocean oil seep research to naturalize crude as part of the ocean ecosystem, while the rhetoric of Rigs-to-Reefs programs suggested that oil technology could improve natural ecosystems. Framing leftover infrastructure and offshore extraction as ecological benefits blurred the environmentalist perception of the environment and industrial technology as existing in separate spheres. As argued by Sara Pritchard, envirotechnical systems can be strategically naturalized or technologized, depending on the context.[181] The process of naturalizing involves redefining a concept or physical entity to align with the culturally hegemonic definition of nature; in this case, that which is able to endure, in conjunction with and despite of, human agency. Technologizing, on the other hand, redefines a concept or physical entity as a product of human agency. The two are not isolated definitions, but rather definitions that lean on each other, as the line between nature and technology is often blurred. By analyzing offshore oil as an envirotechnical system, we can see how the oil industry both naturalized and technologized crude in the ocean environment. Responding to widespread environmental concerns about oil production, the industry asserted a new vision of a symbiotic relationship between oil production and the environment by naturalizing crude and its extraction in ocean ecosystems.

[181] Sara B. Pritchard, *Confluence: The Nature of Technology and the Remaking of the Rhône,* (Cambridge: Harvard University Press, 2011).

Santa Barbara and the Question of Pollution

The Santa Barbara spill highlighted two public environmental concerns: aesthetics and pollution. Since 1967, Santa Barbara county officials sought protection for their ocean view during negotiations over offshore leasing with the Department of the Interior.[182] Drilling rigs would tarnish the aesthetic ocean view, the local middle-class community argued. That the spill happened near a middle-class, Republican neighborhood (an area that voted for the recently elected President Nixon) played a significant role in the response to the spill.[183] Malcoln Baldwin, a senior legal associate for the Conservation Fund, argued that locals employed the argument about aesthetics because they struggled to find information about the pollution risks of offshore oil production.[184] After the spill, images and testimonials of wildlife dying from ingesting oil provided evidence to suggest that oil pollution may have negative physiological impacts in addition to the aesthetic concerns.

Various oil industry (and industry adjacent) publications responded to the spill. R.E. Foss and Robert Klaus of Sun Oil downplayed the original damage in the company magazine *Our Sun*, using United States Geological Survey (USGS) statistics for support. Compared to other institutions that surveyed the Santa Barbara damage, the USGS provided the lowest spillage approximations at 18,500 barrels compared to the Coast Guard's estimate of 78,000.[185] Klaus, the editor of *Our Sun*, cited scientists such as Dr. Wheeler J. North (a marine biologist at Caltech) who provided evidence that the wildlife in the channel were healthy. Klaus wrote, "Dr. North pointed out that limpets ate crude oil which was spilled from the *Torrey Canyon* when that

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[182] Malcoln F. Baldwin, "The Santa Barbara Oil Spill," *University of Colorado Law Review* 42, no. 1 (May 1970): 33.
[183] Spezio, 1, 201.
[184] Baldwin, 42.
[185] Don E. Kash, Irvin L. White, Karl H. Bergey, Michael A. Chartock, Michael D. Devine, R. Leon Leonard, Stephen N. Salomon and Harold W. Young, *Energy Under the Oceans: A Technology Assessment of Outer Continental Shelf Oil and Gas Operations* (Norman: University of Oklahoma Press, 1973): 277.

tanker broke up off southern England in 1967 and disgorged some 850,000 barrels of oil in the sea. 'I observed the same phenomenon in Santa Barbara, with no ill effects,' he said."[186] Notably, North was "unable to assess the effects on fish," which would have been a primary concern for both ecologists and the fishing industry.

R.E. Foss, executive vice president of Sun Oil, was certain that technological solutions could solve the "pollution problem" on and off California shores. He argued:

> "I am fully convinced that we can drill for and produce oil we have found without any unreasonable risk of another pollution problem. As one with actual experience in oil operations in California and off its shores, I saw that employing the many advances in techniques and equipment made in recent years and the safeguards which have been provided, we can, with every reasonable assurance, drill with safety in the Santa Barbara Channel as well as in other offshore areas."[187]

Foss's response technologized the pollution problem rather than examining it within the broader context of oil production. From Foss's perspective, the problem was not oil production nor human carelessness. The problem was the failure of technology — something he believed could be fixed. Drawing on ideals of progress (with a heavy dose of technological optimism), oil executives like Foss insisted that pollution could be prevented (or at least well-monitored and then cleaned up) with an investment in petrochemical technologies. Supported by the scientific expertise and authority provided by Dr. North and scientific institutions like the USGS, oil executives like Foss searched for reasons why oil production could continue. And they continued drilling, in spite of it all. Though Sun Oil was not implicated in the blowout, the company had a vested interest in the area. While Union's Platform A continued leaking oil, Sun Oil drilled from

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[186] Robert L. Klaus, "In the Case of Santa Barbara, Part 1: The Situation," *Our Sun* (Summer 1969), 5. Cities Service Oil and Gas Collection, Box 51, Folder 4. Western History Collections, University of Oklahoma Libraries, Norman, Oklahoma.

[187] R.E. Foss, "In the Case of Santa Barbara, Part 2: The Implications," *Our Sun* (Summer 1969), 17. Cities Service Oil and Gas Collection, Box 51, Folder 4. Western History Collections, University of Oklahoma Libraries, Norman, Oklahoma.

a platform nearby.[188] Within a year of the spill, Sun Oil had published four articles about Santa Barbara in company magazines to calm shareholder fears about the potential risks of oil extraction and the environmental backlash they had received.[189] This platform would be the last one built for at least six years.[190]

Though examples of pollution are easy to come by, defining pollution is much more difficult. And in an environmental era marked by *Silent Spring*, pollution was at the forefront of the American environmental movement. The definition of pollution as a "physical impurity or contaminate" can be traced back to the 1797.[191] However, how much of a material constitutes contamination or pollution is not clear. Mary Douglas argued in *Purity and Danger* that uncleanliness, including pollution or contamination, is "matter out of place."[192] To Santa Barbara residents, environmentalists, and the media, oil coating the shores of Santa Barbara was out of place. This is in part because oil is rarely seen. Most surface oil seeps have been drawn down, and oil's liquid nature confines it to barrels, drums, and pipelines once extracted. However, Kenneth Landes, a consulting petroleum geologist and professor emeritus at the University of Michigan, argued in the April 1973 edition of the *American Association of Petroleum Geologists' Bulletin* that oil in the ocean was *not* out of place.[193] He asserted, "Mother Nature was a marine polluter before there were tankers and oil-powered ships; in fact, she must have been polluting

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[188] In December 1969, Union Oil collected approximately 420 gallons of oil per day from the base of Platform A. Spezio, 54.
[189] Articles from 1969 and 1970 editions of *Our Sun* include: "In the Case of Santa Barbara, Part 1: The Situation" by Robert L. Klaus, editor of *Our Sun*; "In the Case of Santa Barbara, Part 2: The Implications" by R. E. Foss, executive Vice President of Sun Oil Company; "Santa Barbara: An Overview" by Donald Weaver, Associate Professor of Geology at the University of California, Santa Barbara; and an anonymously authored article, "Santa Barbara Revisited."
[190] Spezio, 54.
[191] "pollution, n." OED Online, March 2023, Oxford University Press. https://www.oed.com/view/Entry/146992?redirectedFrom=pollution (accessed June 06, 2023).
[192] Mary Douglas, *Purity and Danger: An Analysis of Concepts of Pollution and Taboo* (London: Routledge, 2002), 50. https://doi.org/10.4324/9780203361832.
[193] John A. Dorr, Jr., "Memorial to Kenneth Knight Landes, 1899-1981," *Geological Society of America*, https://rock.geosociety.org/net/documents/gsa/memorials/v14/Landes-KK.pdf.

the seas long before there were people."[194] To Landes, the fact that these seeps released oil long before humans inhabited the area meant they were a natural part of the environment.[195] In his argument, oil companies should not have shouldered all the blame for oil pollution due to the very existence of seeps that occurred naturally.

In a contradictory manner, Landes also argued that oil seeps *are* pollutants. Drawing attention away from human mistakes, Landes naturalized the crude coming from oil seeps while simultaneously calling for a technological solution to prevent pollution seeping from the earth. His thorough discussion of "natural pollution" is minimized in the conclusion where he focused on solving the pollution issue. Whether the oil came from a well drilled by oil workers or a natural seep, the technological fix was the same. Landes argued that pollution could be reduced "by withdrawing oil from the polluting reservoirs through production."[196] This technological fix would improve the environment by getting rid of the pollutant entirely. Removing the oil through extraction would end the pollution debate, as no substance would be left to debate over. Landes's argument agreed with Douglas's base argument about matter out of place; however, he argued that the ocean can be cleaned (or purified, to use Douglas's vocabulary) through continued oil drilling of the natural oil seeps. To Landes, the matter could be removed from the place entirely. In this interpretation, pollution was definitely a problem, but one that could be solved by petroleum engineers and safety standards.

The clear difference between a spill and a seep that Landes failed to account for is the scale. To support his position, Landes quoted a 1970 *Science* article by scientists Alan Allen and Roger Schlueter of General Research Corporation (a firm in Santa Barbara) and Paul Mikolaj

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[194] Kenneth K. Landes, "Mother Nature as an Oil Polluter," *American Association of Petroleum Geologists Bulletin* 57, no. 4 (April 1973): 637. https://doi.org/10.1306/819A430E-16C5-11D7-8645000102C1865D.
[195] Landes, 637.
[196] Landes 640.

from the University of California-Santa Barbara's chemical engineering department. However, Landes specifically omitted information from the quote about the thickness of natural oil seep slicks. Landes quoted from the paper's abstract:

> "The resulting slicks are several hundred meters wide . . . tarry masses within these slicks frequently wash ashore."[197]

In the original publication, however, Allen, Schlueter, and Mikolaj wrote:

> "The resulting slicks are several hundred meters wide and are of the order of 10^{-5} centimeters thick; tarry masses within these slicks frequently wash ashore."[198]

According to a 1970 study of the Santa Barbara oil spill, an oil slick thickness of .01 inches is common, and the Santa Barbara slick was likely thicker, even more so near the platform.[199] There is a significant difference in volume between an oil slick that is .01 inches (approximately .0254 centimeters) thick, and one that is .0001 centimeters thick. Keeping the width metric of seven hundred meters prompts the reader to imagine that natural oil seep slicks cover a large area of the channel, with no regard for how thick the slick is. Landes did not mention that the oil slick caused by the Santa Barbara blowout covered approximately 1,700 square kilometers (far bigger than his hundred meter description of natural seep slicks) after the first eight days, with a much thicker footprint. By leaving out the estimated slick thickness, Landes gave readers creative liberties to assume the total volume of a natural oil seep slick, while omitting information about how large and dense the spill actually was.

Landes's article naturalized oil by connecting its history in the Santa Barbara area with contemporary ecological research of the Santa Barbara spill. Framing oil as a natural substance

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[197] Ellipses found in original text. Landes, 638.
[198] Alan A. Allen, Roger S. Schlueter, and Paul G. Mikolaj, "Natural Oil Seepage at Coal Oil Point, Santa Barbara, California," *Science* 170 (November 27, 1970): 974.
[199] M. Foster, A.C. Charters, and M. Neushul, "The Santa Barbara Oil Spill I: Initial Quantities and Distribution of Pollutant Crude Oil," in *Santa Barbara Oil Pollution, 1969: A Study of the Biological Effects of the Oil Spill Which Occurred at Santa Barbara, California in 1969*, Water Pollution Control Research Series: 15080 DZR 11/70, Federal Water Quality Administration, Department of the Interior, (October 1970), 9.

by way of naturally occurring oil seeps, he went on to argue that this "natural pollution" can be technologically fixed. He further technologized the issue by referring to the process of oil seepage along the Santa Barbara coast as "production."[200] Playing with the idea that both humans and the earth "produce" materials blurs the environmental/technology boundary present in the minds of his contemporary environmentalists. By describing oil seeps as both sites of industrial, technologically mediated oil production and natural oil production, his argument allowed him to technologize or naturalize crude as needed. His base assertion was that oil entering the biosphere had been produced — by nature or by people. However, it is unclear whether Landes's thoughts on pollution were supported by other scientists. In 1983, geologists Keith Kvenvolden and John Harbaugh argued that Landes's claim "extends the definition of pollution beyond its usually accepted meaning which connotes contamination by man's activities," though they did not dispute his claim outright.[201] In muddying the distinction between environment and technology that was popular at the time, Landes again reflected Douglas's argument. In this instance, he disordered the categorizing framework of human intent that distinguishes oil production from natural oil seepage. Companies like Union Oil and Sun Oil used the ambiguous meanings of pollution, set forth by people like Landes, to deflect attention away from the acute blowout event, while redefining the nature of marine environments and their relationships to human development.

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[200] Landes, 638.

[201] Keith A. Kvenvolden and John W. Harbaugh, "Reassessment of the Rates at Which Oil from Natural Sources Enters the Marine Environment," *Marine Environmental Research* 10, no. 4 (January 1983): 224. https://doi.org/10.1016/0141-1136(83)90003-X.

Natural Oil Seep Research

Landes's 1973 article, however, was not the first time natural oil seeps had been brought into the oil spill conversation. He was building on several years of oil seep research that began in Santa Barbara, but later spread to other states with intense oil production. The Santa Barbara spill led directly to increased oil seep research because of the geography of the area and the nature of the spill.[202] Many natural oil seeps in the channel (notably along Coal Oil Point) were brought into the public conversation by oil executives, and the long, slow spill from the base of Union's Platform A led to new questions about the difference between acute spills (such as a blowout) and chronic spills.[203]

The unique geology and geography of Santa Barbara's oil seeps gave people within the oil industry room to question the nature of the pollution found in the channel and the nature of oil itself. Robert Klaus noted, "In all the controversy surrounding the oil spill, the fact has been pretty consistently overlooked that oil has come ashore on the beaches in the Santa Barbara area for hundreds of years. It comes from natural oil springs, or seeps, offshore."[204] The history of natural oil seeps off the Southern California coast made appearances in publications such as "The Santa Barbara Oil Spill," by Malcoln F. Baldwin (1970), *Biological and Oceanographical Survey of the Santa Barbara Channel Oil Spill, 1969-1970* compiled by Dale Straughan (1971), *Oil Pollution and the Public Interest: A Study of the Santa Barbara Oil Spill* by A.E. Keir Nash, Dean E. Mann, and Phil G. Olsen (1972), and the previously discussed "Mother Nature as an Oil

[202] Paul G. Mikolaj, Alan A. Allen, and Roger S. Schlueter, "Investigation of the Nature, Extent and Fate of Natural Oil Seepage Off Southern California" (paper presentation, Fourth Annual Offshore Technology Conference, Houston, Texas, May 1-3, 1972): I-366. https://doi.org/10.4043/1549-MS.
[203] Spezio, 54.
[204] Klaus, 11.

Polluter," by Kenneth K. Landes (1973).[205] However, little was known about how much oil was actually escaping from the natural seeps compared to what had come from the blowout.

The lack of oil seep knowledge provided ecologists and geologists with a new research avenue, but the lack of data turned into uncertainties about how damaging the natural seeps really were. Allen, Schlueter, and Mikolaj opened their 1970 *Science* article about natural oil seeps at Coal Oil Point by acknowledging the attention the channel seeps had received since the spill. The flow rate from these oil seeps had never been documented, they argued, though there had been historic interest in the phenomenon. They conservatively concluded that, for the duration of the October 1969 study, at least 10 barrels of oil were released per day. At the upper limit, they estimated over 100 barrels per day.[206] This publication was based on research Allen had conducted before the blowout occurred, and Allen would go on to publicly dispute Union Oil's estimation.[207] Though some research from Allen, Schlueter, and Mikolaj was funded by Standard Oil, Allen's findings were later substantiated by both Dr. Michael Neushul of the Federal Water Pollution Control Administration and the President's Panel on Oil Spills.[208] In a 1971 report of the Santa Barbara spill, biologists from the University of California-Santa Barbara

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[205] Landes, 637; Baldwin, 38; A. E. Keir Nash, Dean E. Mann, and Phil G. Olsen, *Oil Pollution and the Public Interest A Study of the Santa Barbara Oil Spill* (Institute of Governmental Studies, University of California, 1972), 13. C. Ventura and J. Wintz, "Natural Oil Seeps: Historical Background," in *Biological and Oceanographical Survey of the Santa Barbara Channel Oil Spill, 1969-1970, volume 1: Biology and Bacteriology,* comp. Dale Straughan (Los Angeles, California: Allan Hancock Foundation, University of Southern California, 1971); The *Biological and Oceanographical Survey* was funded in part by a grant from the Western Oil and Gas Association to the Allan Hancock Foundation at the University of Southern California. Chapter two provides historical background for the natural oil seeps in the Santa Barbara Channel. By introducing this concept at the beginning of the book with an additional chapter dedicated to the history of oil seeps, Straughan frames oil pollution in marine environments as a common occurrence. This highlights the naturalness of oil seepage, thus downplaying the disaster that introduced pollution into the waters.

[206] Allen, Schlueter, and Mikolaj, "Natural Oil Seepage," 976-977.

[207] Alan A. Allen, "Lessons Learned From The 1969 Santa Barbara Oil Spill – Minibytes #3," *Minibytes* (blog), Elastec, May 3, 2018. https://www.elastec.com/santa-barbara-oil-spill-lessons/; Robert Easton, *Black Tide: The Santa Barbara Oil Spill and Its Consequences (New York: Delacorte Press, 1972).*

[208] Mikolaj, Allen, and Schlueter, "Investigation of the Nature, Extent and Fate of Natural Oil Seepage Off Southern California," I-375; Easton, 251-52.

(including Neushul) argued that research into the natural oil seeps could help determine the impacts of oil pollution over time.[209] Determining the specific impacts was important because at the time, the lack of information about the impacts of oil pollution benefitted the industry. They could claim that there was little scientific evidence as to whether oil was harmful to wildlife because few (if any) studies had been conducted. Bird carcasses provided evidence, but the exact causal relationship between oil and health had not been identified. The Santa Barbara oil spill prompted the oil industry, local ecologists, and geologists to treat natural oil seeps as scientific objects of study for both the ecological and geological worlds, and not just as a "passing curiosity" like before.[210]

Research into marine oil seeps involves both the ecological and geological sciences, and the various scientists who jumped on this issue are noteworthy. Oil has long been within the purview of geologists, but the condition of marine ecosystems is ecological. In *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*, Naomi Oreskes and Erik Conway explain how Cold War scientists created doubt about scientific consensus, using non-peer reviewed work by scientists outside of disciplines that speak to the issues at hand.[211] Often physicists, these scientists made claims about the relationship between tobacco smoking and health as well as seeding denial about global warming. Similarly, research after Santa Barbara saw petroleum geologists like Kenneth Landes commenting on biological and ecological matters and writing editorials that received no peer review. His article, "Mother Nature as an Oil Polluter," continued to be cited in the 21st century.[212] Sun Oil's

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[209] M. Foster, M. Neushul, and R. Zingmark, "The Santa Barbara Oil Spill Part 2: Initial Effects on Intertidal and Kelp Bed Organisms," *Environmental Pollution* 2 (1971): 132.
[210] Allen, Schlueter, and Mikolaj, "Natural Oil Seepage," 975.
[211] Naomi Oreskes and Erik M. Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming* (New York: Bloomsbury, 2010).
[212] Landes's "Mother Nature as an Oil Polluter" was cited in the National Research Council (US) Committee's *Oil in the Sea*, specifically for information about the history of natural oil seeps. There is no mention of his argument about

company magazine articles also often cited geologists for ecological questions. In this case, the oil industry was not just stirring doubt about the scientific consensus — they were funding their own research and consulting scientists with little expertise on marine life to counter other scientific studies of the channel.

One of the few studies released shortly after the Santa Barbara spill by an ecologist was written by Dr. Dale Straughan, an ecologist working with the Allan Hancock Foundation through the University of Southern California.[213] In a report on the Santa Barbara spill funded by the Western Oil and Gas Association (of which Union Oil was a member), Straughan et.al. argued that the oil spill did not cause as much damage as initially reported by the press.[214] Straughan's work with oil companies extended into 1976 when she presented an article (funded by Standard Oil) at the Second Annual Conference of The Coastal Society about oil pollution in Southern California's wetlands.[215] Straughan's history of working with oil companies, taken in tandem with the critiques from her biologist peers, suggests that her science was misguided. Dr. Max Blumer from the Woods Hole Oceanographic Institution argued in a 1971 letter to the Maine Environmental Improvement Commission that Straughan's data was incomplete with "no analysis of the oil involved – the most important evidence by which one could judge the environmental hazard of the oil."[216] Straughan's scientific publications demonstrate the oil

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pollution, however. National Research Council (US) Committee on Oil in the Sea: Inputs, Fates, and Effects, *Oil in the Sea III: Inputs, Fates, and Effects*, Washington, DC: National Academies Press, 2003.

[213] The Allan Hancock Foundation is named after G. Allan Hancock – the former owner of Rancho La Brea that extracted from the La Brea tar pits in Los Angeles. "Capt. G. Allan Hancock," About the College, Allan Hancock College, last modified, Mar. 18, 2021. https://www.hancockcollege.edu/about/capt-hancock.php.

[214] Straughan notes that representatives from the California State Water Quality Control Board, the California Department of Fish and Game, and the Federal Water Quality Administration served as a Liaison Committee of non-oil industry representatives, though a former petroleum geologist, Dr. Mason L. Hill, also sat on this committee.

[215] Dale Straughan, "Oil in Southern California Marshes," *Time-Stressed Coastal Environments: Assessment and Future Action, Proceedings of Second Annual Conference of The Coastal Society* (Arlington, VA: The Coastal Society, November 17-20, 1976): 204.

[216] Gladwin Hill, "Expert on Oil Spillages Disputes Hopeful Study on Santa Barbara," *New York Times*, April 22, 1971, https://www.nytimes.com/1971/04/22/archives/expert-on-oil-spillages-disputes-hopeful-study-on-santa-barbara.html.

industry's investment in ecological research. But her strategy of minimizing the concerns of ecological harms with insufficient data was met with scientific skepticism for her collected data and analysis. Even with public criticism, her report was widely cited, as the *New York Times* article featuring Blumer noted.[217]

Natural oil seep research boomed in the early 1970s, expanding to other oil producing areas such as the Gulf of Mexico and Alaska.[218] While there was some oil seep research conducted before the spill, many articles about natural oil seeps published from 1969-1973 reference Santa Barbara in their title or text.[219] Allen, Schlueter, and Mikolaj noted in 1970 that before the spill there were few studies of the seeps in the Santa Barbara channel. In fact, they only cite two studies: one from 1959 and one from 1960.[220] That same year, chemists James S. Mattson and Harry B. Mark, Jr., geologist Ronald L. Kolpack[221], and physicist Clarence E. Schutt argued in reference to the Santa Barbara spill that new techniques were necessary to distinguish oil produced by blowouts from natural oil seepage.[222] The oil industry was clearly

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[217] Gladwin Hill, "Expert on Oil Spillages Disputes Hopeful Study on Santa Barbara."

[218] In 1971, T.C. Johnson prepared "Natural oil seeps in or near the marine environment: a literature survey" for the U.S. Coast Guard. A year later at the Symposium on the Impact of Oil Resource Development on Northern Plant Communities (held as part of the 23rd American Association for the Advancement of Science Alaska Science Conference) three of the twelve papers investigated natural oil seeps. "Proceedings of the Symposium on the Impact of Oil Resource Development on Northern Plant Communities," *Institute of Arctic Biology*, Occasional Publications on Northern Life no. 1, (March 1973): 1-96. https://scholarworks.alaska.edu/bitstream/handle/11122/2958/BiologicalPapers_no1.pdf?sequence=1&isAllowed=y

[219] See: Allen, Schlueter, and Mikolaj, "Natural Oil Seepage at Coal Oil Point, Santa Barbara, California"; Mikolaj, Allen, and Schlueter, "Investigation of the Nature, Extent and Fate of Natural Oil Seepage Off Southern California"; James S. Mattson, Harry B. Mark, Ronald L Kolpack, and Clarence E Schutt, "Rapid, Nondestructive Technique for Infrared Identification of Crude Oils by Internal Reflection Spectrometry. Qualitative Differentiation of Crude Oils Originating from Natural Seepages and Platform "A" in the Santa Barbara Channel," *Analytical Chemistry* 42, no. 2 (1970): 234-38.

[220] Allen, Schlueter, and Mikolaj, "Natural Oil Seepage," 977.

[221] Kolpack worked with Straughan on the oil industry funded *Biological and oceanographical survey of the Santa Barbara Channel oil spill, 1969-1970* by compiling the physical, chemical and geological studies sections. Straughan, *Biological and oceanographical survey,* vi. According to the EPA National Library Catalog, Kolpack also published "Fate of Oil in a Water Environment, phase 1: final report," for the American Petroleum Institute in 1973. Record Display for the EPA National Library Catalog, "Fate of Oil in a Water Environment, phase 1: final report," US Environmental Protection Agency. https://cfpub.epa.gov/ols/catalog/

[222] Mattson, Mark, Kolpack, and Schutt, 234.

interested in this question, as 11 oil companies sponsored one oceanographer's research into oil seeps.[223] William Sweet, Jr. in Texas A&M University's oceanography department directed this research, with the goal of educating the public about natural oil seeps.[224] The push for natural oil seep research by oil companies demonstrates their ecological response to the environmental concerns about oil production. Funding scientists like Straughan and Sweet, Jr., oil companies sought scientific evidence that oil was a natural substance that defied the definition of pollution, and that oil production could exist harmoniously with the environment. Scientists, as the perceived experts of environmental knowledge within the military-industrial-academic complex, could be leveraged to provide authority to oil industry claims about oil seepage and natural pollution. The arguments were not always accepted, but money consistently flowed to ecologists from oil companies.

The push for natural oil seep research is evidence of the oil industry's tactic of seeding doubt. Kenneth Landes's stated goal in introducing natural oil seeps as sources of pollution was to argue that not all pollution could be traced back to industry mistakes. This deflected attention away from the oil industry's failure to successfully secure the platform by funneling attention towards a critique of the natural world. The proliferation of Texas city newspapers discussing William Sweet's research suggests that the oil industry wanted the public to doubt whether the oil they saw on the beach came from a spill or a seep. Decades later, the National Research

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[223]In the first year of research, 8 oil companies helped sponsor this research, increasing to 11 in the second year: Atlantic Richfield, Chevron, Cities Service, Conoco, Gulf, Humble, Marathon, Mobil, Phillips, Sun, and Tenneco. "Tar Lumps In Gulf Found To Be Natural," Beaumont Enterprise, January 14, 1972. "Natural Gas Seepage Gulf Pollution Source," Eagle, August 18, 1972. Cities Service Oil and Gas Collection, Box 18, Folder 5. Western History Collections, University of Oklahoma Libraries, Norman, Oklahoma.

[224]In a 1972 memo to John Steiger, Sweet states, "One of the major purposes of the oil seep study was to educate the public as to the presence of natural seepage in the marine environment and the Gulf of Mexico in particular a continuing emphasis has been made to obtain publicity for the project." Sweet added that newspapers, radio, and television stations picked up the news about oil seeps through the Gulf region. Cities Service Oil and Gas Collection, Box 18, Folder 5. Western History Collections, University of Oklahoma Libraries, Norman, Oklahoma.

Council (NRC), in collaboration with oil companies, reaffirmed the focus on natural oil seeps with respect to marine pollution in their 2003 publication, *Oil in the Sea III*. By stressing the lack of data and lack of certainty over the causes and effects of oil pollution, oil companies tried to deflect total blame of oil spill damage by crafting doubt about what constituted environmental harm in the first place.

Photos of oil-soaked birds and mammals distributed by national news outlets made it difficult for oil companies to reject all blame for the 1969 blowout. The amount of oil washing up on the shores of Santa Barbara that January was not like the tar balls of historic record. But instead of doubting the existence of the environmental damage, oil companies seeded doubt about where it originated through natural oil seep research. If the public accepted that oil seeped naturally into the channel, the oil industry could doubt the origin of oil washed up on the beach. This strategy deflected blame and redefined the channel's marine environment by naturalizing the substance accused of causing environmental damage. As evidenced by Kenneth Landes's article, designating the environment as a "natural polluter" resonated with contemporary concerns about toxicity and pollution.[225] Oil was considered out of place, especially washing up on miles of beach in massive quantities. People like Landes argued that oil extraction was a technological fix for that pollution. Naturalizing crude in the oceans absolved the industry from dealing with pollution, while also providing an opportunity for the oil industry to become environmental champions. Investing in natural oil seep research at a scale never seen before, oil companies like Union Oil, Sun Oil, and larger oil institutions like the Western Oil and Gas Association sought to naturalize crude by highlighting its most natural, untouched state: marine seepage. However, scientific skepticism pushed back on industry funded ecological research.

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[225] Etienne S. Benson, *Surroundings: A History of Environments and Environmentalisms* (Chicago, Illinois: University of Chicago Press, 2020), 160. https://doi.org/10.7208/chicago/9780226706320.001.0001.

Third party ecological research of the harms of oil pollution would not be conducted until the late 1970s and into the early 1980s, with a large influx of research happening after the Exxon Valdez oil spill in 1989. By 2003, the National Research Council still suggested that interpretations of the scientific research of the Exxon Valdez spill was uncertain.[226]

Rigs to Reefs

Just as Landes had suggested that oil industry activities (such as extracting from natural ocean seeps) could improve the environment, the oil industry promoted the ecological benefits of oil drilling technologies in the Gulf of Mexico through Rigs-to-Reefs programs in the 1970s and 1980s. In February 1972, the Cities Service Company's magazine *Service* published an article entitled "Rig Fishing – It's More Than Just A Sport." The very first sentence reads, "The oil and gas industry of the United States is responsible for creating new ecological communities at almost 3,000 points in the Gulf of Mexico off Louisiana and Texas."[227] To this unnamed author, offshore rigs not only produced the fuel that the country desperately needed, but they acted as habitats that could support ecosystems. Oil production, so this article suggests, would not only exist in harmony with the environment but also *improve* it.

Early on, companies like Cities Service promoted rig fishing, the practice of fishing at active or inactive rig sites. Fishers would simply come up to an offshore rig, sometimes tie the boat to the rig itself, and fish. In the 1970s and 1980s, the oil industry began publicizing rig fishing not only as a strategic fishing opportunity, but also as an opportunity for ecosystem development. An undated pamphlet from the Midcontinent Oil and Gas Association argued that

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[226] National Research Council (US) Committee on Oil in the Sea: Inputs, Fates, and Effects, 14.
[227] "Rig Fishing – It's More Than Just A Sport," *Service: A Publication of Cities Service Company* (Feb. 1972): 19. Cities Service Oil and Gas Collection, Box 30, Folder 2. Western History Collections, University of Oklahoma Libraries, Norman, Oklahoma.

the transformation of a rig into a reef was " a matter of ecological progression." The pamphlet continued: "The underwater steel columns of the platforms gather coatings of moss, barnacles, and other marine growth. Small fish are attracted to these food items and the little fish in turn, bring the big ones. Soon, an entire ecological community is in operation in the shadows of the platforms."[228] Some rigs were left as they were to create artificial reefs, while others were submerged.[229] As of 2023, Texas Parks and Wildlife describes the continuing creation of artificial reefs in detail: "All equipment associated with the deck is removed in the process (such as drilling equipment, tanks, pumps, buildings and so on). Insides of legs are inspected to assure they contain no petroleum. All wells below the structure are plugged by the company, according to standards set by the U.S. Bureau of Ocean Energy Management (BOEM)."[230] While the formation of rigs-to-reefs has changed over the years, the discourse over its impact stayed consistent. Turning rigs into artificial reefs continues to be framed as a way to protect rare (and thus valuable) ecosystems in the Gulf.

This *Service* article presents an early look at how rig fishing was promoted by oil companies as an ecological benefit. Since the 1950s, fishers had argued that building artificial reefs would "improve catches."[231] The relationship between oil rigs and fishing had even been

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[228] Dr. Lyle St. Amant, a biologist with the Louisiana Wild Life and Fisheries Commission is featured in this pamphlet. Dr. St. Amant was also interviewed by Charles E. Petty for *Our Sun* magazine in which he argued that "Oil slicks and spillages, be they accidental or otherwise, are unsightly, costly to clean up and totally unacceptable form an esthetic standpoint, yet they seem to be one of the least toxic industrial effluents entering our waters." "Fishing's Great Along the Louisiana Coast!" Midcontinent Oil & Gas Association, Louisiana-Arkansas Division. n.d. Cities Service Oil and Gas Collection, Box 18, Folder 5. Western History Collections, University of Oklahoma Libraries, Norman, Oklahoma; Charles E. Petty, "Louisiana's Omnipresent Offshore Operations," *Our Sun* (Summer/Autumn 1970), 4. Cities Service Oil and Gas Collection, Box 51, Folder 3. Western History Collections, University of Oklahoma Libraries, Norman, Oklahoma

[229] Dolly Jørgensen, "An Oasis in a Watery Desert? Discourses on an Industrial Ecosystem in the Gulf of Mexico Rigs-to-Reefs Program," *History & Technology* 25, no. 4 (December 2009): 353. https://doi.org/10.1080/07341510903313030.

[230] "How a Rig Gets Reefed," Rigs to Reefs, Texas Parks and Wildlife Department, accessed June 6, 2023. https://tpwd.texas.gov/landwater/water/habitats/artificial_reef/rigs-to-reefs.phtml

[231] Jørgensen, "An Oasis in a Watery Desert?" 346.

explored in pop culture, such as the film *Thunder Bay*, staring James (Jimmy) Stewart.[232] However, institutional Rigs-to-Reefs programs did not appear until the 1980s, systematically turning old rigs into artificial reefs through state law. The 1985 National Artificial Reef Plan was developed by the Department of Commerce after years of failed bills, and at the state level, Louisiana and Texas became the first states to pass rigs-to-reefs programs in the late 1980s.[233] The Gulf states' enthusiasm for Rigs-to-Reefs has not been shared by other oil producing regions, however. California residents and politicians objected to a rigs-to-reefs program due to the history of offshore oil pollution in California waters.[234] The 1969 blowout at Santa Barbara lingered in public memory, leading politicians and locals in California to reject the idea that offshore platforms could be ecologically beneficial.

While this article from Cities Service is not the first to ever suggest the idea of rig fishing, it does demonstrate how oil companies used Rigs-to-Reefs to present themselves as environmentally conscious. This 1972 Cities Service article suggests that they were promoting the idea that rigs created ecosystems over a decade before the first rigs-to-reefs program was installed at a state level and at least 3 years before *Louisiana Conservationist* ran their first article.[235] Using rigs as artificial reefs suggested that oil companies could improve the environment through habitat creation and economically benefit other industries. However, as Jørgensen argues, the beliefs that rigs attracted more fish, enhanced the local environment, and

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[232] *Thunder Bay* told a story of a community concerned that oil drilling would negatively impact their fishing livelihoods, only for rare shrimp to appear because of the drilling. "Thunder Bay," AFI Catalog of Feature Films, American Film Institute, accessed July 19, 2023. https://catalog.afi.com/Catalog/moviedetails/53492

[233] Louisiana passed their rigs-to-reefs program in 1986, and Texas followed them in 1989. Dolly Jørgensen, "Mixing Oil and Water: Naturalizing Offshore Oil Platforms in Gulf Coast Aquariums," *Journal of American Studies* 46, no. 2 (May 2012): 473. https://doi.org/10.1017/S0021875812000175.

[234] Jørgensen, "An Oasis in a Watery Desert?", 347.

[235] The article itself uses the term "artificial reef" to describe the role the rig plays in the ecosystem. "Rig Fishing – It's More Than Just A Sport," 19.

created ecosystems was not originally based in scientific data but in the testimonies of fishers.[236] Read charitably, the idea to use rigs as reefs is an environmentally friendly action that creates new ecosystems (as opposed to the destruction of spills) while also providing new economic opportunities for fishers. But, given that there are few natural reefs in the Gulf, the proposed ecological benefit should be called into question.[237] Does the introduction of an artificial reef into an environment that historically does not have reefs constitute an ecological benefit? There was little scientific evidence at the time that this was the case. [238] What artificial reefs definitely did was *centralize* marine life into a place where they could be extracted in large quantities by eager fishers. This version of the gulf is not a pristine wilderness; rather, it is an ecosystem that has been enhanced for human consumption.

The oil industry, historically, had caused significant ecological damage at sites of oil production and transportation. The idea to use rigs as reefs offered a solution to one facet of environmental harm caused by the industry: habitat destruction. But, rather than prevent oil from harming the environment by ceasing production entirely, the industry focused on technological fixes. The decision to technologically create new habitats was not a scientific decision, but an ideological and social one that benefited local fishing economies. Though habitat creation was the secondary benefit of rigs (behind increased fish catches), oil companies promoted the environmentally conscious angle of artificial reefs.

The argument for rigs-to-reefs, however, did not improve the environmental profile of the oil industry. As oil companies pushed artificial reefs as an ecological improvement for the Gulf

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[236] Jørgensen, "An Oasis in a Watery Desert?", 347-48.
[237] Jørgensen, "An Oasis in a Watery Desert," 355.
[238] Even in November 2013, Ryan Fikes, a staff scientist for the Gulf Restoration Campaign of the National Wildlife Federation, suggested that experts are still divided on whether artificial reefs produce ecological benefits or simply increase wildlife density. Ryan Fikes, Artificial Reefs of the Gulf of Mexico: A Review of Gulf State Programs & Key Considerations (National Wildlife Federation, November 2013), 4. https://www.nwf.org/~/media/pdfs/water/review-of-gom-artificial-reefs-report.pdf

into the 2000s, people like Cynthia Sarthou of the Gulf Restoration Network and Jack Sovel of the Ocean Conservancy questioned whether the new rig ecosystems were natural and good for the ecosystem or evidence of domestication.[239] From their perspective, the unnatural creation and materials of the artificial reefs conflicted with the idea of a pristine environment. In contrasting naturalness and goodness with domestication, environmentalists suggested that the placement of these reefs would unnecessarily change the natural, pristine ecosystem. Though oil companies pushed for Rigs-to-Reefs to be seen as a technological fix for an ecological concern, the established benefit was economic. Increasing the amount of marine life through artificial reefs was for the expressed purpose of better fishing conditions. To promote the relationship between the fishing and oil industries, oil companies argued for the value of these habitats as providers of food and shelter for marine life. But the evidence that rigs were an ecological benefit for an environment without natural reefs was lacking. The push for Rigs-to-Reefs reflected an environmental ethic of stewardship from oil companies and fishers that suggested the environment can and should be enhanced for human benefit. This view was not shared by all scientists, nor environmentalists, who were skeptical of the proposed ecological benefits of artificial reefs. The oil industry continues to celebrate artificial rigs as an environmental and technological improvement for the Gulf, and specifically an improvement of *their* design.

Conclusion

Over 10 years after the Santa Barbara spill, Cities Service's company magazine, *Cities Service Today*, published a piece titled "Santa Barbara Revisited." The article used similar appeals to scientific authority and a focus on aesthetics as the *Our Sun* articles published a

[239] Jørgensen, "An Oasis in a Watery Desert?" 357.

decade before. With the gift of hindsight, Cities Service highlighted the technological achievements that "restored the Channel and its surroundings to its natural beauty within months."[240] Following the aesthetic concerns, the article addressed the biological ones: "Today, a dozen years later, no visible traces of the spill are evident. In fact, scientific studies reveal no permanent damage to the environment and that reports of harm done at the time were grossly exaggerated."[241] Which scientific studies the author was referring to remains a mystery – no citations or names appear in the article. The scientific studies themselves were not as important as the authority they conveyed.

The effects of 1970s oil seep research persisted into the 21st century. In 2003, the National Research Council published *Oil in the Sea*, which weaponized the uncertainty of science to draw attention away from oil industries as polluters. Repeatedly, the book argues that the primary source of oil pollution in the ocean is from natural oil seeps, and it features several sections and appendices defining natural oil seeps and how local biotic communities adapt to them. The concern over technological mistakes — such as what caused the Santa Barbara Spill and the Exxon Valdez spill — was minimized. Or, in the spirit of R.E. Foss, they were considered a problem that could be fixed.

By using ecological language and science, oil companies framed their production as environmentally friendly in the face of widespread criticism. The oil industry addressed environmentalist critiques of the industry by highlighting the technological fixes they could provide combined with an ecological focus of naturalization. To the oil industry, continued extraction had the potential to improve upon the environment using technology — the platform

[240] Cities Service did have interest in two platforms in the Santa Barbara Channel alongside Phillips Petroleum and Continental Oil, although they did not have interest in Platform A. "Santa Barbara Revisited," 3.
[241] "Santa Barbara Revisited," 3.

and the drilling rig — that functioned dually as an ecological community and a way to reduce natural pollution. As the environment became conceptualized as flows and systems during the Cold War, the oil industry translated their extractive work into the languages of ecology and technology as a response to environmental catastrophes.

CONCLUSION

The relationship between oil and the environment is full of complexity. While it may be convenient to assume the oil industry does not care about its impact on the environment, the laborious process of oil extraction from the earth demands an environmental ethic — an ethic that intentionally blurs any distinction between nature and technology and promotes intense extraction and consumption. Environmentalists are not innocent either, as fortress conservation practices of colonial origin require the displacement of Indigenous communities in the name of "protecting the environment." As we write histories that enter the age of climate crisis, it is necessary to draw out the complexities of environmental protection and industrial change — they are not always in opposition.

While there is plenty of literature that describes the conflicting nature of environmentalism and the oil industry, this thesis is meant to find some common ground. Both conservationists of the early 20th century and oil executives agreed that nature was meant to be used. Preservationists generally disagreed, believing nature needed to be protected and preserved.[242] In both cases, the desires and goals of settlers were prioritized. In the Arctic, oil companies and ecologists sought environmental knowledge to further their respective fields of science and oil. And when Santa Barbara residents complained about oil drilling? They argued

[242] Carolyn Merchant, *The Columbia Guide to American Environmental History* (New York: Columbia University Press, 2002), 132.

over how the land should be used and how it should look, but they never argued over who first called the land home. They both believed they had the power to define nature and determine how it was used. The original peoples of the land were not consulted. And with the support of the US government, oil extraction and scientific research, especially under the guise of resource management, together reaffirmed settler colonial power.

Settler colonialism winds its way through this story, informing both scientific practice and extraction. Settler colonialism demands land (and therefore, nature) as well as the power to decide what to do with that land. Oil extraction provides justification for dominion by producing energy for an industrial society, and scientific research remakes landscapes and knowledge structures within a Western scientific paradigm. The naturalization of oil extraction leaned on ecological research about what constitutes nature, while also proposing that their technologies were harmonious with the environment while simultaneously improving it. Some technological changes to the land, though, were economic decisions disguised as environmental ones.

Key to this story is the geography of oil. Features of individual environments played specific roles in how ecological knowledge was used and altered by oil companies. The arctic plain showed oil workers and scientists how much damage a truck could do to the permafrost, and the existence of natural oil seeps in the Santa Barbara Channel inspired oil magazine editorials that questioned the very definition of pollution. In a gulf with few reefs, oil companies presented a plan to build some, centralizing marine life on new structures in the ecosystem. Fossil fuels, far underground and yet surfacing far more regularly, tell stories of Earth's deep history while simultaneously shaping our own. It is in oil that we see evidence of past life, and it is in oil that we question life's future.

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