

# **The Greater Sage-grouse in Wyoming: A Technonatural Study**

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## ACADEMIC ABSTRACT

This dissertation examines the operation of neoliberal environmentalism through the instrumentalization of the Greater Sage-grouse (*Centrocercus urophasianus*) in Wyoming. It treats technological interventions within environmental construction as generating biotic-machinic entanglements termed *technonature*. I present the formation and operation of the Wyoming Conservation Exchange as a case study of technonatural territorialization connected to global energy and hydrocarbon commodity flows. The theoretical framework elaborates how “the environment” is constructed and governed through tactical instrumental deployments connected to technocratic management allowing economically powerful actors to inscribe their desires within Wyoming’s landscape, politics and biota as a function of environmental security related to commodity development. The question motivating this work is “Whose environment is the Environmental Defense Fund defending?”

The Greater Sage-grouse has become an object of U.S. Federal environmental governance since the late 1990’s. It has experienced significant population declines due to anthropogenic disturbance and habitat loss through industrial action across its range. Wyoming’s Sagebrush Steppe contains 37.5% of the remaining range wide population. The grouse was listed as a candidate species under the 1973 U.S. Endangered Species Act triggering responses from Federal, State, and international wildlife management agencies, as well as environmental non-governmental organizations. Wyoming could lose nearly a quarter of its surface should Federal regulations require the designation of critical sage-grouse habitat. Governor Dave Freudenthal signed *Executive Order 2008-2* into law in response to the regulatory threat to Wyoming’s hydrocarbon and mineral-based economy. The grouse, in response was de-listed as a candidate species in 2015 by the U.S. Fish and Wildlife Service.

*EO 2008-2* established the Wyoming Core Area Strategy as a statewide conservation umbrella and laid the framework for a habitat mitigation economy allowing industrial activity to continue within sage-grouse habitat. This incentivized the Environmental Defense Fund (EDF) to test a market-based instrument – a habitat exchange – within Wyoming. The Greater Sage-grouse is a test species as it is highly sensitive to changes in its environment and this dissertation examines how the habitat mitigation economy advanced by EDF is drawing the grouse into global commodity networks as a territorialization process for global flows of hydrocarbons and minerals. At stake is the ability to write the history of the species, land, and the global environment as EDF develops conservation technologies prioritizing flows critical to the hydrocarbon environment through the technology of the Wyoming Conservation Exchange.

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## GENERAL AUDIENCE ABSTRACT

The Greater Sage-grouse (*Centrocercus urophasianus*) entered Euro-American scientific study as early as the Lewis and Clark expedition as they explored the Intermountain region of Western North America. The first thorough scientific study of the sage-grouse in the 20<sup>th</sup> Century, *The Sage Grouse in Wyoming*, by Dr. Robert Lansing Patterson included the effects of anthropogenic disturbance on grouse populations. Since the 1952 publication of Patterson's study, Greater Sage-grouse numbers have been declining as the bird loses its home to encroachments such as urbanization, agriculture, grazing, mining, and fossil fuel extraction. The last stronghold of the grouse is the Sagebrush Steppe within Wyoming containing nearly 40% of the remaining population. Known for its flamboyant mating displays, the ground-dwelling avian species has become a political flashpoint in conservation, land management, and environmental circles as its numbers declined steadily since the 1990's due to an accelerating energy boom threatening its habitat.

The bird became a threat to extractive industry in Wyoming at the turn of the Millennium as environmentally concerned groups petitioned the U.S. Fish and Wildlife Service (USFWS) to evaluate its populations under the Endangered Species Act (ESA). Nearly a quarter of Wyoming's surface would be strictly policed as critical habitat were the grouse listed as endangered or threatened under the ESA. Wyoming and its partners created the Wyoming Core Area Protection Strategy (CAP) as a wildlife management framework through *Executive Order 2008-2*. The Wyoming CAP includes the foundation of a habitat mitigation economy allowing industry to trade surface disturbances within critical sage-grouse habitat for modified land purportedly to the benefit of the species.

The Nature Conservancy invited the Environmental Defense Fund to form the Wyoming Conservation Exchange – a market-based conservation instrument tailored to trading in habitat mitigation credits. This dissertation studies the Wyoming Conservation Exchange as an instrument connected to larger networks of wildlife management agencies, non-governmental organizations, and mining and fossil fuel interests. It evaluates the effects of the Wyoming Conservation Exchange and the economy it seeks to establish as changing how the environment is managed across the Sagebrush Steppe. Environmental Defense Fund's conservation instrument is reviewed through the economy created for and through the Greater Sage-grouse as an object of environmental governance. Habitat offsetting can, has and will change the physical, and political environment of Wyoming allowing powerful actors to write the rules of how the environment should be managed. As such, this dissertation questions whose environment the Environmental Defense Fund is defending as it explores sage-grouse management within the state.

*Dedicated to the memory of Mark Hillel Ihde -  
Friend and interlocutor.*

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This project would have been impossible without the support of family, friends, neighbors, faculty, colleagues and Virginia Tech's ASPECT program. I cannot list below all of those who contributed through discussions, advice, and kindness, but I hope that those whose names I pass over can forgive my transgression.

My parents, Denise and Peter, supported me throughout my scholastic career culminating in this work. The difficulties they faced and sacrifices they made had true material effects exhibited within my dissertation. My sister, Valerie has been my constant cheerleader, and her love was always a boost in the darkest times. In short, my family shaped my thinking about environment, biology, politics, and luck in ways that have influenced the document below.

I am lucky to have found a home in Virginia Tech's ASPECT program. This document shows the dynamic environment that ASPECT supports and Virginia Tech is fortunate to have such an innovative program. My critical bent would not be as developed without the guidance of my Chair, Timothy W. Luke. I am grateful for the years of advice he has provided, as well as the material support he helped me wrangle. He pulled me out of an intellectual pit and I will always be grateful for his kindness. My committee was dynamite. Each chapter following Chapter One is inflected with their individual influences. François Debrix, Nneka Logan, and Mauro Caraccioli showed patience and faith in me throughout the process and their thoughtful advice and provocative thinking is embodied below – I hope.

Linda and Don Ihde allowed me to dedicate this work to their son, Mark. He was my neighbor, childhood friend, and the first critical philosopher I knew. The happy memories I have will always outweigh the bad. I hope that he would greet the work below with his sharp mind and sense of irony that I always loved.

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## List of Acronyms and Abbreviations

(AMWG)	Adaptive Management Working Group
(ANSAC)	American Natural Soda Ash Corporation
(BLM)	Bureau of Land Management
(CAP)	Wyoming Core Area Protection strategy
(CBO)	Congressional Budget Office
(CCA)	Candidate Conservation Agreements
(CCAA)	Candidate Conservation Agreement with Assurances
(DDCT)	Density/Disturbance Calculation Tool
(DoI)	Department of the Interior
(EDF)	Environmental Defense Fund
(ENGO)	Environmental Non-governmental Organization
(ESA)	The Endangered Species Act
(FA)	Functional Acre
(GHMA)	General Habitat Management Areas
(GRB)	Green River Basin
(GRSG)	Greater Sage-grouse
(HQT)	Habitat Quantification Tool
(IM)	Instruction Memorandum
(LMP)	Federal Land Management Plan
(LNG)	Liquid Natural Gas
(LWG)	Greater Sage-grouse Local Working Groups
(MBI)	Market-Based Instrument



(MZII)	Management Zone II
(MOU)	Memorandum of Understanding
(NEPA)	National Environmental Policy Act
(NEWLWG)	Northeast Wyoming Local Sage-grouse Working Group
(NRCS)	U.S Department of Agriculture Natural Resources Conservation Service
(NTT)	BLM's National Technical Team
(PAPA)	Pinedale Anticline Project Area
(PES)	Payments for Ecosystem Services
(PHMA)	Primary Habitat Management Areas
(PRB)	Powder River Basin
(RAM)	Resource Assessment Method
(RCS)	Recovery Credit System
(ROD)	Record of Decision
(SCCD)	Sublette County Conservation District
(SGI)	National Sage-grouse Initiative
(SGIT)	Federal Sage-grouse Implementation Team
(SWLWG)	Southwest Wyoming Local Sage-grouse Working Group
(TBGPEA)	Thunder Basin Grasslands Prairie Ecosystem Association
(TNC)	The Nature Conservancy
(UGRB)	Upper Green River Basin
(USDA)	U.S. Department of Agriculture
(USFS)	U.S. Department of Agriculture U.S. Forest Service

(USFWS)	U.S. Fish and Wildlife Service
(USGS)	U.S. Geological Survey
(WAFWA)	Western Association of Fish and Wildlife Agencies
(WCE)	The Wyoming Conservation Exchange
(WGFD)	Wyoming Game and Fish Department
(WLCI)	Wyoming Landscape Conservation Initiative

## **Preface: The Greater Sage-grouse in Wyoming**

This dissertation is an examination of the environmental politics surrounding and working through the Greater Sage-grouse in Wyoming. As such, it displays networks of actors interested in Greater Sage-grouse conservation through analyzing instruments deployed in the production of territory related to the grouse. It takes the Environmental Defense Fund's Wyoming Conservation Exchange as an instrumental focal point and point of entry into the production of sage-grouse habitat, workforces, and technologies by tracing network connections among governmental, non-governmental and industrial actors against the regulatory background of the Endangered Species Act (ESA). The work displays how extractive industry has been displacing the Greater Sage-grouse from its home and habitat through increasing surface disturbance in critical sage-grouse population areas thus effectively killing populations of the bird as an industrial side-effect. In response, the government of Wyoming and their partners are attempting to offset the destructive side-effects of extractive commodity production by constructing sage-grouse habitats offsite from industrial disturbance. The Environmental Defense Fund has spearheaded the construction of a habitat mitigation credit economy to provide economic incentives for sage-grouse habitat development. The question motivating this work is "whose environment is the Environmental Defense Fund defending?" I attempt to answer this question in four primary chapters.

Chapter One defines my theoretical and methodological terms and commitments. I theorize the process of creating, and administering territory through technological applications related to environmental management as *technonaturalization* and apply this framework to Wyoming as the grouse itself becomes an instrument in the production of territory, workforces, and commodities. Technonaturalization displays the construction of synthetic ecosystems related

to the reproduction of machines and capital by showing how the organic becomes enrolled in civilizational life-support networks that partially form the global environment.

Technonaturalization is concerned with the governance and construction of synthetic environs populated and supported by humans, machines, and capital. It is reliant on the continued expansion of reproductive networks that reinscribe technological, scientific, and political-economic power within materiality through extensions of instruments that are tactically important to maintaining the environmental dominance of commodity flows within synthetic ecosystems. The chapters following show how the production of instruments is critical to technonaturalization by displaying how representations of the grouse and its habitat have been enrolled as instruments within the production of Wyoming's landscape through connections to global flows of trona, and hydrocarbons.

Chapter Two is an examination of the network that articulated the Greater Sage-grouse as a species of concern in Wyoming and across its range. This chapter frames the problematique of sage-grouse conservation against the threat of an Endangered Species Act listing due to declining grouse populations. It is primarily concerned with the articulation of the Greater Sage-grouse through the Wyoming Core Area Protection strategy (CAP) signed into law under Gov. Dave Freudenthal's *Executive Order 2008-2*. In particular, it shows how the grouse was articulated as a threat to Wyoming's economy because an Endangered Species Act listing of *threatened* or *endangered* would require Wyoming to strictly police surface disturbances across 24% of its territory. The Wyoming CAP is framed as a preemptive instrumental response to that threat which was used to reterritorialize Wyoming, and frame relationships among human and sage-grouse populations through rewriting the rules governing land use and ownership. The Wyoming

CAP is theorized as a necessary evolution in wildlife management technology that provided the regulatory and technological bedrock for establishing the Wyoming Conservation Exchange.

Chapter Three analyzes the Wyoming Conservation Exchange as a development in market-based conservation instruments (MBIs). The chapter focuses on the production of habitat mitigation credits used to offset trona and hydrocarbon extraction within the Wyoming CAP's critical sage-grouse habitat areas. Specifically, it shows how the Wyoming Conservation Exchange is concerned with producing workforces of private landowners by financially framing relationships to territory and sage-grouse populations by turning representations of sage-grouse habitat into economic incentives. It carries the analysis of the previous chapter through an examination of the political-economic network attached to the viability of the habitat mitigation credit economy. The analysis shows that the Wyoming Conservation Exchange needs state regulatory frameworks - such as the CAP - as well as continued habitat destruction and surface disturbance by extractive industry in order to remain economically viable.

As an instrument, the Wyoming Conservation Exchange is tasked with producing the credits necessary for continued trona and hydrocarbon extraction within critical sage-grouse habitat by connecting private landowners to concentrations of industrial capital. Chapter Three argues that the habitat mitigation credit economy is trading little more than representations of the grouse and its habitat while allowing the continued destruction of its real, material home through accelerating industrial activity. This is accomplished through adjusting the synthetic environment created under the CAP to incorporate simulated technological surrogates of sage-grouse habitat while ignoring population fluctuations and failing to standardize habitat mitigation credit production. At bottom, the chapter argues that the commodity of sage-grouse habitat mitigation credits is a fictitious representation of material sage-grouse conservation activity, and, as such,

displays the self-referential character of capital expansion within and through technological systems. The Wyoming Conservation Exchange is theorized as a security instrument to maintain continued flows of hydrocarbons critical to global fossil fueled civilization.

Chapter Four names names and displays some of the industrial connections embedded within the implementation and administration of the Wyoming Conservation Exchange. The analysis revolves around the Vice President of the Exchange, Wanda Burget, and her associations with the Wyoming Mining Natural Resources Foundation, and the Southwestern Wyoming Local Sage-grouse Working Group (SWLWG) through her associate, Julie Lutz. This chapter displays an informational network instrumental within the production of territory related to sage-grouse conservation in Southwestern Wyoming as well as the extractive actors benefitting from that network and the operation of the Wyoming Conservation Exchange. In particular, it traces network connections through local technocratic domination of conservation instruments monitoring sage-grouse populations, articulating local sage-grouse conservation plans, and channeling information from local sage-grouse administration to State and Federal agencies interested in regulating sage-grouse territory. It shows how the Wyoming Conservation Exchange contains trona and coal operatives within its board membership, and how those operatives connect the Wyoming Conservation Exchange to the largest trona mine on the planet in the Green River Basin as well as several smaller coal mines and coalbed methane wells.

Chapter Four shows how local technocratic power was exercised through the SWLWG to produce developmental guidelines friendlier to trona and hydrocarbon extraction within critical sage-grouse habitats. In particular, trona, coal and coalbed methane extraction are coded as less environmentally destructive and thus more permissible than “energy development” within the SWLWG conservation plan and recommended actions. This means that credit production and

acquisition is cheaper to offset ecological damage caused by extractive industry within critical habitat areas administered by the SWLWG connected to the Wyoming Conservation Exchange through Wanda Burget, and Julie Lutz. I show how production of habitat credits is critical to maintaining global commodity flows of natural soda ash, as well as hydrocarbons within and through the CAP, and how this activity is supported by the Wyoming Conservation Exchange.

This dissertation concludes by summarizing and contextualizing the data presented throughout to show how the Environmental Defense Fund's Wyoming Conservation Exchange fits into a larger strategy of territorial domination through the instrumentalization of the Greater Sage-grouse. Most importantly, it shows how geo-engineering of territory through the Wyoming Conservation Exchange favors the continued flow of hydrocarbons, and increasing global urbanization through drawing the grouse and representations of its habitat into conservation technologies that benefit actors historically responsible for destroying grouse populations through habitat fragmentation and surface disturbance. The Wyoming Conservation Exchange, as an evolution in market-based instrumentation furthers the project of technonaturalization by turning the grouse into an instrument for workforce production, capital expansion, and territorial domination by extending the Wyoming CAP's habitat mitigation credit economy and accelerating the production of simulated material change within Wyoming's sagebrush steppe. Whose environment is the Environmental Defense Fund defending? It is the global synthetic ecosystems of capital girded by the circulation of hydrocarbons and soda ash within machinic urbanity.

**Introduction:**  
**Technonaturalization in Wyoming: A Study of the Greater Sage-grouse through the Environmental Defense Fund**

Whose environment is the Environmental Defense Fund defending? This dissertation examines the activities of the Environmental Defense Fund concerning Greater Sage-grouse (*Centrocercus urophasianus*) conservation in Wyoming, and argues that EDF through the deployment of the Wyoming Conservation Exchange, is helping to construct habitats that benefit the continued expansion of capital at the expense of Greater Sage-grouse populations. As such, this dissertation is a case study of environmental politics surrounding and working through the instrumentalization of the Greater Sage-grouse in Wyoming to geo-engineer the landscape for mining and fossil fuel interests. I introduce the problematique below beginning with how the grouse has been articulated within technoscientific management. Second, I briefly outline the political-economic stakes involved in Greater Sage-grouse conservation across its range and within the state as connected to EDF's Wyoming Conservation Exchange. Lastly, I connect this discussion to the global stakes of their involvement before a theoretical and methodological exposition in the following chapter that grounds my analysis of Environmental Defense Fund's instrumentalization of the Greater Sage-grouse and the vicissitudes of that instrumentalization.

Managing the Sage-grouse in Wyoming: A Scientific Sketch

Wyoming holds 37.5 percent of the remaining Greater Sage-grouse populations across its historic range which spans eleven U.S. states and two Canadian provinces, at the time of writing. The grouse first entered the annals of Euro-American scientific culture through the Lewis and Clark expedition finding the birds in "great abundance," in the newly acquired territories of the



Western United States.<sup>1</sup> Since that encounter, the bird's home and habitat have been disturbed, transformed, and destroyed through agricultural use, urban development, mining, and more recently oil and gas extraction across the Eastern sagebrush steppe.<sup>2</sup> Wyoming, as a Greater Sage-grouse stronghold is critical in the fight for the survival of the species, the transformation of landscape through conservation actions, the continued reproduction of the global environment exhibiting the effects of hydrocarbon civilization, and the growth of capital.

Difficulties abound in measuring sage-grouse populations as they are spread across the sagebrush steppe, and most of the data concerning them have been generated from lek counts - observations of males during mating displays. Regardless of the accuracy of concrete numbers, they experienced significant declines between 1965 and 2003 losing an (conservatively) estimated two percent per year.<sup>3</sup> Their population declines are correlated with habitat loss and fragmentation as the remaining birds occupy 56 percent of their estimated historic range.<sup>4</sup> Despite the organization of the Sage-Grouse Technical Committee through the Western Association of Fish and Wildlife Agencies (WAFWA) in 1954 their numbers declined range wide sparking interest in sage-grouse as a scientific and political object as concerns have been registered about anthropogenic encroachment relative to their populations.<sup>5</sup> The WAFWA

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<sup>1</sup> Schroder, Michael A. "Grouse of the Lewis and Clark Expedition." *COLUMBIA: The Magazine of Northwest History*. Winter 2003-2004. 20-21.

<sup>2</sup> Knick, Steven T. and John W. Connelly. "Greater Sage-grouse and Sagebrush: An Introduction to the Landscape." In Knick, Steven T. and John W. Connelly (eds.) *Greater Sage-grouse: Ecology and Conservation of a Landscape Species and its Habitats*. University of California Press and the Cooper Ornithological Society, 2011. 6.

<sup>3</sup> *Ibid.* 6.

<sup>4</sup> U.S. Department of the Interior. *Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to List Greater Sage-Grouse (Centrocercus urophasianus) as an Endangered or Threatened Species; Proposed Rule*. U.S. Fish and Wildlife Service. Washington; National Archives and Record Administration, October 2015. (Federal Register, Vol. 80, No. 191). (50 CFR Part 17). 59864.

<sup>5</sup> Stiver, San J. "The Legal Status of Greater Sage-Grouse: Organizational Structure of Planning Efforts." In Knick and Connelly, 2011. 35.

Technical Committee sounded the alarm in 1995, when population estimates were at their lowest after collecting wing barrel<sup>6</sup> and lek counts to estimate population trends.<sup>7</sup>

It appears that the alarm bells were not heard until 2005 when WAFWA, in partnership with the State of Wyoming and the US Fish and Wildlife Service (USFWS) developed a landscape scale approach representing a “paradigm shift,” from localized sage-grouse conservation to a focus on the floristic provinces of the sagebrush steppe.<sup>8</sup> WAFWA and USFWS shifted sage-grouse conservation focus from the local administration of individual subpopulations - typically the domain of conservation districts in Wyoming, to a view that treated subpopulations as belonging to the sagebrush steppe.<sup>9</sup> Floristic provinces were divided into management zones that reached across state borders, and combined local, state and federal authority under individuated management zones. Wyoming, for example is split between management zones (MZ) I and II with the bulk of the state falling under MZ II encompassing the energy rich and strategically important Greater Green River Basin.<sup>10</sup> The Northeast of Wyoming - the Powder River Basin - is under MZ I, and is also one of the most important coal and gas producing regions in the lower 48.<sup>11</sup>

The compression of administrative authority and weakening of state wildlife management was presumably committed for the benefit of the species but also amplified a cacophony of

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<sup>6</sup> This is another method to estimate populations in which hunters deposit a wing clipped from the body of harvested grouse into an approved barrel collected by a state-run wildlife agency. It is entirely voluntary, and has been used to generate local knowledge about population numbers which have been fed into local management frameworks.

<sup>7</sup> Stiver, San J. “The Legal Status of Greater Sage-Grouse: Organizational Structure of Planning Efforts.” In Knick and Connelly, 2011. 35.

<sup>8</sup> Knick and Connelly in Knick and Connelly, 2011. 3; Stiver in the same volume. 38.

<sup>9</sup> Stiver, S.J., A.D. Apa, J.R. Bohne, S.D. Bunnell, P.A. Deibert, S.C. Gardner, M.A. Hilliard, C.W. McCarthy, and M.A. Schroeder. *Greater Sage-grouse Comprehensive Conservation Strategy*. Western Association of Fish and Wildlife Agencies. Cheyenne, Wyoming, 2006.

<sup>10</sup> Knick, Steven T. “Historical Development, Principal Federal Legislation, and Current Management of Sagebrush Habitats: Implications for Conservation.” In Knick and Connelly, 2011. 22.

<sup>11</sup> *Ibid.* 23.

voices ranging from private landowners to fossil fuel industry actors all interested in articulating their agendas through sage-grouse conservation. The discursive space that opened because of the grouse and how it was articulated incentivized state action, and Wyoming broke ground in 2008 through *Executive Order 2008-2* that unified sage-grouse conservation occurring within its borders under the “Greater Sage-Grouse Core Area Protection Strategy.”<sup>12</sup> It seems, however that range wide population declines within and outside of Wyoming have not subsided due to continued habitat fragmentation and loss as fossil fuel exploration, urbanization and mineral extraction sweep across the range.<sup>13</sup>

Though an object of scientific discourse at least since Robert Lansing Patterson’s seminal 1952 study of the grouse in Wyoming’s Upper Green River Basin (UGRB), population declines have calibrated contemporary scientific studies to learning about sage-grouse behavior and habitat relative to extractive industry - particularly natural gas wells.<sup>14</sup> Patterson’s study included the effects of anthropogenic disturbance on sage-grouse populations, and recent theses, and dissertations have been dedicated to understanding the grouse and its relationship to a habitat increasingly urbanized as the natural gas boom accelerates through the West.<sup>15</sup> The primary

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<sup>12</sup> Office of the Governor. “Greater Sage-Grouse Core Area Protection.” *Executive Order 2008-2*, State of Wyoming, August 1, 2008.

<sup>13</sup> Knick and Connelly, in Knick and Connelly, 2011. 1.

<sup>14</sup> Chambers, Jeanne C, Jeffrey L. Beck, Steve Campbell, John Carlson, Thomas J. Christiansen, Karen J. Clause, Jonathan B. Dinkins, Kevin E. Doherty, Kathleen A. Griffin, Douglas W. Havlina, Kenneth F. Henke, Jacob D. Hennig, Laurie L. Kurth, Jeremy D. Maestas, Mary Manning, Kenneth E. Mayer, Brian A. Meador, Clinton McCarthy, Marco A. Perea, and David A. Pyke. *Using Resilience and Resistance Concepts to Manage Threats to Sagebrush Ecosystems, Gunnison Sage-Grouse, and Greater Sage-Grouse in Their Eastern Range: A Strategic Multi-Scale Approach*. Gen. Tech. Rep. RMRS-GTR-356. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, 2016; Juliusson, Lara M, and Kevin E. Doherty. “Oil and gas development exposure and conservation scenarios for Greater sage-grouse: Combining spatially explicit modeling with GIS visualization provides critical information for management decisions.” *Applied Geography*. Vol. 80, March 2017. pp. 98-111. <https://doi.org/10.1016/j.apgeog.2017.01.006>; Patterson, Robert L. *The Sage Grouse in Wyoming*. Denver: Sage Books [for] Wyoming Game and Fish Commission, 1952.

<sup>15</sup> Holloran, Matthew J. “Greater Sage-Grouse (*Centrocercus urophasianus*) Population Response to Natural Gas Field Development in Western Wyoming.” Dissertation. University of Wyoming, 2005. <http://www.oilandgasbmps.org/docs/WY030-HolloranSageGrouseStudy.pdf>; Spence, Emma. "Landscape management for a landscape species: Understanding the impacts of anthropogenic factors on sage-grouse

driver of population declines is habitat fragmentation and loss as the species is theorized as a sagebrush obligate, a specialist species, an indicator species, or an umbrella species displaying high habitat fidelity.<sup>16</sup>

Greater Sage-grouse has been pulled into, and reified by scientific discourse because of its persnickety habits, and the challenges their varied habitats present. Habitat selection by the species is still somewhat of a mystery, and drawing general conclusions about sage-grouse behavior relative to their environment has displayed individuals as highly selective of where they live during their seasonal life cycles.<sup>17</sup> Sage-grouse have been notoriously difficult to transport and relocate, and seem to show individual preferences for landscape features.<sup>18</sup> In other words, scientific investigation of the grouse has shown it to be highly dependent on the landscape from which it emerged, and has specialized to live in the sagebrush steppe. This means that habitat fragmentation affects populations at the individual level and predicting, or mitigating disturbance effects must operate at a fine-grain if disturbed populations are to flourish, and survive.<sup>19</sup>

Unfortunately, oil and gas extraction and continued habitat fragmentation have been recognized

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populations in Wyoming." Electronic Thesis or Dissertation. Bowling Green State University, 2017. <https://etd.ohiolink.edu/>; Trefren, Jennie Lee. "The Emergence of the Wyoming Core Area Strategy: 'The Sage Grouse Rebellion.'" Electronic Thesis or Dissertation. Virginia Polytechnic and State University, 2012. <http://hdl.handle.net/10919/42650>.

<sup>16</sup> Gamo, Scott, Jason D. Carlisle, Jeffrey L. Beck, Juliette A. C. Bernard, and Mollie E. Herget. "Greater Sage-Grouse in Wyoming: An Umbrella Species for Sagebrush-Dependent Wildlife." *The Wildlife Professional*, Spring 2013. pp.56-59; Hanser, Steven E. and Steven T. Knick. "Greater Sage-grouse as an Umbrella Species for Shrubland Passerine Birds: A Multiscale Assessment." In Knick and Connelly, 2011. 475; Stiver, San J. "The Legal Status of Greater Sage-Grouse: Organizational Structure of Planning Efforts: Appendix 2.1 Memorandums of Understanding, 1999 and 2000." In Knick and Connelly, 2011. 42-3.

<sup>17</sup> Wisdom, Michael J., Cara W. Meinke, Steven T. Knick, and Michael A. Schroeder. "Factors Associated with Extirpation of Sage-grouse." In Knick and Connelly, 2011. 467.

<sup>18</sup> Baxter, Rick J. "Survival, Movements, and Reproduction of Translocated Greater Sage-Grouse in Strawberry Valley, Utah." *Journal of Wildlife Management* 72(1), 2008, pp. 179-186. Doi: 10.2193/2006-402; Baxter, Rick J. "Survival of Resident and Translocated Greater Sage-Grouse in Strawberry Valley, Utah: A 13-Year Study." *The Journal of Wildlife Management* 77(4), 2013, pp. 802-811. Doi: 10.1002/jwmg.520; Reese, Kerry P. and John W. Connelly "Translocations of sage grouse *Centrocercus urophasianus* in North America," *Wildlife Biology* 3 (3/4), December 1997. pp. 235-241. <https://doi.org/10.2981/wlb.1997.029>.

<sup>19</sup> Naugle, David E., Kevin E. Doherty, Brett L. Walker, Matthew J. Holloran, and Holly E. Copeland. "Energy Development and Greater Sage-grouse." In Knick and Connelly, 2011. 492.

by some scientists as the political reality facing the grouse.<sup>20</sup> Thus, the possibility of sage-grouse extinction looms over a landscape threatened by biotic impoverishment of both floristic communities and the fauna specialized to live in them despite well intentioned conservation efforts.

### Grousing About Difficulties: Politicizing Greater Sage-grouse

By the early 2000's, the grouse became a U.S. Federal political object as the U.S. Fish and Wildlife Service (USFWS) was pressured to assess population health in response to public outcry, lawsuits, and scientific studies grappling with its population declines. Concerned publics included state wildlife management agencies, private citizens, and environmental non-governmental organizations. USFWS was pressed to include the grouse under the Endangered Species Act which would include the preservation, and protection of inhabited and habitable grouse territory across their range. A listing as *threatened* or *endangered* would hamstring extractive industry by strictly policing, if not halting, exploration and development in federally protected sage-grouse zones. Fossil fuel, and mining interests, as this work shows, coalesced around the grouse as an object, and joined assemblages of actors interested in preserving, and enhancing sage-grouse habitat. Companies such as the American Natural Soda Ash Corporation, Anadarko Petroleum,<sup>21</sup> Peabody coal and its subsidiaries, Westmoreland Coal, Kiewit Coal, Shell, BP, Ultra, Encana, and QEP Energy partnered with, state, federal, local, and global wildlife management and conservation organizations to fund the research and development of

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<sup>20</sup> Doherty, Kevin E., David E. Naugle, Holly E. Copeland, Amy Pocewicz, and Joseph M. Keisecker. "Energy Development and Conservation Tradeoffs: Systematic Planning for Greater Sage-grouse in their Eastern Range." In Knick and Connelly, 2011. 513.

<sup>21</sup> Now owned by Occidental Petroleum. See: Hiller, Jennifer "Anadarko shareholders go for the cash in \$38 billion Occidental buyout." *Reuters*. August 8, 2019. Accessed October, 15, 2019. <https://www.reuters.com/article/us-anadarko-petrol-m-a-vote/anadarko-shareholders-go-for-the-cash-in-38-billion-occidental-buyout-idUSKCN1UY22M>.

technologies concerning sage-grouse management, and the restoration, enhancement, and reproduction of destroyed habitat within Wyoming's critical energy plays.<sup>22</sup>

Wyoming, in 2003, finalized their Sage-grouse Conservation Plan and formed local sage-grouse working groups composed of selected stakeholders drawn from ranching, and agriculture, the sporting community, state and federal wildlife and land management agencies, private landowners, and extractive industry representatives all inserted into decision-making positions.<sup>23</sup> Local work groups are tasked with articulating the state plan at the local level reactive to the perceived needs of the grouse while maintaining mineral, and hydrocarbon production critical to Wyoming's economy, and the geopolitical position of the United States.<sup>24</sup> I examine the Southwest Wyoming Local Sage-grouse Work Group in the fourth chapter through its emergence as a conservation instrument and its operation through its conservation plan to show how the local articulation of the state management plan connected fossil fuel and mineral extraction to the object of the sage-grouse as well as the Wyoming Conservation Exchange discussed in Chapter Three.

My analysis shows how interlocking directorates of extractive industry were able to dominate the production of territory through sage-grouse conservation activities as well as draw power from, and influence the production of knowledge about the grouse and its habitat. Chapter

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<sup>22</sup> Lockman, Dave, Art Reese, Miles Moretti, Fred Palmer, Aimee Davidson, Gary and Jo Ann Zakotnik, and John Andrikopoulos. *The Farson Landowners' "Healthy Lands Initiative" A Unique Conservation Initiative on a Working Wyoming Landscape Sponsored by Shell Oil Company and the Mule Deer Foundation*. The Mule Deer Foundation, 2017; Northeast Wyoming Sage-grouse Local Working Group. *Northeast Wyoming Sage-Grouse Conservation Plan Addendum*. The Northeast Sage-grouse Local Working Group, February 2014. 26, 55,103,107,108; Southwest Wyoming Local Sage-grouse Working Group. *Southwest Wyoming Sage-grouse Conservation Plan. V. 2.0*. The Southwest Wyoming Local Sage-grouse Working Group. November, 2013. 90-91; Upper Green River Basin Sage-grouse Local Working Group. *Upper Green River Basin Sage-grouse Conservation Plan Addendum - 2014*. The Upper Green River Basin Sage-grouse Local Working Group, 2014. 22, 24, 25, 28, 29, 32, 33.

<sup>23</sup> The State of Wyoming. *Greater Sage-grouse Conservation Plan*. The State of Wyoming, June 24, 2003. 6.

<sup>24</sup> *Ibid.* 2.

Four and the Conclusion show how local work groups were instrumentalized by Wyoming's biggest exporters, the American Natural Soda Ash Corporation, while allowing operatives from mining interests to write the rules governing the use of sage-grouse habitat while incubating a new type of conservation economy based on "habitat credits," discussed in Chapter Three. The analysis foreshadowed above, and discussed in the following work shows how sage-grouse conservation activities allowed for the continuance of habitat fragmentation, and thus the destruction of the grouse under the guise of its conservation.

Sage-grouse plans were augmented, and enhanced through the establishment of the Wyoming Core Area Protection (CAP) strategy articulated in 2008 under Governor Freudenthal's executive order. Chapter Two discusses the formation of the CAP strategy up to Governor Matthew Mead's articulation in 2015.<sup>25</sup> The CAP changed the rules governing people in relation to the grouse, and shows how it created a space for Federal intervention by encouraging private landowners to preemptively adopt Candidate Conservation Agreements with Assurances (CCAA).<sup>26</sup> The 2008 CAP articulation was a collaboration between the State of Wyoming, USFWS, and WAFWA all eager to avoid an Endangered Species Act listing fearing that Wyoming would lose an estimated 24 percent of its total surface area to sage-grouse conservation.<sup>27</sup> By 2010, USFWS listed the grouse as a candidate species under the 1973 Endangered Species Act but precluded a full listing of *threatened*, as the grouse's population

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<sup>25</sup> Office of the Governor. "Greater Sage-Grouse Core Area Protection." *Executive Order 2015-4*, State of Wyoming. July 29, 2015.

<sup>26</sup> Wyoming Bureau of Land Management, Natural Resource and Conservation Service, Wyoming Game and Fish Department, Wyoming Department of Agriculture, Wyoming Association of Conservation Districts, U.S. Forest Service, and U.S. Fish and Wildlife Service. *Greater Sage-Grouse Umbrella CCAA for Wyoming Ranch Management: A Candidate Conservation Agreement with Assurances for Greater Sage-Grouse (Centrocercus urophasianus)*. U.S. Fish and Wildlife Service, 2013.

<sup>27</sup> Stoellinger, Temple, and David "Tex" Taylor. "A Report on the Economic Impact to Wyoming's Economy from a Potential Listing of the Sage Grouse." *Wyoming Law Review*: Vol. 17. No. 1. University of Wyoming, 2016.

were deemed more stable than other candidate species. The USFWS removed the candidate species listing in their 2015 *Record of Decision* after reviewing population management techniques implemented in sage-grouse core habitat areas and primarily based their decision on the CAP's ability to attach private landowners to the growing sage-grouse conservation assemblage.

The political hullabaloo over an iconic avian of the West attracted environmental non-governmental organizations as well as the industrial actors responsible for sage-grouse population declines. Wyoming's Upper Green River Basin - the focus of Patterson's study - is home to 49 percent of the remaining sage-grouse population under the CAP, and has become a hotbed of scientific activity again, as well as containing some of the most important reserves of U.S. natural gas.<sup>28</sup> The Basin's importance is underscored by the litany of industrial, governmental and non-governmental actors that have tested management and conservation actions in concert. The Nature Conservancy, Sublette County Conservation District, and the University of Wyoming's Ruckelshaus Institute, along with energy companies operating in the Pinedale Anticline Project Area, and Jonah Field invited the Environmental Defense Fund to partner with them, and form the Upper Green River Conservation Exchange.<sup>29</sup>

The Upper Green River Conservation Exchange was an evolution in wildlife and habitat management grounded in market-based approaches to conservation. Their initial focusses were the Greater Sage-grouse, and Mule Deer but the group was principally concerned with the viability of market-based conservation infrastructure through its ability to attract landowners and attach their lands to sage-grouse conservation. The Nature Conservancy, Wyoming Chapter

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<sup>28</sup> Upper Green River Basin Sage-grouse Local Working Group, 2014. 7.

<sup>29</sup> "Partners." Wyoming Conservation Exchange, August 6, 2014.

<http://www.wyomingconservationexchange.org/upper-green-river-conservation-exchange/partners/>.



conducted a payments for ecosystem services feasibility study in 2010, and found that interests among landowners for a market-based conservation scheme were sufficient to test a market-based conservation instrument - a habitat exchange - that the Environmental Defense Fund had piloted at Fort Hood in Killeen, TX in the early 2000's.<sup>30</sup>

Since the initial study conducted by The Nature Conservancy, the Upper Green River Basin Conservation Exchange mutated into the statewide Wyoming Conservation Exchange which I examine primarily in chapters Three, Four and the Conclusion. The CAP strategy clearly articulated the need for sage-grouse conservation relative to the abilities of the state to continue commodity production. Wyoming's CAP in Chapter Two is cast as an instrument to ensure the continued operation of commodity networks that sustain Wyoming's economy while drawing landowners into conservation activities that attempt to offset the habitat destruction caused by that commodity production. The commodity networks examined in this dissertation are: trona, natural gas, coal and oil, as well as representations of the grouse and her habitat. The CAP instituted operational parameters within specific habitat zones that limited or forbade the disturbance of occupied sage-grouse habitat. As I argue in Chapter Two, these parameters can be violated if accompanied by habitat mitigation credits in which a company from extractive industry partners with a private landowner to produce sage-grouse habitat outside of the disturbance caused by that company.

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<sup>30</sup> Duke, Esther A., Amy Pocerwicz, and Steve Jester. "Upper Green River Basin Ecosystem Services Feasibility Analysis Project Report." The Nature Conservancy. December, 2011; Hansen, Kristiana, Esther Duke, Craig Bond, Melanie Purcell, and Ginger Paige. "Rancher Preferences for a Payment for Ecosystem Services Program in Southwestern Wyoming." *Ecological Economics* 146, 2018, pp. 240-49. doi: 10.1016/j.ecolecon.2017.10.013; Wolfe, David. "Operation Warbler: How Fort Hood and Local Ranchers Teamed up to save a Bird." Environmental Defense Fund. July 15, 2015. Accessed April 08, 2019, <https://www.edf.org/blog/2015/07/15/operation-warbler-how-fort-hood-and-local-ranchers-teamed-save-bird>; Wolfe, David W., K. Brian Hays, Shannon L. Farrell, and Susan Baggett. "Regional Credit Market for Species Conservation: Developing the Fort Hood Recovery Credit System." *Wildlife Society Bulletin* 36(3), 2012, pp.423-431. doi:10.1002/wsb.184.

The Wyoming Conservation Exchange is designed to complement the Wyoming CAP, and I argue in Chapter Three that the Exchange is part of extractive infrastructure by instituting an economy that trades in fictitious commodities while incentivizing landowners to act as a labor force for the actors who have destroyed sage-grouse populations and habitat. The “functional acre,” or habitat mitigation credit is theorized as a fictitious commodity because: (1) it is parasitic on state regulatory frameworks through the CAP and cannot be said to be a voluntarily traded object; (2) there is no standardized way of producing benefits to the sage-grouse as there is scientific disagreement concerning what habitat features are critical to sage-grouse habitat; and (3) it is a way for industrial capital to enroll private land and landowners as workforces in the production of territories that may have no benefit for the species but nonetheless produce operational permissibility within the CAP, and allow for the continued destruction of sage-grouse habitat elsewhere in the state. In essence, I theorize the habitat credit economy that the Environmental Defense Fund and its partners are attempting to create as part of a security apparatus ensuring the continued production, and circulation of fossil fuels, and minerals critical to global urbanization and the continuance of energy intensive, hydrocarbon fueled civilization.

Wyoming has become a laboratory as organizations test and develop conservation instruments on sage-grouse populations while attempting to maintain intensive extractive production within the state. Many of these tests aim at attracting and generating capital, or labor, and are not strictly designed to the benefit of the species though they attach themselves to the landscape scale conservation framework.<sup>31</sup> Despite the political, economic and ecological

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<sup>31</sup> Froger, Géraldine, and Marie Hrabanski. "Biodiversity Offsets as Market-based Instruments for Ecosystem Services?" *Ecosystem Services* 15 (2015): 123-24. doi: 10.1016/j.ecoser.2015.09.001; Gómez-Baggethun, Erik, Rudolf De Groot, Pedro L. Lomas, and Carlos Montes. "The History of Ecosystem Services in Economic Theory and Practice: From Early Notions to Markets and Payment Schemes." *Ecological Economics* 69, no. 6, 2010. 1209-218. doi: 10.1016/j.ecolecon.2009.11.007; Hansen, Kristi, Anne Jakle, and Mary Hogarty. *Market-based Wildlife Mitigation in Wyoming: A Primer*. Laramie, Wyoming: Ruckelshaus Institute of Environment

discourse surrounding and working through the greater sage-grouse, there has been no critical interdisciplinary dissertation-length analysis of its environmental politics. The following study focuses on sage-grouse in Wyoming and shows how it has been instrumentalized in the production of territory, subjectivities, and commodities at multiple and overlapping levels. Specifically, the activities of the Environmental Defense Fund are examined through analyses of the grouse emerging as an object of scientific monitoring, and governmental power. This work documents how EDF's lobbying for the implementation and development of the Wyoming Conservation Exchange is related to the sage-grouse as an instrument of territorial, and workforce production. As such, this study is the first of its kind, and shows how the Environmental Defense Fund shares a relationship with the grouse's destructors through geo-engineering Wyoming's landscape for the expansion of hydrocarbon capital as a conservation tactic. The chapters provide evidence for how EDF's Wyoming Conservation Exchange is connected to extractive industries dominating the production of Wyoming's landscape, accelerating the destruction of the sagebrush steppe, and ghettoizing the sage-grouse in reservations by threatening its survivability through habitat fragmentation, and destruction.

#### From Geo-Engineering to Technonature: A Preface

Geo-engineering has become a buzz word within the environmental conservation community as *ecological restoration*, *conservation biology*, and *rewilding* have become popular

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and Natural Resources, 2013; Hansen, Duke, Bond, Purcell, and Paige. "Rancher Preferences for a Payment for Ecosystem Services Program in Southwestern Wyoming." *Ecological Economics* 146, 2018. 240-49; Kreuter, Urs P., David W. Wolfe, Kenneth B. Hays, and James R. Conner. "Conservation Credits—Evolution of a Market-Oriented Approach to Recovery of Species of Concern on Private Land." *Rangeland Ecology & Management* 70, no. 3, 2017, 264-72. doi: 10.1016/j.rama.2016.10.012; Lebeau, Chad W., M. Dale Strickland, Gregory D. Johnson, and Michael S. Frank. "Landscape-Scale Approach to Quantifying Habitat Credits for a Greater Sage-grouse Habitat Conservation Bank." *Rangeland Ecology & Management* 71, no. 2, 2018. pp. 149-58. doi: 10.1016/j.rama.2017.10.004.

terms in an era characterized by accelerated species extinction.<sup>32</sup> Geo-engineering, for my purposes, is the instrumentalization, and technologization of the planet in attempts to address perceived environmental problems. “The Environment” has been reified into an object of political, social, cultural, and economic power that allows governments, people, and organizations to adjust Earth’s habitats and habitability as a method of ethical justification affecting flora and fauna, people and places at a global scale of technological terraformation. Geo-engineering, as a practice, has potentially global consequences as “the environment,” becomes a system of systems open to adjustment by those with the means, and skill to deploy new technologies that adjust the synthetic living conditions of Earth’s inhabitants.<sup>33</sup>

Geotechnics - the totality of relations mediated by and through geo-engineering - is built upon the machines that allow the powerful to adjust and recreate “the environment,” and the material configurations resulting from their actions shape biospheric trajectories, and leave evidence of their relationship to a dead Nature across, and through the planet.<sup>34</sup> Geotechnics, which I borrow from Benton MacKaye - the planner of the Appalachian Trail, Skyline Drive,

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<sup>32</sup> Allenby, Braden R. *Reconstructing Earth: Technology and Environment in the Age of Humans*. Washington, D.C.: Island Press, 2005; Brand, Stewart. *Whole Earth Discipline: An Ecopragmatist Manifesto*. New York: Viking Penguin Group, 2009; Glavin, Terry. *The Sixth Extinction: Journey among the Lost and Left Behind*. New York: Thomas Dunne Books, 2007; Higgs, Eric. *Nature by Design: People, Natural Process, and Ecological Restoration*. Cambridge, MA: MIT Press, 2003; Kolbert, Elizabeth. *The Sixth Extinction: An Unnatural History*. New York: Picador, 2014; Latour, Bruno. *Facing Gaia: Eight Lectures on the New Climate Regime*. Translated by Catherine Porter. Polity: United Kingdom, 2017. 12; Leakey, Richard and Roger Lewin. *The Sixth Extinction: Patterns of Life and the Future of Humankind*. New York: Doubleday, 1995; Lynas, Mark. *The God Species: Saving the Planet in the Age of Humans*. Washington, D.C.: National Geographic, 2011; MacKaye, Benton. *From Geography to Geotechnics*. Urbana: University of Illinois Press, 1969; Marris, Emma. *Rambunctious Garden: Saving Nature in a Post-wild World*. New York: Bloomsbury, 2011; Monbiot, George. *Feral: Rewilding the Land, the Sea, and Human Life*. Chicago: University of Chicago Press, 2014; Primack, Richard B. *Essentials of Conservation Biology*. Sunderland, MA: Sinauer and Associates, 6th ed., 2014; Sale, Peter F. *Our Dying Planet: An Ecologist’s View of the Crisis We Face*. Berkeley: University of California Press, 2011. 202-203; Woodwell, George M, ed. *The Earth in Transition: Patterns and Processes of Biotic Impoverishment*. New York: Cambridge University Press, 1990.

<sup>33</sup> Latour, 2017. 12; Luke, Timothy W. *Ecocritique: Contesting the Politics of Nature, Economy, and Culture*. Minneapolis: University of Minnesota Press, 1997. 90.

<sup>34</sup> Jatenberg, Tom and David McKie. *Eco-Impacts and the Greening of Postmodernity: New Maps for Communication Studies, Cultural Studies and Sociology*. London: Sage, 1997. 3, 4, 7, 10, 14, 22; Luke, 1997. 72; MacKaye, 1969. 61.

and the Blue Ridge Parkway, “concerns habitability. It is defined as ‘the applied science of making the earth more habitable.’”<sup>35</sup> Geotechnics is a process that instrumentalizes features of Earth to integrate the human synthetic environment of machines, technologies and capital with the organic ecosystems of the - in his words - wilderness community.<sup>36</sup> Geotechnics produces human-machine ecosystems, and as MacKaye elaborates, habitability can be divided into three categories: physical, economic and social; each applied to the manufacture of: territory and resources, commodities and markets, and subjectivities and populations respectively.<sup>37</sup>

The above categories cannot be divorced from each other in the materiality of geotechnics, however one category can be amplified to the reduction of the others through geo-engineering. The work above, and below demonstrates how economic habitability within Wyoming concerning Greater Sage-grouse conservation is dominating physical and social habitability at the expense of populations, subjects, and territory through the implementation of the CAP, and the Wyoming Conservation Exchange. Economic habitability, for my purposes, describes the creation of environments for machines of capital - the corporation, and the following study theorizes the encirclement of the globe and the production of the environment by machinic networks as, following the work of Lewis Mumford and Timothy W. Luke, a global Megamachine.<sup>38</sup> I theorize both the CAP and the Exchange as instruments and examine them by

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<sup>35</sup> MacKaye, 1969. 110.

<sup>36</sup> Ibid. 48. His notions of the organic wellsprings of human civilization are beautiful, and lucid, but I eschew MacKaye’s vocabulary in this dissertation because I view the totality of planetary relations united under an environment as containing, and exhibiting unintended consequences of action. For reasons of precision I adopt ‘technonaturalization’ and ‘organic,’ and ‘synthetic’ as suitable adjustments of ‘geo-engineering,’ the ‘wilderness community,’ and ‘geotechnics’ while attempting to go beyond them. In short, I am hesitant to use ‘wilderness’ or ‘wildness’ in this work because I am unsure of their meaning in a post-natural framework. I will pursue the above terms in later works that examine their meanings - preferably through embodied, postphenomenological investigations.

<sup>37</sup> Ibid. 49, 110-112.

<sup>38</sup> Luke, 1997. 175, 194; Luke, Timothy W. “At the end of Nature: Cyborgs, ‘Humachines’, and Environments in Postmodernity.” *Environment and Planning A*, vol. 29, 1997b. 1378; Mumford, Lewis. *The Myth of the Machine: Technics and Human Development*. New York: Harcourt Brace Jovanovich. 1966. 3.

locating them within fields of relationships created by economics, culture, technology and politics as connected to logistical networks of commodity production. In short, my method of inquiry is not simply to examine instruments themselves, but to examine instruments as included within regimes of technics that shape, govern, and repeat the formation of subjects, species, materiality, civilization, technology, and topography - in other words, the environment.<sup>39</sup>

Techniques and technologies have been deployed attempting to mitigate the destructive effects of synthetic environments created by the machines of capital as more species become threatened through industrial practices reliant on hydrocarbon energy translated into global material culture.<sup>40</sup> Instruments have been developed, and deployed attempting to geo-engineer ecosystems into synthetic economies of hydrocarbon civilization to justify, or mitigate its ecocidal consequences.<sup>41</sup> Those instruments point to future material conditions of life on Earth as spaces, places, and species are drawn into the synthetic infrastructures of machinic reproduction, and capital's expansion.<sup>42</sup> I term new combinations of material and energy *technonatural* as they

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<sup>39</sup> Ihde, Don. *Technics and Praxis*. Dordrecht, Holland: D. Reidel Publishing Co., 1979; Ihde, Don. *Ironic Technics*. USA: Automatic Press, 2008; Luke, Timothy W. *Capitalism, Democracy and Ecology: Departing from Marx*. Chicago: University of Illinois Press, 1999; Luke, Timothy W. "Technology." In Death, Carl, ed. *Critical Environmental Politics*. London: Routledge, 2013; Marx, Karl. *Capital: A Critique of Political Economy*. Edited by Friedrich Engels. Vol. II. Moscow: Foreign Languages Publishing House, 1961; Marx, Karl. "The Fragment on Machines." in *Grundrisse: Foundations of the Critique of Political Economy*. Translated by Martin Nicolaus. London: Penguin Books, 2005. 690-712; Mumford, Lewis. *Technics and Civilization*. New York: Harcourt Brace Jovanovich, 1934; Mumford, Lewis. *The Myth of the Machine: The Pentagon of Power*. New York: Harcourt Brace Jovanovich. 1970.

<sup>40</sup> Higgs, 2003; Vatn, Arild. "Markets in Environmental Governance — From Theory to Practice." *Ecological Economics* 117, 2015. pp. 225-33. doi: 10.1016/j.ecolecon.2014.05.005; White, Damian F., Alan P. Rudy, and Brian J. Gareau. *Environments, Natures and Social Theory: Towards a Critical Hybridity*. New York: Palgrave, 2016.

<sup>41</sup> Apostolopoulou, Evangelina, Elisa Greco, and William M. Adams. "Biodiversity Offsetting and the Production of 'Equivalent Natures': A Marxist Critique." *ACME: An International Journal for Critical Geographers* 17, no. 3. 2018. pp. 861-92; Luke, 1997; Narain, Divya, and Martine Maron. "Cost Shifting and Other Perverse Incentives in Biodiversity Offsetting in India." *Conservation Biology* 32, no. 4, 2018. pp. 782-88. doi:10.1111/cobi.13100.

<sup>42</sup> Luke, 1999.

display the working of technological interventions to sustain the synthetic environments created by humans, capital and their machines.<sup>43</sup>

This case study then, records the technonaturalization of Wyoming, and the Greater Sage-grouse's range to suit remote global technological, and political-economic connections rather than its immediate habitat. The Environmental Defense Fund's Wyoming Conservation Exchange as a newly developed market-based conservation instrument is a window into the system of relations generating technonature in Wyoming.<sup>44</sup> I attempt to show how instruments have been and are being deployed in Wyoming that change the relationships of people to the land, the non-human, and capital. The political upshot of this dissertation is the exhibition of instruments used to develop technonature connected to the desires of actors that use them and how those instruments assimilate the organic into the synthetic while remaking the environment to suit the needs of capital. The Greater Sage-grouse, the CAP strategy, EDF and the Wyoming Conservation Exchange are instruments transforming the ecological, economic, and political landscape of Wyoming, and these transformations have global reach, as I argue in the Conclusion. Thus, this work shows the who, what, how and why of Wyoming's present, and future landscape through conservation activity that influences the global trajectory of the environment.

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<sup>43</sup> White, Damian F., and Chris Wilbert, eds. *Technonatures: Environments, Technologies, Spaces, and Places in the Twenty-first Century*. Waterloo, Ont.: Wilfrid Laurier University Press, 2009.

<sup>44</sup> Wyoming Conservation Exchange. *Greater Sage-Grouse Habitat Quantification Tool: A Multi-Scaled Approach for Assessing Impacts and Benefits to Greater Sage-Grouse Habitat, Scientific Methods Document*. V. 3.0. Environmental Defense Fund, 2014.

## Chapter 1: Instruments, Assemblages and Environmentality: Toward the Technonatural

This chapter is a theoretical exposition of my case study of the Greater Sage-grouse demonstrating the expansion of socio-natural phenomena termed *technonature* that are generated by organic-artificial entanglements through the extension of instruments. The overarching methodological commitments are drawn from assemblage theory to ground a political ecology with a focus on the construction and administration of environments through extensions of power girded by political-economic distributional patterns related to capital.<sup>1</sup> I contend that a methodological focus on instruments as they exist within assemblages lends itself to network analyses that reveal the machinations of power within Wyoming related to the Greater Sage-grouse. While little of the grouse itself is included in the essay below, I hope to show how an assemblage analysis that begins with *instruments* reveals the processes involved in the production of technonatural formations. The following chapters then demonstrate and animate

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<sup>1</sup> DeLanda, Manuel. *A New Philosophy of Society: Assemblage Theory and Social Complexity*. London: Bloomsbury, 2006; DeLanda, Manuel. *A Thousand Years of Nonlinear History*. New York: Zone, 1997; DeLanda, Manuel. *Intensive Science and Virtual Philosophy*. London: Continuum, 2002; DeLanda, Manuel. *War in the Age of Intelligent Machines*. New York: Zone, 1991; Lukács, György. *History and Class Consciousness: Studies in Marxist Dialectics*. Translated by Rodney Livingstone. London: The Merlin Press, 1971; Luke, Timothy W. *Capitalism, Democracy and Ecology: Departing from Marx*. Chicago: University of Illinois Press, 1999; MacKaye, Benton. *From Geography to Geotechnics*. Urbana: University of Illinois Press, 1969; Malm, Andreas. *Fossil Capital: The Rise of Steam Power and Roots of Global Warming*. London: Verso, 2016; Mills, C. Wright. *The Power Elite*. New York: Oxford University Press, 1956; Mills, C. Wright. *The Sociological Imagination*. New York: Oxford University Press, 1959; Mitchell, Timothy. *Carbon Democracy: Political Power in the Age of Oil*. London: Verso, 2011; Mumford, Lewis. *Technics and Civilization*. New York: Harcourt Brace Jovanovich, 1934; Mumford, Lewis. *The Myth of the Machine: Technics and Human Development*. New York: Harcourt Brace Jovanovich, 1966; Mumford, Lewis. *The Myth of the Machine: The Pentagon of Power*. New York: Harcourt Brace Jovanovich, 1970; Nail, Thomas. "What is an Assemblage?." *SubStance* 46, no.1, 2017. pp. 21-37; Thacker, Eugene. *Biomedica*. Minneapolis: University of Minnesota Press, 2004; Tomlinson, John. *The Culture of Speed: The Coming of Immediacy*. London: Sage, 2007; White, Damian F., Alan P. Rudy, and Brian J. Gareau. *Environments, Natures and Social Theory: Towards a Critical Hybridity*. New York: Palgrave, 2016; White, Damian F., and Chris Wilbert, eds. *Technonatures: Environments, Technologies, Spaces, and Places in the Twenty-first Century*. Waterloo, Ont.: Wilfrid Laurier University Press, 2009; White, Richard. *The Organic Machine*. New York: Hill and Wang, 1995.



my theoretical and methodological commitments, thus advancing the studies of political ecology, environmental politics, and the Greater Sage-grouse in Wyoming.

The special focus on instruments and network analysis are methodological considerations that demonstrate how instruments are mobilized and used within geo-engineering, and should serve as nexuses for analyses between actors that may, at first glance, seem in tension with or contradict one another. Instruments are extended by assemblages for many reasons, as I argue below, but they are tactically deployed for the production of hybrids through organic-artificial entanglements that inscribe the machinations of power within them, and thus materiality itself. Simply, instruments are primarily concerned with the production of artifacts. In this sense, the following shows how a study of instruments can be employed in dialectical analyses by recognizing their place within reproductive commodity circuits that allow for the production, and expansion of technonature. The landscapes of Wyoming, and its biota are being subjected to an environmental management strategy termed *environmentality* that is concerned with the production of milieux through the continued production of commodities. In this way, Wyoming's flora and fauna bear historical inscriptions of power within their being, and thus, should be considered artifacts of technonatural development.

Instruments extend power by conditioning the relationships between things that allow for the formation of technonature connected to larger processes of capitalistic terraformation through the functions of machinic assemblages. Topologically speaking, instruments exist within and are used by assemblages guiding the arc of technonatural developments by amplifying the capabilities of the machines to which they are attached. Essentially, the study shows how instruments link the fates of human and non-human populations through geotechnics that have

reach from the microphysics of the local to global machinations of power through governmentalizing activities channeled through technological deployments.

I provide definitions of my core concepts below, and expand them to sharpen the analyses used in the following chapters. Specifically, I provide definitions and characterizations for *technonature*, *assemblage*, *instruments* and *environmentality* by connecting them to larger theoretical threads in neo-Marxism, Foucauldian inspired literature, and the philosophy of technology. As a broader theoretical remark on the philosophical underpinnings of the research presented, I treat none of the above concepts as static objects, but as processes that follow a Foucauldian understanding of power as the ability to generate the arc of history by working through contingency. Network analysis fits nicely with this understanding of power, as it helps animate the so-called capillary approach that takes interest in the micro-physics of power, and the politics of everyday life cast in terms of environment. I demonstrate how the above concepts fit into a processual framework, and how they should be treated within the construction of reality.

#### The Technonatural Condition: Synthetic and Organic Imbrications of the Machine

In using the term *technonature*, I am attempting to move beyond dualistic conventions of nature, and society as distinct spheres of action.<sup>2</sup> The term implies a hybrid ontology that recognizes the material entanglement of human, and non-human agencies involved in the co-production of environments. The concept is built from scholarship in political ecology that recognizes the historical co-evolution of humanity with non-humanity through technological enrollment of organic systems in the expansion of second nature ecosystems formed through

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<sup>2</sup> White and Wilbert, eds., 2009.

industrial activity.<sup>3</sup> The enrollment of organic components within technologically textured environments displays the hybridization of human and non-human economies into synthetic life-support infrastructures, conceived as logistical networks below, necessary for continued civilizational development producing global ecosystems of capital.<sup>4</sup>

Some scholars have characterized hybridized - or built - environments as cyborgian - as they are made of organic, and synthetic components to produce functioning assemblages - others have named the process technospheric expansion,<sup>5</sup> some have argued that this hybridization process is evidence of a mechanosphere and the evolution of machinic life forms,<sup>6</sup> still others have argued this as a process of megamachinic consciousness,<sup>7</sup> or the interaction of the noosphere and biosphere within materiality<sup>8</sup>. For my purposes, technonature as a process is primarily concerned with the continued reproduction of civilization through the expansion of technological infrastructure and continuance of commodity production. Geotechnic expansion necessitates the generation of frontiers through the identification of components of reality critical in the maintenance of productive and consumptive patterns that lie at the heart of civilizational reproduction. Incorporation of organic components within technonature signals additions and subtractions into machinic assemblages that rewrite materiality through geo-engineering for the continued reproduction of megamachinic consciousness, and civilizational viability.<sup>9</sup>

Incorporation strategies within civilizational infrastructures allow for continued expansion of consumptive and productive patterns either through treating non-human organic

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<sup>3</sup> Lukács, 1971. 128; Luke, 1999. 68.

<sup>4</sup> Ihde, Don. *Technology and the Lifeworld: From Garden to Earth*. Bloomington, IN: Indiana University Press, 1990.

<sup>5</sup> Luke, 1999. 59-87.

<sup>6</sup> DeLanda, 1991.

<sup>7</sup> Mumford, 1966. 210-11.

<sup>8</sup> Samson, Paul R. and David Pitt eds. *The Biosphere and Noosphere Reader: Global Environment, Society and Change*. New York: Routledge, 1999. 2.

<sup>9</sup> Mumford, 1966. 197.

components as part of human-non-human assemblages, or by treating them as externalities of productive processes. The former is accomplished by including materials as either entirely within, or part of commodification while the latter expresses the knock-on effects of commodity production as part of technonatural enviroing. In other words, if something is undergoing technonaturalization it is either enrolled in commodity production, or it is affected by it to the degree that its being is materially inseparable from it and bears inscriptions of technological interventions within its history. Conceptually, then, technonatural lifeforms, topographies, environments, and etc., display a history of geotechnic hybridity within their being, and have been incorporated into civilizational history in such a way as to aid in the production of new commodities and the generation of frontiers.

Technonaturalism should be read as a strand of post-naturalism that recognizes the current state of planetary existence as the result of political, social, cultural, economic, technological and ethical imbrications with previously autarkic, and organic planetary systems. This treats the natural as physically linked and interacting with the synthetic and technological without overextending human agency within technonaturalization. Larger processes, such as planetary carbon cycles, have been affected by technological deployments within civilization and have changed through these interactions, but have not been entirely erased. In keeping with the above example, evidence suggests that the carbon cycle has been affected by commodity production within civilizations, and, in the case of carbon trading schemes, has been commodified.<sup>10</sup> However, the technonatural view does not treat the carbon cycle as entirely human constructed, nor independent of synthetic influences. Instead, planetary processes are

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<sup>10</sup> Lohmann, Larry. *Carbon Trading: A Critical Conversation on Climate Change, Privatisation and Power*. Uddevalla, Sweden: Mediaprint, 2006.

being geo-engineered into civilizational life support systems, and, the totality of relationships exhibited through them shows geotechnic effects of their incorporation.<sup>11</sup>

This allows for a reading of planetary conditions that takes seriously both the material agencies of previously autarkic organic systems, and technologies used to create, condition, maintain, and rule patterns of civilizational being.<sup>12</sup> The primary theoretical upshot of the technonatural reading is that there is no need to view global change as a revenge of nature,<sup>13</sup> nor is it possible to say that humans are entirely the mandarins of their planetary environment.<sup>14</sup> Instead, it is more appropriate and fruitful to recognize the problems associated with global change as the aberrations of a massive planetary-scale machine - termed, following Mumford and Luke, the Megamachine - made up of the historical, material and psychic imbrications of the organic and synthetic. The Megamachine adds bite to the normalization of accidents and risks built into theories of modernity grounded in technological complexes.<sup>15</sup> In short: the larger the system, the more accidents and risks built into it, and the synthetic nature of the Megamachine is

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<sup>11</sup> Think of how a river can support industrial processes through its multiple uses. It may be incorporated into machinic assemblages through acting as a highway system for transporting material, or as a sewage system for industrial effluent, or both. In either of the above examples the river is incorporated into reproductive activity that links it to a network of productive machines. This reading is purposefully instrumental to show how critical it is to understand instrumentalization processes of previously self-governing systems such that the object itself is understood differently, and thus, pragmatically speaking, is used differently than it would have otherwise been. Understanding the interface between human understanding, practices, organization, and labor related to autarkic and organic systems is critical in coming to grips with the formation of capitalist ecosystems characterized as dominated by the concerns of capital in the production of synthetic environments unfolding within planetary space. See, for example: White, 1995.

<sup>12</sup> Mumford, 1966. 194.

<sup>13</sup> Malm, Andreas. *The Progress of This Storm: Nature and Society in a Warming World*. London: Verso, 2018. 77, 148-49.

<sup>14</sup> Lynas, Mark. *The God Species: Saving the Planet in the Age of Humans*. Washington, D.C.: National Geographic, 2011. 9, 4, 11-12.

<sup>15</sup> Beck, Ulrich. *Risk Society: Towards a New Modernity*. London: Sage, 1992; Luke, 1999. 110-11; Luke in White and Wilbert, 2009. 203; Pellizzoni, Luigi. "Risk." In Death, Carl, ed. *Critical Environmental Politics*. London: Routledge, 2013. 198-207.

to integrate autarkic and organic assemblages into its being as material embodiment in the establishment and maintenance of synthetic ecosystems.<sup>16</sup>

In using the term *autarkic* to describe processes prior to technonaturalization, I am implying that there are, and were self-organizing processes that led to the formation of material components of existence that eventually generated the formation of life on Earth.<sup>17</sup> This analytic distinction suggests that there is an organic, and geological history independent of humans, and their synthetic environments. Autarky is typically used to suggest notions of self-rule, and I extend this definition through theories of self-organization and emergent properties popular in assemblage literature. More specifically, processes that were autarkic both gave rise to, and ruled over humanity through much of their evolutionary history shaping genetic predispositions, as well as conscious adaptations to environments.<sup>18</sup> Human history is inexorably linked to planetary being, and processes that shaped human consciousness. Regardless of whether these processes were ever called “natural,” their independence from humanity is only analytically useful as all biospheric interactions shape those processes not least of which through civilizational respiration such as the release of carbon dioxide, or methane through burning fuel sources.

Geological history suggests the biosphere has had a profound effect on shaping planetary conditions through the self-organized establishment of ecosystems. Ecosystemic organization is evidence of self-organizing processes, and the effects produced by them on the greater whole of planetary cycles is evidence of recursive interactions between parts and wholes. Assemblage theory allows for an analysis of ecosystems from a meso theoretic point of view that neither begins with the individual, nor the totality of relations exhibited through planetary cycles.<sup>19</sup>

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<sup>16</sup> Ihde, Don. *Ironic Technics*. USA: Automatic Press, 2008. 16, 54; White, Rudy, and Gareau, 2016. 15.

<sup>17</sup> DeLanda, 1997. 16.

<sup>18</sup> DeLanda, 1997. 103-179; Mumford, 1966. 8, 36-7. Mumford, 1970. 51.

<sup>19</sup> DeLanda, 2006. 28.

Instead, emergent properties of assemblages can be theorized as arising from the interactions of individual parts without succumbing to atomic analyses of the properties of those parts. Self-organization is helpful in understanding autarky because emergent properties arising from the interactions of individuals can be explained without appealing to intention thus reducing the danger of anthropomorphizing nature as acting with it, while avoiding conclusions that treat it as a human construction. In the above, the totality of planetary relations can be seen as emergent properties of interacting assemblages themselves undergoing changes in response to emergent properties.

Autarky is helpful in understanding anthropogenic effects within planetary systems because it is not necessarily committed to autonomy despite connotations of self-rule. Autonomy embeds notions of directed, and purposeful action that implies an intentional rationality. Organic existence need not have an underlying or implied intentionality behind it that organized being.<sup>20</sup> In my usage, autarkic planetary systems are themselves self-sufficient economies that exchange matter and energy in the sense of distributional patterns. This implies a mind-independent material assemblage of organization that would exist without humans becoming aware of it. I do not mean to rethread economic understandings of planetary existence in the sense that these systems really are, or behave like the theoretical postulates of economics, but autarky, and economy serve as useful heuristics for coming to grips with the technologization of planetary systems that I am suggesting.

Self-sufficient exchanges of matter and energy based on deficits and surpluses capture physical dynamics of intensivities such as heat, or chemical exchanges allowing for a smoother

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<sup>20</sup> The discussion of whether there is purposeful design to existence, while interesting, is well beyond the scope of this work.

understanding of process within organic planetary systems without committing to purposeful or directed action on the part of those systems.<sup>21</sup> Technonatural production is at the interface of purposeful action, and autarkic or previously autarkic planetary spheres of influence. Purposeful and directed action harnesses matter and energy from autarkic processes in the production of the synthetic. The synthetic, or artificial, is the capture and organization of some part of autarkic systems in the production of materiality. This may include external effects not known, or intended by the organizing agent through interrupting matter and energy flows in the production of something intended to address a perceived problem. In using *synthetic*, I mean that which is produced through human labor from organic, or previously organic stock parts. *Organic* conveys that which was organized through autarkic processes without instrumental intervention of some agency.

Notice that I am committed to the production of the synthetic through human labor, and that this definition may exclude other elements within the biosphere that display observable behaviors commonly conceived of as intentional. In using *synthetic* against *organic* I do not wish to exclude other beings that labor, and through their labor add to and interact with autarkic systems in the production of environment. It is impossible to divorce the history of biotic existence from the history of technonature materially, and fashioning an analytic without recognizing those histories of interaction within current spaces of action is an anthropocentric view at odds with assemblage theory, and thus technonature. The synthetic is a product of instrumental reason and while other animals exhibit the possession instrumental reason,

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<sup>21</sup> DeLanda, Manuel. "Space: Extensive and Intensive, Actual and Virtual." in Buchanan, Ian and Gregg Lambert (eds.). *Deleuze and Space*. Edinburgh Scholarship Online, 2012. doi: 10.3366/edinburgh/9780748618743.003.0005.



humanity is the only known species that has erected systems of technologies rivaling that of autarkic planetary systems, and are organized by those technological systems.<sup>22</sup>

Normal life functions that have influenced planetary conditions, such as atmospheric concentrations of carbon dioxide resulting from bacterial anaerobic respiration, can hardly be said to be the result of planned interventions within the biosphere.<sup>23</sup> Carbon dioxide concentrations resulting from bacterial anaerobic respiration, to carry the example, are the result of biotic existence and do not necessarily indicate the use of instrumental reason in harnessing material flows. All beings labor in their struggle for existence, and that labor helps distribute matter and energy throughout their environment. The general definition of an ecosystem is a community of interacting organisms and their environment, and it is their labor related to their basic life functions that form connections between them through harnessing matter and energy. In this sense, autarkic planetary flows are emergent properties of life itself conceived of as interconnected assemblages co-producing planetary economies based on biological needs. Thus, the *organic* is that which is produced through autarkic planetary economies based on necessary life functions of organisms conceived as populations of assemblages.

The construction of the synthetic, then, implies the attempted incorporation of organic and (previously) autarkic components into the construction of materiality. This is accomplished through the application of instrumental reason to a segment of the organic that is then reified and thus alienated from its autarkic conditions. The absorption of the autarkic by the instrumental is further complicated by the development trajectories of organic materials alienated from their conditions of discovery and subjected to the means-ends rationality of instrumental reason. The

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<sup>22</sup> Lukács, 1971. 38; Mumford, 1970. 98.

<sup>23</sup> Foster, John Bellamy, Brett Clark, and Richard York. *The Ecological Rift: Capitalism's War on the Earth*. New York: Monthly Review Press, 2010. 130-131.

synthetic, in other words, never rids itself of the organic and autarkic, and thus always contains it in its being as attempts to discipline the organic are made to feed the Megamachine. The risk embedded within the Megamachine is the product of the narrowness of instrumental reason as organic components follow their development trajectories as part of an autarkic economy that exists beyond and before the presence of mind. The synthetic environment, therefore, is never completely in *control* of the organic and autarkic thus embedding structural risk inherited from the myopia of instrumental reason.

The synthetic is the purposeful construction of assemblages with the intention of producing desired results through the instrumentalization of the organic. In this sense, the synthetic is the purposeful interruption of organic autarkic systems to produce synthetic milieux. In using milieux, or milieu, I am thinking in terms of spaces of action formed through inter-linking assemblage networks that are territorially bounded, coded, and real connected through relations of exteriority channeled through instruments.<sup>24</sup> This allows for synthetic assemblages to act tactically in their organizing processes, coordinate actions that organize more assemblages toward a directed purpose strategically, and be connected to one another in networks to insure their continued reproduction through affecting the construction of milieux and thus relationships with materiality.<sup>25</sup> Relations of exteriority then, allow for increasing complexity of assemblage organization through networking populations of existing assemblages as well as synthesizing new hybrids.<sup>26</sup> This logistical process can be understood as technonatural environing when it is concerned with commodity production.

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<sup>24</sup> DeLanda, 1991. 15, 18-20; DeLanda, 1997. 25-28; DeLanda, 2002. 26-7; DeLanda, 2006. 1-11.

<sup>25</sup> DeLanda, 1991. 23; Foucault, Michel. *Security, Territory, Population Lectures at the College De France, 1977-78*. François Ewald, Alessandro Fontana, and Michel Senellart, eds. Basingstoke: Palgrave Macmillan, 2007. 21.

<sup>26</sup> DeLanda, 2002. 62.

Instruments, thus conceived, are tasked with organizing information flows such that they can be incorporated within and across assemblages through translations that produce, or cement hybridity. In assemblage theoretic language, instruments are extensive properties of assemblages that allow for linkages to form creating relations of exteriority.<sup>27</sup> In this sense, instruments allow for the formation of nodes within networks, and thus, reveal the topology of networks as connections are made between assemblages coded and territorialized as distinct entities. Flows that enable the formation of exterior relations are the lifeblood of synthetic ecosystemic processes and, thus, their importance is that of intensivities that generate emergent properties that are extensive and thus carry discrete material identities.<sup>28</sup> Networks allow for intensive flows across assemblages and instruments allow for the translation and collection of intensive properties across media thus allowing for intensivities to develop and catalyze organizing processes.<sup>29</sup> Instruments within synthetic ecosystems, therefore, channel capital as an intensive morphogenic property of assemblage networks that display extensive structures related to concentrations of capital through technonature.

By capital as an intensive property of things, I mean a mind-dependent feature of reality that is conditioned by the commodity form as defined by György Lukács.<sup>30</sup> The commodity form is a sense of consciousness that embeds instrumental rationality as that which structures the relationship between things. All things are reified through the commodity form as potential sites for capital's development through commodification. In this way, the technonatural approach treats capital as an agency because intensities of it can catalyze technonatural development

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<sup>27</sup> DeLanda, 2006. 10-12.

<sup>28</sup> MacKaye, Benton. *From Geography to Geotechnics*. Urbana: University of Illinois Press, 1969. 110-111.

<sup>29</sup> See: Thacker, 2004. Thacker's discussion provides an excellent review of how territorialization processes happen due to the flow of information across media enabled by instruments.

<sup>30</sup> Lukács, 1971. 83, 86-7, 100, 170.

through the generation of extensive properties seen as geotechnic processes within actual space.<sup>31</sup> The intensive property of capital can be seen through assemblages bearing the inscription of the commodity form and the commodity assemblage (a type of synthetic assemblage) offers a nexus into the synthetic economy of capital.<sup>32</sup>

Capital as an intensive property is best understood through Marx's remark in *The Grundrisse* that treats capital as divisible only analytically and in specifically functionalist terms in actual space through differences in extensive properties of assemblages at different phases within capital's circulation and development.<sup>33</sup> Extensive properties of commodity assemblages are actualizations of capital understood as flow throughout synthetic assemblage networks that form technonature.<sup>34</sup> How capital develops along its trajectories produces differences in actual space based on the extensive properties of the assemblages linked together within productive networks through relations of exteriority.<sup>35</sup> The materiality of synthetic assemblages, therefore display flows of capital that are co-extensive with mind conditioned by the commodity form at different phases of capital's material development within space.<sup>36</sup>

The above ties to Marxist approaches in critical geography by recognizing capitalist globalization as a variegated process that develops unevenly as a product of socio-environmental relationships.<sup>37</sup> Without instruments that allow for the flow of capital across different assemblages, the commodification process, and thus the extensive morphogenic processes of

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<sup>31</sup> Streeck, Wolfgang. *Buying Time: The Delayed Crisis of Democratic Capitalism*. London: Verso, 2017. 60.

<sup>32</sup> Paterson, Matthew. "Commodification." in *Death*, 2013. 61.

<sup>33</sup> Marx, Karl. *Grundrisse: Foundations of the Critique of Political Economy*. Translated by Martin Nicolaus. London: Penguin Books, 2005. 692.

<sup>34</sup> *Ibid.* 105.

<sup>35</sup> Marx, 2005. 712.

<sup>36</sup> Herzogenrath, Bernd. "White." In *Prismatic Ecology: Ecotheory Beyond Green*. Cohen, Jerome Jeffrey, ed. Minnesota Scholarship Online, 2015. doi: 10.5749/minnesota/9780816679973.003.0002. 4; MacKaye, 1969. 99; Menely, Tobias and Margaret Ronda. "Red." In Cohen, Jerome Jeffrey, ed., 2015. 5-6; Mumford, 1966. 9.

<sup>37</sup> Harvey, David. *Spaces of Global Capitalism: Towards a Theory of Uneven Geographical Development*. New York: Verso, 2006. 77.

capital are stymied at best, and remain only virtual potential at worst.<sup>38</sup> Methodologically speaking, therefore, any and all instruments are appropriate sites for analysis in understanding technonaturalization, as are the specific material networks of assemblages that they enable, hold together and produce.<sup>39</sup> Capital as a mind-dependent intensive property of things, therefore, is enrolled in the immanent processes of geotechnics as a matter of material, mind, and flow displayed within technonature.<sup>40</sup>

### More Power to the Machine: Strategic Control of Synthetic Flows

Technonature is an historical ecotone characterized by the gradual obliteration of natural/social, organic/artificial, urban/rural, and human/non-human binaries according to their material conditions of emergence. Geo-engineered technonatural formations, I contend, are driven by a strategic process termed *environmentality*, and, politically speaking, it is over the formation of the technonatural environment that differing *environmentalities* are deployed by synthetic assemblages. Technological deployments, the regimes of technics surrounding the use of technologies, and technoscientific research concerning technological developments are key sites in coming to grips with environmentality and thus the formation of technonature.

Environmentality is concerned with the actualization of materiality through the hybridization of organic and synthetic components in the construction of environs. This process is accomplished through the mobilization of political, economic, cultural, and social resources through the deployment and development of technologies, and instrumentalized knowledge that allow for the absorption of organic history within technonature's corporeality. An organism

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<sup>38</sup> Swyngedouw, Erik. "Circulations and Metabolisms: [Hybrid] Natures and [Cyborg] Cities." In White and Wilbert, eds., 2009. 65-66, 72.

<sup>39</sup> Luke, Timothy W. "The Property Boundaries/Boundary Properties in Technonature Studies: "Inventing the Future." In White and Wilbert, eds., 2009. 199.

<sup>40</sup> MacKaye, 1969. 99, 102, 107, 110, 111, 123.

targeted by a regime of environmentality, for example, can either be incorporated within a technonatural formation - like Haraway's famous example of OncoMouse<sup>41</sup> - or it may go the way of the Dodo. Regardless, however, that organism's biotic history (species history more precisely) has been incorporated into technonatural history.

Technonatural history focuses on human-non-human imbrications that have gradually come to dominate material reality. The autarkic nature of planet Earth and its life support systems represented through the relatively new sciences of earth system science, the various disciplines of biology including genetics and ecology, and understood through organic histories found in disciplines such as geology, and paleontology allow for a more nuanced reading of human-non-human interactions than discourses treating environments as entirely human made, or independent of human action. One can locate the beginnings of technonature along with Lewis Mumford at roughly 5000 years ago in Egypt with the first systems of civilizational infrastructure that allowed for humanity's beginning alienation from its organic habitat.<sup>42</sup>

Mumford locates the beginnings of the first 'megamachine' in Egyptian pyramidal society that allowed for social reproduction to be coordinated through the establishment of communication channels that integrated hierarchical institutional structures with one another, thus allowing for greater coordination in the flows of labor, energy and materials.<sup>43</sup> I define technonature alongside Mumford regarding the integration of material, psychic, and energetic components into coordinated civilizational action on a grand scale. As Benton MacKaye - a friend of Mumford's put it "The Essence of civilization is a flow," and it is the integration and

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<sup>41</sup> Haraway, Donna J. *Modest\_Witness@Second\_Millennium. FemaleMan\_Meets\_OncoMouse: Feminism and Technoscience*. New York: Routledge, 1997. 71.

<sup>42</sup> Mumford, 1966. 3; Mumford, 1970, 28.

<sup>43</sup> Mumford, 1966. 12-13, 188-89.

direction of flow that concerns the shape of geotechnics, and thus technonature.<sup>44</sup> More importantly, as I briefly state below and illustrate in the following chapters the Megamachine is a planetary life support system for one formulation of culture that rules over and dominates global flows of energy, humanity, and infrastructure.<sup>45</sup> Translated into assemblage theoretic language, this means the Megamachine is an immanent hyperassemblage of planetary complexity that re-territorialized the planet with the rise of paleotechnics beginning civilizational reliance on fossil energy and military regimentation of extractive, and manufacturing industries related to the intensification of mining activity.<sup>46</sup> Instrumental reason is part and parcel of the Megamachine that dominates the planet and the paleotechnic technological complex nested in the unfolding neotechnic phase is the materialization of that thinking.<sup>47</sup>

Technonature following Mumford has enjoyed previous epochs, but the return of the Megamachine heralds the organization of humanity around the seemingly supernatural power of technology.<sup>48</sup> The instrumentalization of humanity by the Megamachine is key in understanding the formation of technonature. As Marx put it “In machinery, the appropriation of living labor by capital.”<sup>49</sup> Humans have been included in machinic reproductive systems conceived above as synthetic assemblages, and it is through their labor that the Megamachine reproduces itself, and thus the conditions of the environment.<sup>50</sup> Instrumentalized humans are linked to globally

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<sup>44</sup> MacKaye, 1969. 123.

<sup>45</sup> Ghosh, Amitav. *The Great Derangement: Climate Change and the Unthinkable*. Chicago: University of Chicago Press, 2016; Malm, Andreas. *Fossil Capital: The Rise of Steam Power and Roots of Global Warming*. London: Verso, 2016; Mitchell, Timothy. *Carbon Democracy: Political Power in the Age of Oil*. London: Verso, 2011; Tomlinson, John. *The Culture of Speed: The Coming of Immediacy*. London: Sage, 2007.

<sup>46</sup> Luke, 1999. 63-71. Mumford, Lewis. *Technics and Civilization*. New York: Harcourt Brace Jovanovich, 1934. 156-62.

<sup>47</sup> Mumford, 1934. 213.

<sup>48</sup> Mumford, 1970. 70, 263-69.

<sup>49</sup> Marx, Karl, 2005. 703.

<sup>50</sup> DeLanda, 1991. 4; Lukács, 1971. 38; MacKaye, 1969. 129; Marx, 2005. 693; Mumford, 1966. 197. Mumford, 1970. 165.

networked assemblages through their alienation within commodity flows. These networks can share information, and thus coordinate activity as human labor is absorbed by the Megamachine as capital within commodity production. The commodity and its circulatory system are the conduits through which the Megamachine remakes reality as it harnesses organic human energy through the circulation of capital and its morphogenic powers that translate the immanent and virtual into the material and actual.

Commodity production, the circulation of capital, and the morphogenic powers of it de-territorialize previously organic and autarkic assemblages into re-territorialized, de-natured synthetic assemblages alienating labor and humanity from their organic habitat while reproducing the synthetic environs of technonature.<sup>51</sup> The commodity in this sense, displays the history of instrumentalized humanity within the production of technonature. As Lukács wrote “In so far as this process does acquire the semblance of a qualitative character, this goes no further than an aspiration towards the increased rationalization, mechanisation and quantification of the world confronting him.”<sup>52</sup> Technonature’s basic structure is that of specific manufactured milieux termed *environs* that display the hybridity of human existence within machinic networks. Technonature’s environs provide the local uplinks for the alienation of humanity from the autarkic, and organic assemblages from which they emerged, and have subjected a select few for service to the Megamachine.<sup>53</sup>

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<sup>51</sup> Luke, Timothy W. “At the end of Nature: Cyborgs, ‘Humachines’, and Environments in Postmodernity.” *Environment and Planning A*, vol. 29, 1997b. 1376; Luke, Timothy W. “Cyborg Enchantments: Commodity Fetishism and Human/Machine Interactions.” *Strategies*: Vol. 13, No. 1, 2000. <https://doi.org/10.1080/10402130050007511>. 56; Luke, Timothy W. “Liberal Society and Cyborg Subjectivity: The Politics of Environments, Bodies and Nature.” *Alternatives: Global, Local, Political*: Vol. 21, No. 1, Jan-Mar. 1996. <https://doi.org/10.1177/030437549602100101>. 11.

<sup>52</sup> Lukács, 1971. 171.

<sup>53</sup> Mumford, 1966. 192.



Technonature, so defined, is the product and process of synthetic assemblages that work to further alienate humanity from the organic through the reproduction of capital's synthetic ecosystems. Technonature, thus, should be treated as an artifact of the Megamachine itself, and not simply that of human action, but that of a subsection of instrumentalized and assimilated humanity. Technonature is an artifact of human assimilation into the machine-being of embodied technics displayed through technological complexes linked to power complexes that have integrated military institutions, political bureaucracies, and whole economies of civilizational reproduction around flows of energy, capital, and material establishing networks operating at global scale.<sup>54</sup>

Power complexes coordinate human action through structural institutional networks connected to reproductive commodity networks conceived as technological complexes. That is: power complexes are attached to technological complexes such that they direct the construction of milieux. As C. Wright Mills wrote "What we experience in various and specific milieux...is often caused by structural changes. Accordingly, to understand the changes of many personal milieu we are required to look beyond them. And the number and variety of such structural changes increase as the institutions within which we live become more embracing and more intricately connected with one another."<sup>55</sup> In short, technological complexes are part of larger machinery networked to dense institutional nodal points that facilitate the production, domination and governance of milieux.

Nodal points of the Megamachine are understood in terms of network density conceived as connections made between power complexes and their ability to synthesize hybrids thus

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<sup>54</sup> DeLanda, 1991. 4; Mills, 1956. 269-72; Mumford, 1970. 283.

<sup>55</sup> Mills, 1959. 10.

rewriting materiality through the coordinated and deliberate production of synthetic assemblages. Humans are economically integrated and habituated into synthetic conditions of being thus furthering the reproductive cycles of power complexes whilst alienating them from connections between organic systems and their synthetic environs. The experienced reality of networked humanity is that of an instrument connected to larger machinery engaged in reproducing its own conditions of existence thus rewriting the environment in its image. Machinery's ability to manipulate reality is indexed to its ability to manipulate and assimilate humanity into networks.<sup>56</sup> This is accomplished through the construction of milieux that continue the circulation of capital and the production of commodities.<sup>57</sup> Thus, milieux undergoing restructuring must include ways of instrumentalizing humans by connecting them to commodity flows to continue the domination of human consciousness through the construction of technonatural environs networked to the Megamachine.<sup>58</sup>

Technonaturalism is an attempt to read materiality in terms of how civilizational support systems dominate the planet through the gradual absorption and linking of organic processes and histories to the machinations of synthetic social organization. More specifically, its focus on technology as that which mediates the processes of technonaturalization implies that humanity and human history need not be treated monolithically in coming to grips with the present state of affairs at the planetary scale. As segments of instrumentalized humanity came to dominate their environments, those with power also came to dominate other humans simultaneously linking the natural and the social through synthetic assemblages of the Megamachine.<sup>59</sup>

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<sup>56</sup> Marx, 2005. 704.

<sup>57</sup> Foucault, 2007. 18.

<sup>58</sup> Marx, Karl. *Capital: A Critique of Political Economy*. Edited by Friedrich Engels. Vol. II. Moscow: Foreign Languages Publishing House, 1961. 159.

<sup>59</sup> Mumford, 1970. 91. I explore these segments of humanity as technocrats - extensions of the Megamachine - in Chapter 4 through Wanda Burget using a network analysis to trace her connections to multiple assemblages

This implies that some humans, and some civilizations have had a more profound effect on the construction of the technonatural than others through applications of power.<sup>60</sup> Hierarchical organization allowing for some networked humanity to exercise power over others is connected to the reproductive ability of those outside of networks dictated by access to the instruments of economic production. As James Burnham put it “The instruments of economic production are, simply, the means whereby men live. In any society, the group controlling these means is by that fact socially dominant.”<sup>61</sup> Thus, the construction of milieu is controlled by access to the productive power of technological complexes that network together the synthetic conditions of instrumentalized humanity through commodity production and capital flows. This is dependent on: the level of integration of hierarchical and bureaucratized organizations with one another as instruments of control forming the institutional basis of synthetic existence; as well as the reach of the network into autarkic and organic economies of material and energy flows thus dictating the conditions of survivability for those outside of, or not fully integrated into the Megamachine.<sup>62</sup>

In other words, at stake in the becoming of technonatural formations are the politics of lived reality, planetary history, and survivability within the environment. The technocratic core of instrumentalized humanity within power complexes however may have to reckon with the fruits of their labor to the Megamachine. As Mumford warned discussing Galileo: “he could

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concerned with Greater Sage-grouse conservation. For now, however, the technocrat is thought of as a critical human link that is not consumed by the machine as labor, but as an instrument that allows for its reproduction through the extension of networks. The technocrat is a critical piece of machinery, in other words, that exemplifies human-non-human hybridities through connecting resource networks and reinforcing machine consciousness understood through instrumental reason as a model rationality.

<sup>60</sup> Miller, Daniel. “Materiality: An Introduction.” In Miller, Daniel (ed.). *Materiality*. Durham: Duke University Press, 2005. 19.

<sup>61</sup> Burnham, James. *The Managerial Revolution*. Bloomington: Indiana University Press, 1966. 28.

<sup>62</sup> Mumford, 1970. 113; Beniger, James. *The Control Revolution: Technological and Economic Origins of the Information Society*. Cambridge, MA: Harvard University Press, 1986. 6, 10.

have no anticipation of what the world would be like if the machine and machine-made men succeeded in de-naturing or banishing every organic attribute...the ultimate consequence of the mechanical world picture would be an environment like our present one: fit for only machines to live in.”<sup>63</sup> However, for the time being, hierarchical organization and access afforded to the technocratic elite acting in service to the Megamachine confers illusions of power and control over technonatural production and thus the shape of history itself. “In a world of machines, or of creatures that can be reduced to machines, technocrats would indeed be gods.”<sup>64</sup>

The technocrat’s function within the Megamachine is to direct geo-engineering, and thus dominate geotechnics in terms of flow and habitability.<sup>65</sup> This is accomplished through the deployment of strategic plans for including the necessary components of production into the circulation of commodities while minimizing risk of damage to the Megamachine. Environmentality defined above is concerned with the strategic inclusion of matter, and energy into the environment through the tactical actualization, and structuration of milieux via instruments. Instruments, thus condition milieux as part of the microphysics of power. Technocratic management, therefore, includes feeding humans into synthetic networks of capital production as human commodities abstracted from their autarkic conditions in order to produce, govern and dominate the environment through instruments of labor connected to the Megamachine.<sup>66</sup> In return for identifying and ensuring the function of machinic networks the Megamachine leaves the technocrat in a hyperreality seemingly apart from the risk laden

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<sup>63</sup> Mumford, 1970. 56-7.

<sup>64</sup> Ibid. 72.

<sup>65</sup> MacKaye, 1969. 110.

<sup>66</sup> Marx, 1961. 34-5, 141, 160.

conditions they help create through illusions of design certainty, predictability, and human control.<sup>67</sup>

### Technonature and Environmentalism: State-of-the-Art as Art of the State

Technology is central in its role of assisting in the creation of lived experience within the technonatural, and technological development indicates new ways through which hybridization can occur through either: extending the virtual horizons of the technological for further evolution of synthetic assemblages,<sup>68</sup> or through the synthesis of new hybrids inscribed with the mark of the commodity form to be included within the Megamachine.<sup>69</sup> As I have argued, these processes are accomplished through the extension of instruments within milieux that either network extant synthetic assemblages together, or draw in organic components to be included within the commodity assemblage. This process entails the identification of components within assemblages and above I have conceived of these components as populations existing within a multiplicity of flows.

Strategies termed *environmentalities* are deployed and developed for and by technocratic power complexes to dominate the synthetic environment through maintaining the productive power of the Megamachine. Technonatural spaces, thus are contested spaces of varying degrees of technocratic domination, and are shaped principally through a process termed *environmentality*. Environmentalism, for my purposes, is a socio-techno-environmental process that organizes the relationships of living, and non-living through the production of knowledge/power regimes such that they create administrable environs. It is a core process of technonatural production as the successful environmentalism sets the conduct of conduct, and

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<sup>67</sup> Ihde, 2008. 18-30; Lasch, Christopher. *The Revolt of the Elites and the Betrayal of Democracy*. New York: W. W. Norton & Company, 1996. 5-6, 19-20.

<sup>68</sup> DeLanda, 1991. DeLanda, 1997.

<sup>69</sup> Lukács, 1971; Luke, 1999. 68-9; Marx, 1961. 158; Marx, 2005. 703; Mumford, 1970. 93.

thus the dominant regime of geotechnic habitability that in turn produces environments. In short, environmentality is concerned with the administration of things through the production and administration of technonatural milieux.

Derivative of, and extending Michel Foucault's *governmentality*, environmentality has enjoyed multiple uses in the literature concerning the politics of environmental management and governance. Due to environmentality's multiple deployments<sup>70</sup> it is, in my view, more productive to talk of competing, and overlapping environmentalities regarding technonatural production. The execution of any program positing and studying environmentality rests on assumptions concerning governmentality, and the production and extension of another related concept and practice - *biopower*. I give a brief characterization of my understanding of both below, and then move to link technological environmentality with technonature through the Megamachine.

Governmentality arose from Foucault's lectures in 1978 collected as *Security, Territory, Population*, and was used to describe an art of government that concerned the administration of populations emerging from socio-technical assemblages of eighteenth century Europe.<sup>71</sup> Since its introduction, the term has been applied across multiple registers describing everything from disciplinary practices of centralized state administration, to internalized spiritual practices of the self, the practices of sovereignty, or the application of market rationality to the governance of things by state and non-state actors.<sup>72</sup> At its core, governmentality refers to processes that

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<sup>70</sup> Fletcher, Robert. "Environmentality Unbound: Multiple Governmentalities in Environmental Politics." *Geoforum*, vol. 85, 19 June 2017, pp. 311–315., doi: 10.1016/j.geoforum.2017.06.009.

<sup>71</sup> Lövbrand, Eva and Johannes Stripple. "Governmentality." In *Critical Environmental Politics*. Death, Carl, ed., 2013. 112.

<sup>72</sup> Fletcher, 2017. 312.

establish the ‘conduct of conduct’ which concerns the production of social milieux relating to population, and aimed at addressing perceived problems with its administration.<sup>73</sup>

For my purposes, I rely on one iteration of environmentality termed *neoliberal environmentality* that fixes the centrality of market mechanisms to the production of the environment.<sup>74</sup> Neoliberal environmentality favors the creation of public-private partnerships between governmental, industrial, and non-governmental actors;<sup>75</sup> conservation actions external to state authority emphasizing financial incentives grounded in instrumental market rationality;<sup>76</sup> technological development and implementation strategies that enhance commodification processes grounded in the production of knowledge/power regimes;<sup>77</sup> de-politicization of environmental problems reduced to responsabilization of consumptive patterns at the level of the individual;<sup>78</sup> and technocratic risk management strategies that exist outside of democratic or popular control.<sup>79</sup> At bottom, the brilliance of neoliberal environmentality is harnessing environmental causes, and crises to the productive potential of instrumental market rationality to turn a profit through either creating new markets trafficking in ecological crisis commodities,<sup>80</sup> or through burying, and depoliticizing ecological degradation as a structural result of market activity.<sup>81</sup> In any instance, neoliberal environmentality tightens the grip of markets, and market

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<sup>73</sup> Lövbrand and Stripple, 2013. 112.

<sup>74</sup> Fletcher, 2017. 312.

<sup>75</sup> Harvey, David. *A Brief History of Neoliberalism*. Oxford: Oxford University Press, 2005. 76; Luke, 1999. 71; Rutherford, Stephanie. *Governing the Wild: Ecotours of Power*. Minneapolis: University of Minnesota Press, 2011. 78.

<sup>76</sup> Fletcher, 2017. 312; Luke, Timothy W. *Ecocritique: Contesting the Politics of Nature, Economy, and Culture*. Minneapolis: University of Minnesota Press, 1997. 56; White, Rudy, Gareau, 2016. 159-60.

<sup>77</sup> Higgs, Eric. *Nature by Design: People, Natural Process, and Ecological Restoration*. Cambridge, MA: MIT Press, 2003. 49-51; Paterson, Matthew. “Commodification.” In *Death*, 2013. 56; Rutherford, 2011. xvii-xix, 187-88; White, Damian F., Alan P. Rudy, and Brian J. Gareau, 2016. 98.

<sup>78</sup> Luke, 1997. 118; Rutherford, 2011. xxii & 185.

<sup>79</sup> Allenby, Braden R. *Reconstructing Earth: Technology and Environment in the Age of Humans*. Washington, D.C.: Island Press, 2005. 46-7; Luke, 1997. 115; Luke, 1999. 132; Rutherford, Paul. “Ecological Modernization and Environmental Risk.” In *Discourses of the Environment*. Edited by Darier Éric. Oxford: Blackwell, 1999. 100.

<sup>80</sup> Luke, Timothy W. “Environmentality as Green Governmentality.” In Darier, 1999. 145.

<sup>81</sup> White, Rudy, and Gareau, 2016. 111-113.

makers over technonatural construction through the extension of technocratic management, technoscientific production of new technologies, their subsequent knowledge/power regimes, and the production of environmentalized subjectivities responsive to individuation processes through the extension and internalization of instrumental market rationality.<sup>82</sup>

The conduct of conduct in neoliberal environmentality is assisted through the reason of state reliant on the circulation of commodities, and the market as the site of veridiction.<sup>83</sup> The rule of life itself, the environmentalized subject, and the relationships between human and non-human systems are instantiations of biopower supported by scientific regimes of knowledge production that support continued market activity.<sup>84</sup> Neoliberalized subjectivities take the market as their primary space of action, and their decision-making is aped into the model of *homo economicus* whose life is subjected to and directed by structural conditions set by markets.<sup>85</sup> Environmentalized neoliberal subjectivities are aware of environmental problems affecting civilizational viability, but place faith in the marketization of them as capital expands into new

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<sup>82</sup> Chapter Three explores the depth of neoliberal environmentality through an examination of the Wyoming Conservation Exchange and the habitat mitigation credit economy it supports. Perhaps most importantly, the market is reinscribed through the technological apparatus of the Exchange through the production of commodities resting on scientific representations of sage-grouse and their habitat. The chapter argues that the Exchange is an attempt to produce a workforce that allows for the continued destruction of sage-grouse habitat across the state through the manufacture of extractive permissibility within primary habitat areas zoned through the Wyoming Core Area strategy examined and discussed in Chapter Two. The market, as a site of veridiction following Foucault lies at the heart of the Environmental Defense Fund's conservation tactics and technologies, and the mitigation credit economy is reliant on compliant and motivated workforces to produce, simulate, or otherwise account for quantifiable sage-grouse habitat. The survival of the species in Wyoming is reliant on market forces as milieux are rewritten for technocratic management, and domination.

<sup>83</sup> Foucault, 2007. 18, 325-6, 338, 348-49; Foucault, Michel. *The Birth of Biopolitics Lectures at the Collège De France, 1978-1979*. Edited by Michel Senellart. Translated by Graham Burchell, Picador, 2008. 30-32.

<sup>84</sup> Chapter Two examines the Wyoming Core Area Protection strategy as a biopolitical instrument that connects the local, state, and federal into a Greater Sage-grouse conservation assemblage. The dynamics of scientific management are included within the discussion to show how the human and non-human are subjected to new zoning rules which displays environmental power and the ability to re-write materiality under species conservation. The landscape-scale approach advanced by the Western Association of Wildlife Agencies is realized through the articulation of the sage-grouse as an object of scientific study as well as governmental power. It is through the instrumentalization of the sage-grouse that the biopolitical network of the CAP moves and survives. Thus, the sage-grouse emerges as an object of environmental governance and is simultaneously subject to technonaturalization and market domination.

<sup>85</sup> Brown, Wendy. *Undoing the Demos: Neoliberalism's Stealth Revolution*. New York: Zone, 2015. 117.



spaces either through the production of commodities, or through technologies that are marketed as life-saving, or crisis averting solutions.

Instrumental rationality inherent in neoliberal thinking is extended into problems concerning “the environment,” and relativizes ecosystems to human use or market expansion, and replicates economic thinking through environmental economics, thus completing the illusion that neoliberal market rationality is inherently context-independent knowledge applicable to understanding and solving the contradictions it generates.<sup>86</sup> The administration of populations in neoliberal environmentality, therefore, is supported by knowledge/power regimes that extend the reach of markets into domains of life through the internalization of market logics, and the erection of market edifices generated by technological applications that allow the control and construction of relationships among human and non-human populations reified into objects of power.

The art of state understood as governmentality produces milieux as objects of security apparatuses in which, and through which the population is made legible, and exists.<sup>87</sup> At bottom, the emergence of populations as subject-objects of governance is associated with the application of technologies that made them increasingly legible, and predictable within milieux.<sup>88</sup> For example, the emergence of statistics allowed for increased legibility of both human,<sup>89</sup> and nonhuman<sup>90</sup> populations thus extending the administrative capacity of technocratic security apparatuses through technological refinements, and instruments. Technologies within, and

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<sup>86</sup> Luke, 1999. 69-70; Paterson, in *Death*, 2013. 56; Rutherford, Paul. “The Entry of Life into History.” In *Darier*, 1999. 53-4.

<sup>87</sup> Foucault, 2007. 20-21, 278.

<sup>88</sup> Foucault, Michel. *The Foucault Reader*. Edited by Paul Rabinow. New York: Pantheon Books, 1984. 16-18.

<sup>89</sup> Foucault, 2007. 100-101, 104.

<sup>90</sup> Agrawal, Arun. *Environmentality: Technologies of Government and the Making of Subjects*. Durham, NC: Duke University Press, 2005. 34-5.

applied to milieux simultaneously co-construct them as the conduct of conduct is refined through knowledge/power regimes embedded within security apparatuses as a form of policing.

Technologies, thus mediate “the central workings of power over people and things for environments in the grip of bureaucracies, markets, and systems,” and are central to new modes of governmentality.<sup>91</sup> Technologies, and technological deployments, therefore, are part of the art of state through the co-construction of milieux.

Milieu, for Foucault is defined as “a field of intervention in which, instead of affecting individuals as a set of legal subjects...as a multiplicity of organisms, of bodies capable of performances...one tries to affect, precisely, a population.”<sup>92</sup> Population, he continues, is “a multiplicity of individuals who are and fundamentally and essentially, only exist biologically bound to the materiality in which they live.”<sup>93</sup> Problems within the topography of milieu are identified, and addressed as a security, and surveillance function relating to the object, and space of population. Specifically, governmentalizing actions are taken to reorganize existing relations within them in an effort to control and account for threats to populations with the recognition that they will never be completely erased.<sup>94</sup> The production of knowledge about population, and milieux, therefore, is a central component of governmentality, and the exercise, and circulation of power, and the construction of knowledge is increasingly technologically mediated as population, territory, security, and the organic and autarkic are synthesized through the creation of the technonatural.<sup>95</sup>

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<sup>91</sup> Luke, Timothy W. “Technology.” In *Death*, 2013. 268, 272.

<sup>92</sup> Foucault, 2007. 21.

<sup>93</sup> Ibid.

<sup>94</sup> Ibid. 19-21.

<sup>95</sup> Ihde, Don. *Postphenomenology and Technoscience: The Peking University Lectures*. Albany: State University of New York Press, 2009. 41, 45.

Two interrelated developments arise from the problem of population, and the establishment of liberal arts of government: (1) biopower; and (2) circulation of commodities within and through milieus. As the population becomes legible through security apparatuses, and becomes the central concern of liberal government, the reason of state shifts to problems concerning life and the living within governmentalized milieus.<sup>96</sup> Technocratic power must account for the emergence of threats and thus risky developmental trajectories as a security function to keep the material and energetic flows in place and continue technocratic domination of the environment. The inclusion of alienated human populations within synthetic assemblages introduces more complexity into the already complicated network technonatural environs because humans are endowed with abilities to self-actualize and thus influence their own development trajectories as a matter of praxis.<sup>97</sup> Human autonomy and desire must be channeled to reproduce conditions of synthetic life and technocratic security assemblages make tactical instrumental deployments in step with environmentalized strategy on its behalf.

Biopower is an extension of liberal governmentality that necessarily produces and takes life and the living as its central objects.<sup>98</sup> While Foucault's characterization of liberal governmentality is one that concerns itself with the conduct of men,<sup>99</sup> green governmentality (an iteration of environmentality) as theorized by thinkers such as Paul Rutherford, and Timothy W. Luke broaden the reason of state to include the administration of environments and non-human beings as central to biopolitical projects.<sup>100</sup> The emergence of ecology as a formalized scientific discipline enhanced the legibility of non-human populations,

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<sup>96</sup> Foucault, 2008. 76, 317.

<sup>97</sup> Foucault, Michel. *Technologies of the Self: A Seminar with Michel Foucault*. Edited by Luther H. Martin, Huck Gutman, and Patrick H. Hutton. The University of Massachusetts Press, 1988.

<sup>98</sup> Grove, Kevin. "Biopolitics." In *Death*, 2013. 22.

<sup>99</sup> Foucault, 2008. 186.

<sup>100</sup> Luke in Darier, 1999. 122-23; Rutherford (a) in Darier, 1999. 40; Rutherford (b) in Darier, 1999. 97.

thus extending the concept of population, *ipso facto* biopower, and concerns for the living falling within the purview of the reason of state.<sup>101</sup> The ability to construct technonatural environments is augmented with the expansion of non-human population legibility, thus increasing the vigor of biopolitical projects hybridizing organic and autarkic more efficiently within technonature.

Liberal biopower includes the internalization of the market and market rationality in disciplining, and dominating human subjects through the construction of the environment. Market rationality, and economic thinking are mobilized in the production of spaces, and subjects as part of the art of government. In short, the problem of society arises from the emergence of population, and need for the reproduction of commodities as central to the reason of state. Thus, liberal governmentality is essentially concerned with the maintenance of the social body through the production, and circulation of commodities as a function of security.<sup>102</sup> This requires subjects acting in predictable ways through structuring milieux such that subjects internalize instrumental rationality as a means of being within environments.<sup>103</sup> In terms of technonature, this means geo-engineering milieux such that they bear inscriptions of the market in their materiality, and act as sites for the production and circulation of commodities.<sup>104</sup> As technologies play a principal role in the production of technonatural formations, and are mobilized in processes of environmentality as either directly intervening in milieux, or assisting in the production of knowledge about milieux such that they aid biopolitical projects, technologies are fundamental to the art of government and reason of state.<sup>105</sup>

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<sup>101</sup> Luke in Darier, 1999. 121-122; Rutherford (a) in Darier, 1999. 37-8.

<sup>102</sup> Foucault, 2007. 338.

<sup>103</sup> Agrawal, 2005. 23-4; Rutherford, 2011. 194.

<sup>104</sup> Luke in White and Wilbert, 2009. 210; Swyngedouw in White and Wilbert, 2009. 65-67, 75; White and Wilbert. "Introduction: Inhabiting Technonatural Time/Spaces." In White and Wilbert, 2009. 10.

<sup>105</sup> Luke in Death, 2013. 267-8.

Instruments channel the production of biopower for the Megamachine. Be they instruments of labor, instruments of production, or instruments of surveillance and security, they become part of a biopolitical regime when tactically deployed in line with environmentality. This is because they are central in enrolling the living within the productive patterns of some agency. In the above, it is through the structuring and domination of technonatural environments in service to the Megamachine. In this sense, the Megamachine militarizes instrumentalized humanity for the reproduction of information about the environments it produces while technocratic managers displace noise created by the feedback loops of information concerning the smallest unit of any synthetic assemblage - the body developing within synthetic assemblages.<sup>106</sup> The manufacture of milieux, the territorialization of further components of reality for capital, and the enmeshment of the living with the Megamachine are all biopolitical projects grounded in instrumentation. Therefore, methodologically tracing the network linkages among milieux through instruments should reveal the character of environmentality in the attempted production and control of objects of power understood as subjectivation.

#### From Instruments to Technonature: A Conclusion

Neoliberal environmentality is connected to and deployed by the Megamachine in the construction of the technonatural. This is accomplished through strategies that incorporate the living and non-living into commodity networks that circulate and construct the Megamachine. These strategies are bolstered by tactical actions taken by power complexes in service to the technological complex at the heart of the Megamachine. Taking the demands of the Megamachine and the commodity form together, it is clear that this entails the fixation of “the

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<sup>106</sup> DeLanda, 1991. 106-109; DeLanda, 2006. 72; Virilio, Paul. *The Information Bomb*. London: Verso, 2000. 62, 116, 119, 143.

market” as strategy for the manufacture of “the environment” and tactical actions are intended to include new beings, topographies, and ecosystems within it. The totality of relations including the synthetic ecosystems of capital, and the Megamachine can thus be abbreviated as “the market.” The market therefore, is the engine of technonature and thus, the relations structuring the conduct of conduct at the global scale.

Within technonature, tactical actions include: the deployment of instruments that either draw in organic parts from autarkic flows; or network synthetic assemblages together to direct logistical flows of capital necessary for the continued actualization technonature. In either case, the commodity and the circulation of capital are central concerns of technocratic complexes that work on behalf of the Megamachine. Thus, an investigation of technonature beginning with instruments clustered around an object identified as a concern for the continuance of commodity production will reveal the field of relations surrounding an object. The identification of that field of relations will reveal the character of environmental strategy deployed by an actor such as a power complex. Thus, should a power complex be present, it is possible and necessary to trace its logistical network to the technological complex from which it draws its power. Therefore, a study of instruments clustered around an object of concern will reveal whether it is connected to the Megamachine. The chapter following examines the emergence of the Greater Sage-grouse as an object and instrument of environmental power within Wyoming through the Wyoming Core Area Protection strategy.

The chapters below demonstrate the formation of technonature in keeping with the above and the global connections of the Greater Sage-grouse in Wyoming to the construction of the environment. It is hoped that at the end of the analysis, the reader will have a deeper understanding of technonatural processes and how they reorganize the shape of materiality

through the adjustment of commodity flows in Wyoming. The Greater Sage-grouse, I argue, has been identified as a species of concern for the state and the second chapter shows the process of deterritorialization and re-territorialization through the extension of instruments that are chiefly concerned with maintaining commodity flows, and thus the geotechnic regime dominant in Wyoming.

The third chapter displays how the concern for Greater Sage-grouse survivability not only in Wyoming, but across the sagebrush steppe biome attracted the Environmental Defense Fund. Sage-grouse conservation is the largest conservation action in United States history by land area and has drawn in multiple actors staking claim to its territory and populations. The Environmental Defense Fund is one of the largest and most powerful environmental groups in the world, and their plan for the grouse is through the deployment of a new market-based instrument - The Wyoming Conservation Exchange. The chapter examines the economy of the Exchange itself as it attempts to actualize within Wyoming. Chapter Three shows how the Exchange is attempting to enroll landowners in a new economy similar to carbon markets trading in the common currency of the *functional acre* representing commodified land produced through human labor.

Finally, Chapter Four is a network analysis of the Wyoming Conservation Exchange executive board. The analysis reveals a system of assemblages ranging from Local Sage-grouse Working Groups constructed by the State of Wyoming to the American Natural Soda Ash Corporation, Anadarko Petroleum and other global actors interested in the grouse and its territory. This analysis identifies the production of technonature through the Exchange as part of an environmental strategy coordinated between the Environmental Defense Fund and its partners, and some of the largest players in the paleotechnic complex at the heart of the

Megamachine. The conclusion illustrates how the Environmental Defense Fund is at best a policy entrepreneur attempting to capitalize on the death of the grouse and an unwitting ally of the Megamachine, or, as is more likely, a technocratic security assemblage defending the environment of global hydrocarbon and mining interests.



## **Chapter 2:** **Building the Laboratory: Instrumentalizing the Greater Sage-grouse in Wyoming**

This chapter is an excavation of the background conditions that led to the formulation, and construction of technonaturalization in Wyoming through the instrumentalization of the Greater Sage-grouse (GRSG). Specifically, it examines political responses to declining populations of Greater Sage-grouse within the Rocky Mountain range that decoded and recoded the landscape of Wyoming following a neoliberal environmentality through the tactical deployment of the Wyoming Core Area Protection strategy (CAP). The coding and reterritorialization processes in response to the articulation of the GRSG problem reified the grouse as a biopolitical object around which institutional actors coalesced, and coordinated the use of instruments in terraforming Wyoming for the Megamachine. I contend that the construction of the biopolitical network responding to the decline of the Rocky Mountain GRSG subpopulation is a security function of the State of Wyoming, the U.S. Federal Government and, as later chapters explore, the Environmental Defense Fund (EDF) to produce the conditions necessary for the continued extraction of trona, and fossil fuels within Wyoming.

The chapter proceeds in sections: first, the articulation of the GRSG “problem” in Wyoming as a biopolitical problem within political milieux is explored; second, I examine the multi-agency effort in the territorialization of the GRSG problem and the construction of the national response to the 2010 “candidate species” listing under the Endangered Species Act; third, I show how the Wyoming Core Area Protection (CAP) strategy as an instrumental complex laid the foundation for the Environmental Defense Fund’s Wyoming Conservation Exchange explored in the following chapter. Ultimately, this chapter examines how environmentality concerning GRSG was articulated through the construction of assemblages that

function as laboratories, administering GRSG populations by constructing technonatural spaces forming a security apparatus for extractive industry.

This chapter displays the connections between different governmental organizations that make up the socio-technical assemblage involved in the problematique of GRSG conservation. More adroitly, the Wyoming state government, in an attempt to avoid a “threatened,” or “endangered,” listing by the US Fish and Wildlife Service (USFWS) created the Core Area Protection strategy for GRSG conservation that served as a template for the larger national Sage-grouse Initiative to conserve GRSG within its existing range. Thus, a study of the Wyoming Core Area Protection strategy reveals the network of state, federal and local biopower through the larger processes of environmentality concerning biodiversity loss related to GRSG.

The CAP shows how instruments work recursively to shape strategies protecting technonatural networks through instrumentalization of the land and the living. This shows how tactics inform strategy. The CAP strategy, as it is known, is an instrument tactically deployed within the battleground of Wyoming, and should be understood at scale. Wyoming, and its CAP are a piece within a logistic network connected to the paleotechnic complex of the Megamachine. Reading CAP as a strategy and not a tactical instrumental complex, risks narrowing the larger view of the totality of relations involved in producing technonature. GRGS conservation occurs across states, and countries and thus is simultaneously a state, local, federal, and transnational concern. As I argue in the fourth chapter, GRSG conservation is a globalized problem as it involves the continued reproductive capability of hydrocarbon powered civilization forming the global environment of the Megamachine. This chapter displays the dialectic process of conservation and extraction inherent in neoliberal environmentality beginning with the

formation of the CAP before moving to the Federal articulation and response to the GRGS problem.

The excavation of the background conditions that spurred the development of the Wyoming Conservation Exchange discussed in the following chapter, show the reasoning behind the national GRSG initiative through the production of knowledge about GRSG, its habitat, and its behavior as part of the dialectics involved in the production of technonature. The Environmental Defense Fund's proposals based on the CAP, and the subsequent establishment of The Exchange is but one instrument dominating the production of technonature by securing the conditions necessary for continued commodity flows at the expense of the species. The conservation strategy pursued by federal, and state authorities is focused on producing milieux friendly to commodification and instrumental rationality through a multi-layered, landscape-scale, adaptive conservation approach.<sup>1</sup>

I discuss the biopolitical network involved in reproducing the material conditions for the Megamachine's survival through establishing a frontier that translates biopower into geopower through an exposition of the background to the problem of GRSG in the West. The next chapter builds from the groundwork below to show EDF's current project as an instrument enrolled in neoliberal environmentality to protect commodity networks by further instrumentalizing the sage-grouse and her habitat through technoscientific quantitative metrics. The fourth chapter is an analysis of those network connections through the Wyoming Conservation Exchange's leadership that displays how it is part of a network tasked with reproducing the material conditions for the continued extraction of trona, oil, natural gas and coal that are causing GRSG

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<sup>1</sup> U.S. Department of the Interior. *Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to List Greater Sage-Grouse (Centrocercus urophasianus) as an Endangered or Threatened Species; Proposed Rule*. U.S. Fish and Wildlife Service. Washington; National Archives and Record Administration, October 2015. (Federal Register, Vol. 80, No. 191). (50 CFR Part 17). 59875.

habitat loss across the state. In effect, the following chapters work together, and display the articulation of and response to the GRSG problem within the western United States as a case study in neoliberal environmentalism, and thus the neoliberalization of places, spaces, species and the global environment.

#### Background: An Iconic American Frontier Species as a Threat to Capital's Frontier

The following shows how institutions and actors were mobilized in the deterritorialization and reterritorialization of Wyoming as a biopolitical response to the GRSG problem. In essence, GRGS was articulated as a security threat to the function of Wyoming's extractive economy as a logistical problem as population declines triggered a hard response from federal wildlife regulatory frameworks. Wyoming's CAP strategy is an instrument in response to population declines by functioning as a policy framework that deterritorialized Wyoming's extractive zones, while reterritorializing them as species specific conservation spaces thus rezoning Wyoming's topography according to GRSG populations. This displays the translation of biopower into geopower by recoding the landscape in terms of developmental permissibility, and thus commoditization capabilities of paleotechnic networks operating within the CAP. The CAP displays how milieux were reorganized to fit within federal biopolitical frameworks and translate federal biopower through the Endangered Species Act (ESA) into state geopower for the continued function of extractive industry in GRGS habitat.

In 2010, the USFWS recommended GRSG as a candidate species for listing under the 1973 Endangered Species Act. Their decision to consider GRSG as either threatened or endangered within its range was in response to eight petitions from 1999-2005 to list GRSG under the ESA.<sup>2</sup> GRSG's range is approximately 56 percent of its estimated range pre-Euro-

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<sup>2</sup> Ibid. 59859.

American territorial seizure of the Western United States and Canada.<sup>3</sup> Wyoming, the majority of which is classified currently under the Federal Sage-grouse Initiative as Management Zone II (MZII), contains one of the largest regional populations within the United States, comprising an estimated 37.5 percent of the total GRSG range wide population.<sup>4</sup>

The 2010 USFWS recommendation for listing GRSG as a candidate species implied further investigations of GRSG population health, and an evaluation of habitat deemed critical to population survival. Their recommendation included fact finding concerning GRSG concluding that the primary driver of population decline was habitat fragmentation and habitat loss due to anthropogenic activity.<sup>5</sup> A full listing decision by USFWS was delayed as GRSG population decline was deemed a lower priority than other species under consideration for conservation, and population support.<sup>6</sup> The 2010 decision, while unable to give full priority to the species, found GRSG as a “candidate species” for further evaluation because of continued habitat fragmentation and loss, as well as the absence of any regulatory mechanisms to control, compensate for, or address GRSG population decline.<sup>7</sup>

While the CAP’s development was nascent under *Executive Order 2008-2* signed by then Governor Dave Freudenthal (WY-D), USFWS’s findings in 2010 “galvanized a range wide conservation effort that includes new management plans developed by Federal and State agencies to establish regulatory mechanisms adequate to address identified threats.”<sup>8</sup> Efforts included multi-agency data generation about the condition of GRSG throughout its range

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<sup>3</sup> Ibid. 59864.

<sup>4</sup> Ibid. 59865.

<sup>5</sup> Ibid. 59860. Anthropogenic activity is later named as specifically related to energy development in the 2015 Record of Decision discussed below.

<sup>6</sup> Ibid. 59859.

<sup>7</sup> Ibid. 59871.

<sup>8</sup> Ibid.

including habitat, species behavior when responding to changes in topography, jurisdictional range of the species, and agencies responsible for undertaking the regulation of GRSG, and its habitat, as well as considering courses of action to avoid a full ESA listing. By 2015, Wyoming had issued a series of executive orders to conserve and protect GRSG populations and habitats throughout the state in consultation with the Bureau of Land Management (BLM), the U.S. Forest Service (USFS), the USFWS, the Western Association of Fish and Wildlife Agencies (WAFWA), and the Wyoming Game and Fish Department (WGFD).

GRSG populations, already on the radar of WAFWA by the early 2000's,<sup>9</sup> had been in steady decline in Wyoming, and the decline of the Wyoming subpopulation represented a threat to the paleotechnic complex within the state and others in the West. Under ESA guidelines it is possible to establish, and protect species-specific subpopulations within a given range and classify them as "endangered," or "threatened."<sup>10</sup> The Wyoming population was included in the Rocky Mountain subpopulation for evaluation leaving the Great Basin subpopulation within Idaho, Southwestern Montana, Northeastern California, Utah, Nevada and Oregon as subject to separate management practices. Were GRSG to become listed under the ESA, Wyoming would be compelled to strictly police economic development across at least 24 percent of its total surface area coded as critical breeding habitat for GRSG populations including establishing connectivity corridors between critical habitats under the 1978 Amendment to the ESA.<sup>11</sup> An ESA listing for GRSG would include both a positive duty for state and federal agencies to increase populations, and an obligation to avoid further harm to the species including through

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<sup>9</sup> Ibid. 59872.

<sup>10</sup> Bean, Michael J., and Melanie J. Rowland. *The Evolution of National Wildlife Law*. 3rd ed. Westport, Conn: Praeger, 1997. 200.

<sup>11</sup> Bean and Rowland, 1997. 202, 205, 240; U.S. Department of the Interior, 2015. 59882.

habitat fragmentation and degradation.<sup>12</sup> The ESA, under the 1982 Amendment, also protects listed species from “incidental takes” due to industrial activity, thus any industrial action would be in danger of running afoul of federal regulations should they proceed within protected habitat without the necessary permits.<sup>13</sup>

Wyoming’s economy is reliant on extractive industry with 19.9 percent of GDP coming from mining, quarrying, or fossil fuel production in 2017.<sup>14</sup> Additionally, Wyoming has split-estate mineral rights laws from the Stock Raising Homestead Act of 1916 under which surface rights of the property owner are superseded by subsurface mineral claims. Two-thirds of the mineral estate within Wyoming is federally owned and managed with less than one-third of its surface under federal management.<sup>15</sup> In contrast, the occupied range of GRSG within the Wyoming basin (MZII) falls under federal jurisdiction by 58 percent with the remaining 39 and 3 percent under private, or tribal ownership respectively.<sup>16</sup> Federal law under ESA prohibits the intentional harm of listed species by federal agencies, and grants states, citizens and other agencies court standing to sue for any activity injurious to listed species.<sup>17</sup> This includes permitting activities that might harass or damage critical habitat such as pit mining, oil extraction, grazing, agriculture, or infrastructure projects such as power plants, highways, or rights-of-way for power lines and pipelines. An ESA listing for GRSG would impact the second largest industry in Wyoming - government and government enterprises - accounting for 16.4 percent of state GDP by impeding nearly every other form of economic development within the

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<sup>12</sup> Bean and Rowland, 1997. 219, 237.

<sup>13</sup> Ibid. 234.

<sup>14</sup> US Department of Commerce, and Bureau of Economic Analysis. "Bureau of Economic Analysis: Wyoming." BEA: Data Tools: Wyoming, September 25, 2018. Accessed January 27, 2019. <https://apps.bea.gov/regional/bearfacts/action.cfm>.

<sup>15</sup> Wyoming Conservation Exchange. *Wyoming Conservation Exchange Manual*. V. 2.0. Environmental Defense Fund, 2016. 25.

<sup>16</sup> U.S. Department of the Interior, 2015. 59866.

<sup>17</sup> Bean and Rowland, 1997. 265-67.

state including recreational use of federal lands.<sup>18</sup> GRSG would impact the costs of permitting through necessitating ecological impact assessments (already required through the National Environmental Policy Act), population recovery planning, and conservation agreements. Power would shift to actors wanting to exploit vulnerabilities within Wyoming's economy through state and federal agencies by granting automatic court standing to would-be plaintiffs wanting to halt or impede extractive development under species protection. An iconic avian of the West would clip the wings of state and federal economic development were it listed under the ESA.<sup>19</sup> Clearly, measures needed to be taken to address the GRSG problem.

On August 1, 2008, Wyoming's Office of the Governor issued *Executive Order 2008-2* that articulated the CAP preemptively addressing the GRSG listing through a conservation effort adopting a landscape-scale approach to GRSG throughout its range within the state.<sup>20</sup> This order served as the basis for their conservation strategy culminating in *Executive Order 2015-4* that articulated the GRSG problem through creating a multi-pronged conservation effort with state, local, and federal agencies, and included the basis for a new GRSG habitat mitigation economy. The 2008 order, in its three pages, officially stated the intent of the State, and submitted their nascent conservation strategy for review by USFWS. The order states the logistical concern for the Wyoming Core Area Protection strategy: "WHEREAS the listing of the Greater Sage-Grouse would have a significant adverse affect [*sic*] on the economy of the state of Wyoming, including

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<sup>18</sup> US Department of Commerce, and the Bureau of Economic Analysis, 2018.

<sup>19</sup> A study commissioned by the Wyoming Governor's Office through the University of Wyoming estimated that the annual cost of an ESA listing would be between \$1 and \$4.1 billion in lost revenue per year for Wyoming. See: Stoellinger, Temple, and David "Tex" Taylor. "A Report on the Economic Impact to Wyoming's Economy from a Potential Listing of the Sage Grouse." *Wyoming Law Review* Vol. 17. No. 1. University of Wyoming. 2016. 101. Their numbers concerning surface management, it should be noted, are a bit higher than the numbers I have provided above. In their estimation 68% of Wyoming's surface area is considered within GRSG's range (page 80). I have decided to use the published *Federal Register* numbers because EDF and the State of Wyoming build from those more conservative estimations.

<sup>20</sup> Office of the Governor. "Greater Sage-Grouse Core Area Protection." *Executive Order 2008-2*, State of Wyoming, August 1, 2008. 1-3.



the ability to generate revenues from state lands.”<sup>21</sup> The concern for economic development, and the impediments that GRSG would present are repeated throughout iterations of the Core Area Protection strategy.

The CAP demonstrates the connective ability of instruments within environmentality through the creation of public-private partnerships between governmental and non-governmental actors compressing administrative power and concentrating it within technocratic assemblages. This is characteristic of neoliberal environmentality and shows how instruments frame relations among things by acting as connective nexuses that can translate power across and between assemblages thus reterritorializing synthetic environs. The 2008 order established a partnership between local, state, and federal authorities articulating GRSG conservation as a priority at all levels of government including private, land-owning citizens:

State agencies work collaboratively with the U.S. Fish and Wildlife Service: Bureau of Land Management, U.S. Forest Service, and other federal agencies to ensure, to the greatest extent possible, a uniform and consistent application of this Executive Order to maintain and enhance Greater Sage-Grouse habitats and populations.

State agencies shall work collaboratively with local governments and private landowners to maintain and enhance Greater Sage-Grouse habitats and populations in a manner consistent with this Executive Order.<sup>22</sup>

*Executive Order 2008-2* territorialized Wyoming by deterritorializing and reterritorializing administrative assemblages for the current regime of environmentality exercised over, and through GRSG populations by connecting federal, state, and local administrative assemblages through the CAP to accomplish the goal of mitigating GRSG population declines. Managerial capacity is extended through the CAP by translating federal biopower to the ground in Wyoming as discussed later in chapters three and four. However, it should be noted that conceiving of the

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<sup>21</sup> Ibid. 1.

<sup>22</sup> Ibid. 3.

CAP as a strategy fails to recognize how it is instrumentalized within Federal environmentalism as the 2015 USFWS Record of Decision (ROD) indicates.

The USFWS, after a fact-finding mission conducted pursuant to GRSG's conservation status (and after a suit filed by WildEarth Guardians for their sluggish response) issued their recommendation for the Rocky Mountain GRSG subpopulation on October 2, 2015 in the *Federal Register* stating

Since the 2010 finding, there has been an unprecedented and substantial proactive conservation effort to reduce potential habitat loss and fragmentation from infrastructure and energy development. More than 67 percent of the sage-grouse breeding habitat in the Rocky Mountains is protected by PHMA, where no development will occur, and more than 30 percent is protected GHMA, where required conservation measures will avoid and reduce adverse effects. Therefore, we determined that, due to the combination of regulations on Federal lands and regulatory and voluntary measures on private lands that provide adequate avoidance and mitigation, these potential threats are effectively being reduced in the Rocky Mountain portion of the range.

Therefore, we conclude that sage-grouse in the Rocky Mountain portion of the current range are not in danger of extinction or likely to become so within the foreseeable future, due to the existing effective conservation efforts implemented since 2010 and future conservation efforts. Sage-grouse will remain well-distributed and interconnected into the foreseeable future as these conservation efforts are implemented. Therefore, the sage-grouse is not threatened or endangered in the Rocky Mountain portion of its current range.<sup>23</sup>

Primary Habitat Management Areas (PHMA) and General Habitat Management Areas (GHMA) are zones created through the Wyoming CAP that reterritorialized Wyoming according to GRSG population distribution and use. This template was recommended under the 2006 WAFWA plan and represents a subdivision of managerial authority between the states and the Federal Government. Wyoming's biopolitical managerial authority was enhanced through Federal wildlife protection frameworks and emerged through the CAP as geopower establishing newly

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<sup>23</sup> U.S. Department of the Interior, 2015. 59931-40.

created development zones that then influenced Federal managerial oversight effectively short-circuiting an ESA listing. This shows how instruments can be tactically deployed, and influence the formation and enactment of strategy through the domination of space.

The deployment of the CAP recursively affected the Federal strategy by protecting the commodity networks operating within Wyoming against the threat of deterritorialization should the USFWS determine an ESA listing appropriate for the Rocky Mountain population. The laboratory that Wyoming became in wildlife management seats it as a battleground for 37.5 percent of the remaining population. The populational durability of Wyoming is an asset for testing managerial instruments and the CAP framework helped establish Wyoming as a site for knowledge production concerning GRSG management feeding into Federal environmentality. There are three things to notice embedded within the above recommendation: (1) conservation efforts were experimental, and the USFWS is basing its recommendation on conservation plans and frameworks that were yet to be proven; (2) they apply a regional approach that does not specifically designate the Wyoming population as a central concern favoring aggregating range populations into larger subpopulations; and (3) they characterize the PHMA (Primary Habitat Management Areas) as zones in which development has ceased, and the GHMA (General Habitat Management Areas) as zones in which development has been reduced or curtailed.

Taking these points together, I explore the Wyoming Core Area Protection (CAP) framework to show how USFWS, and the Wyoming CAP produced the policy bedrock for a GRSG mitigation credit economy. The following shows how a market approach was embedded within Wyoming's CAP as well as the biopolitical assemblage constructed through it that informed national conservation policy. This displays how instruments change the conduct of conduct within environmentality as tactics informs and is informed by strategy. This work also

displays how instruments can be nested within one another thus displaying technological immanence within instrumental and tactical development. The construction of technonatural spaces, such as species-specific habitat and management zones, begins with an understanding of how instruments operate tactically within strategies connected to logistical flows. Recognizing the Wyoming CAP as an instrumental complex within Federal environmentality displays topological features necessary for new instruments to develop as nodes within commodity networks that partially construct the global environment.

#### Building the Laboratory: Biopolitical Zones and GRSG Instruments

GRSG populations were plummeting as early as 1997 following a fossil fuel and mining boom in the West, and in 2005 WAFWA issued a proposed plan for GRSG conservation within the Rocky Mountain range.<sup>24</sup> In response, Wyoming, in partnership with USFWS submitted a proposal for conservation efforts within the state. WAFWA recommended a “landscape scale” approach to conservation which included expanding administrative power of the Federal Government through creating federal-state conservation partnerships spanning state boundaries to deal with the GRSG problem within two subregions: the Great Basin, and Rocky Mountain subpopulations.<sup>25</sup> The WAFWA approach was designed to “develop partnerships among local, State, Provincial, Tribal, and Federal Agencies, non-governmental organizations, and private landowners to design and implement cooperative actions to support robust populations of sage-grouse and the landscapes and habitats upon which they depend.”<sup>26</sup> This was a

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<sup>24</sup> Ibid. 59871.

<sup>25</sup> The focus of this study concerns the Rocky Mountain subpopulation and the management strategy that emerged from the need for the state to deal with the GRSG problem. However, I highlight the division within the federal management strategy to show how populations are aggregated, and dealt with separately

<sup>26</sup> Ibid. 59872.

detritorialization of administrative authority that reterritorialized state, federal and local interests into one national GRSG conservation assemblage.

The WAFWA plan was articulated through the BLM and USFS to designate zoning conditions that identified habitat as either “Primary Habitat Management Areas,” or “General Habitat Management Areas,” each territory coded based on the size of GRSG populations within a given range, the use of those areas for GRSG (wintering, breeding, nesting, brooding), and the importance of those populations relative to the overall health of the larger GRSG population.<sup>27</sup> This plan, and the subsequent response by Wyoming through *Executive Order 2008-2*, and the following iterations, set the groundwork for broader federal plans that “represent a paradigm shift in western federal land management in their focus on maintaining large expanses of the sagebrush ecosystem for the benefit of sage-grouse and many other species.”<sup>28</sup> The layered approach to GRSG conservation with different management zones codified territory in terms of permissible and impermissible development areas that “aims to preclude or minimize additional surface disturbance in priority conservation habitats, while providing some management flexibility in sage-grouse habitat areas that are less critical to conservation.”<sup>29</sup>

The shift to management zones was predicated on the perceived biological needs of GRSG populations under consideration: “Floristic provinces (Connelly et al. 2004) were used to delineate Management Zones because they reflect ecological and biological issues and similarities, not political boundaries.”<sup>30</sup> GRSG populations, in this view, shape and inform federal management policy that are then tied to local, and state authority when designing and

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<sup>27</sup> Ibid. 59876.

<sup>28</sup> Ibid. 59874-75.

<sup>29</sup> Ibid. 59875.

<sup>30</sup> Stiver, S.J., A.D. Apa, J.R. Bohne, S.D. Bunnell, P.A. Deibert, S.C. Gardner, M.A. Hilliard, C.W. McCarthy, and M.A. Schroeder. *Greater Sage-grouse Comprehensive Conservation Strategy*. Western Association of Fish and Wildlife Agencies. Unpublished Report. Cheyenne, Wyoming, 2006. 1-6.

implementing management plans. Furthermore, the reterritorialization of power based on “floristic provinces” displays how biopower materially speciated into florapower that was translated into geopower.<sup>31</sup> This intermediate step was rearticulated across states and management zones as the central concern for population health, and, as I show in later chapters, is the basis for the habitat mitigation credit economy tasked with producing the topography of Wyoming. Florapower such as it exists within Wyoming, is critical to technonatural reorganization and setting the conduct of conduct within GRSG’s synthetic environs. How the species reacts to articulations of florapower is critical to its enrollment in technonatural production. Thus, the experimental nature of the “floristic province,” articulated as management zones is critical to Federal environmentality and technonaturalization of the grouse as lifeform through the adjustment of milieu.

Variations in management structure within the experimental strategy are due to state and provincial management plans that are informed by local management tactics.<sup>32</sup> This dispersed network strategy allows for the diffusion of information and more control over synthetic environs through local initiative as Chapter Four discusses in depth. Federal authority, though compressed within management zones, need not be concerned with information impertinent to the experimental landscape-scale approach, thus local and state conservation infrastructure acts as filtration points for information, and diffuse chaff within feedback channels. This increases network durability through enhancing concentrations of information around power complexes individualized to the state, and local level, and adds adaptability and improvisation to management structure. Local knowledge is disembedded and fed up the chain as Chapter Four

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<sup>31</sup> Luke, Timothy W. *Museum Politics: Power Plays at the Exhibition*. Minneapolis: University of Minnesota Press, 2002. 134.

<sup>32</sup> Stiver, et. al., 2006. 2-2.

explores, which allows for strategically situating information nodes to tactically produce results and channel information. Thus, the biopolitical apparatus recommended by WAFWA established a flexible security apparatus allowing variations within management approaches, including the ability to set and guide policy at the state, and local level provided those policies stayed within federal boundaries.

Part of WAFWA's goals within their 2006 recommendation was to erect an information sharing network that allowed for greater coordination between all parties involved in GRSG conservation. This logistical consideration is concerned with presenting a unified body of truth concerning the health of GRSG populations relative to experimental actions: "In addition to the lack of data and information, there is currently no mechanism for efficiently housing and distributing information among the many agencies, organizations, and individuals involved in greater sage-grouse conservation."<sup>33</sup> Lack of coordination between management agencies was an impediment to articulating range-wide conservation plans and defining problems common to GRGS conservation including the standardization of instruments, and evaluating the success of conservation programs. This presented a problem from the outset for the production of truth relative to GRGS instrumentalization, and the management of information and results.

The production of truth concerning the WAFWA strategy must show a properly integrated discursive strategy framed in scientific discourse and concerned with the on-the-ground reality of the grouse taken as a whole rather than diffused into instrumentalized localities. Biopolitically, this means reifying the grouse into an instrumentalized object of scientific knowledge that could then be used to ground power through absolutist scientific knowledge

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<sup>33</sup> Ibid 2-8.

claims.<sup>34</sup> This requires the standardization of knowledge practices and instruments across the dispersed network as well as abstracting data from its conditions of discovery to circulate within and through discursive formations.<sup>35</sup> Scientific observation channeled through instruments creates self-referential systems of representation that enter into economies of power conceived as discursive force.<sup>36</sup> The production of milieux is reliant on the instrumentalization of knowledge and scientific discourse to ground truth claims, and thus claims to objectivity.<sup>37</sup> In order to accomplish this, routinized practices of observation must be disciplined and normalized through relationships to technologies translating data across media.<sup>38</sup>

Instruments, therefore, are tantamount to the production of force by normalizing the behavior of observers through regimes of practice that discipline objects according to scientific representation.<sup>39</sup> Standardizing data collection, therefore, is critical to the implementation of strategy, and the disciplinary regime reaches into tacticalized and instrumentalized localities conceived above as laboratories before strategically referring back to milieux thus allowing for their coordinated manipulation.<sup>40</sup> The translative potential of instrumentalized localities can only be realized for the production of force through disciplinary regimes of observation integrated into a strategic representation of experimental results. Scientific production of knowledge within a rangewide, landscape scale conservation scheme must report regulatory success without the presence of a counterfactual that could indicate otherwise.

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<sup>34</sup> Foucault, Michel. *"Society Must Be Defended": Lectures at the College De France, 1975-76*. Edited by Mauro Bertani and Allesandro Fontana. Translated by David Macey. New York: Picador, 2003. 46; Mumford, Lewis. *The Myth of the Machine: The Pentagon of Power*. New York: Harcourt Brace Jovanovich, Inc, 1970. 122.

<sup>35</sup> Foucault, 2003. 29.

<sup>36</sup> Ihde, Don. *Bodies in Technology*. Minneapolis: University of Minnesota Press, 2002. xiv, 37-8, 43, 46; Foucault, 2003. 24, 33-4.

<sup>37</sup> Ihde, 2002. 49

<sup>38</sup> Ibid. 137-8.

<sup>39</sup> Ihde, Don. *Instrumental Realism: The Interface between Philosophy of Science and Philosophy of Technology*. Bloomington: Indiana University Press, 1991. 19; Foucault, 2003. 30-31

<sup>40</sup> Foucault, 2003. 38.



Technonaturalization and formations displaying inscriptions of power, therefore, refer back to regimented practices of human assimilation to machinic consciousness through routinized and controlled conditions of observation dictated by instrumental deployments enrolled in strategic interrogations of materiality.<sup>41</sup> The laboratories created by the WAFWA plan, therefore, are instruments for the translation of tactical power to that of strategic force for inscribing power within materiality through organizing the relationships among things. Regulatory schemes of deterritorialization and reterritorialization would be thwarted without a way to share knowledge about conservation efforts, thus WAFWA's general guidelines provided boundaries for the production of knowledge about GRSG while maintaining a range wide, multi-jurisdictional approach to the production of habitat management zones.

The federal plan articulated in the 2015 USFWS recommendation credits both WAFWA, and Wyoming as the basis for future conservation efforts in the Rocky Mountain range.<sup>42</sup> This seats Wyoming as a strategically important battleground in the production of knowledge about GRSG and thus as an instrument within a logistical security apparatus for the continued extraction of minerals and fossil fuels across the species range. In particular, the approach developed in Wyoming through tactical deployments of Candidate Conservation Agreements with Assurances (CCAA) was effective for garnering support from private land-owners thus presenting a unified and cohesive strategy.<sup>43</sup> Wyoming's efforts are cited as a "7-year track record of implementation," that informed the decision of USFWS to not list GRSG under the ESA.<sup>44</sup> This displays how tactical instrumental deployments refer back to strategy, and how strategy integrates and refers back to tactics. In essence, the laboratory of Wyoming produced the

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<sup>41</sup> Mumford, 1970. 55, 108-110.

<sup>42</sup> U.S. Department of the Interior, 2015. 59874.

<sup>43</sup> Ibid. 59874, 59886

<sup>44</sup> Ibid. 59874, 59882-59883, 59887, 59929.

results necessary for the reproduction of paleotechnic commodity networks within it, and these results were then integrated into the body of knowledge concerning the administration of population, and the manipulation of milieu. The Wyoming CAP became a model laboratory following WAFWA and USFWS recommendations, and was strategically integrated into the federal framework as a model for the range.

I turn to the components of the Wyoming CAP to show how the larger federal framework was articulated through the state such that local governance and the establishment of the Wyoming Conservation Exchange were possible through a strategy that centralized “the market” within the production of topography and governance of populations. In particular, the CAP allows for development within PHMAs such that GRSG populations can still be disturbed by developers willing to pay for the privilege. Thus, GRSG reified and manipulated through technoscientific knowledge production that helps ground the CAP is also an attractor for capital through the production of scarcity relative to land and surface disturbance. Ironically, the decentralized production of enhanced, restored or protected habitats provided a life-support network for the paleotechnic complex by attracting capital while avoiding listing the species under the ESA through creating a resource frontier explored in Chapter Three. How this was accomplished, and by whom is a political matter, and shows the dialectic of forces at play within the construction of technonature and the global environment.

#### Instrumentalized Zoning: The Wyoming Core Area Protection Strategy

The Wyoming Core Area Protection (CAP) strategy attempted to address the GRSG problem with *Executive Order 2008-2* and was sent to the USFSW for review and approval

which it met in May of 2008.<sup>45</sup> The CAP has undergone four revisions at the time of writing culminating in *Executive Order 2015-4* but the core framework of the proposal and its intent have been preserved since the 2008 submission.<sup>46</sup> It established the foundation upon which both the Federal Plan, and the Wyoming Conservation Exchange were built, and articulates the framework of the landscape approach to conservation within the state through the tactical deployment of zoning instruments setting the conduct of conduct through two types of conservation zones: Primary Habitat Management Areas (PHMA), and General Habitat Management Areas (GMHA).

In addition, the 2015 formulation displays the Federal and State managerial authorities, their responsibilities to one another, and how private land is to be enrolled in GRSG conservation objectives. This is accomplished through the tactical deployment of two additional contractual instruments, Candidate Conservation Agreement with Assurances (CCAA) for landowner enrollment, and Candidate Conservation Agreements (CCA) for governmental entities. Both of these instruments reterritorialize land through recoding administrative authority and property relations. Thus, the Wyoming CAP offers a window into the national biopolitical GRGS

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<sup>45</sup> Office of the Governor. "Greater Sage-Grouse Core Area Protection." *Executive Order 2015-4*, State of Wyoming, 2015. 2.

<sup>46</sup> Governor Gordon (WY-R) has issued a restatement, and elaborated expansion of the CAP with *EO 2019-3*. However, the core strategy remains the same as well as the PHMA and GHMA stipulations since the CAP's enactment. At 58 pages, Gov. Gordon's Order is the most substantial formulation of the CAP and integrates *EO 2015-4*, and *EO 2017-2*, the latter a supplement to the CAP by further elaborating the definition of 'suitable habitat.' *EO 2019-3*, includes summaries of data and the success story of the grouse in Wyoming. However, recent reports on GRSG population health indicate declining GRSG populations across its range. To Wyoming's credit however, their numbers are not as bad as other territories and management zones indicating a 21% population decline from the last reading in 2018. GRSG populations, however, appear to be cyclic and their numbers are predicted to increase over the next three to four years. Idaho, Nevada, and Oregon, however, have seen a massive eight-year decline losing nearly 52% of their populations collectively since 2011. The three states account for roughly 42% of the remaining range-wide population and their counts are troublesome because these declines may indicate a downward trend in the absence of stricter regulation. Wyoming is still the model leader in sage-grouse protection despite their downward population trends and, more importantly, their CAP strategy is credited with increasing private landowner enrollment through the extension of candidate conservation agreements with assurances (CCAAs) explored in this section.

conservation assemblage involved in the production of territory, and the security functions in place for the continued extraction of iron and fossil fuels in Wyoming. The CAP, it should be noted, is a tactical instrumental complex for the adjustment of milieu relative to the biopolitical object of the Greater Sage-grouse. Its instruments and the relations created through them show that the state has been wholly concerned with preserving GRSG populations as a matter of political economics rather than a concern for biodiversity loss due to habitat fragmentation attributable to the paleotechnic complex at the heart of the state. Wyoming's technonatural environing, therefore, shows evidence of commodity form consciousness within its materiality.

This section moves from considerations within the CAP that established territories, and responsibilities for State and Federal administration of GRSG populations through the production of that territory, to show how the instrumental complex included the administration of citizens and laid the bedrock of an environmental subjectivity concerned with the commodification of floristic provinces on private lands. Showing how administrative zones and responsibilities were established not only between public agencies but also through private citizens displays the policy foundations that enabled the creation of other market-based instruments such as the Wyoming Conservation Exchange discussed in chapters three and four, and highlights a deeper theoretical point concerning how technonatural formations contain, and are produced by underlying political economies attached to the machinations of power. The example of the Wyoming CAP and the biopolitical network in which it is embedded shows how capital can take advantage of crisis to produce technonatural formations through instrumentalizing it. The concern for GRSG is, and was never about biodiversity loss in itself, but for the productive capabilities of lands that could be enrolled in the service to capital, and the dominant global commodity networks in Wyoming in particular.

The CAP reterritorialized land in Wyoming coded as critical to the reproduction and survival of GRSG populations. Within that critical habitat, the state made two subdivisions and codified them as PHMA, and GHMA. To be sure, Wyoming built in more area than occupied by GRSG in order to create a buffer for development and possible variations within GRSG range.<sup>47</sup> PHMA habitats are heavily used, and frequently occupied by GRSG, and typically include breeding (lekking in GRSG language), brooding, and seasonal habitats supporting populations of at least 50 birds.<sup>48</sup> GHMA is any territory meeting the above criteria but with evidence of some use and populations of less than 50 birds.<sup>49</sup> Additionally, the PHMAs center the CAP strategy on the reproductive viability of GRSG through a focus on leks - breeding habitat in which males perform mating displays for females - and on the preservation of densely clustered leks termed “lek complexes.”<sup>50</sup> The concern for leks and lek complexes forms the core of the CAP and establishes parameters for development within the vicinity of occupied GRSG territory.<sup>51</sup>

In addition to setting the conditions for territory, the CAP includes standards for the generation of data about GRSG and its responses to the territorial conservation strategy as a

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<sup>47</sup> Ibid. 4.

<sup>48</sup> Wyoming Bureau of Land Management, Natural Resource and Conservation Service, Wyoming Game and Fish Department, Wyoming Department of Agriculture, Wyoming Association of Conservation Districts, U.S. Forest Service, and U.S. Fish and Wildlife Service. *Greater Sage-Grouse Umbrella CCAA for Wyoming Ranch Management: A Candidate Conservation Agreement with Assurances for Greater Sage-Grouse (Centrocercus urophasianus)*. U.S. Fish and Wildlife Service, 2013. 11.

<sup>49</sup> Ibid.

<sup>50</sup> Ibid. 8.

<sup>51</sup> *EO 2019-3* extends the focus of the CAP to interconnectivity of habitats used by grouse including wintering, and brooding habitat more critical to sage-grouse hen reproductive viability rather than simply focused on the more charismatic mating displays put on by cocks attempting to attract mates. It is thought that cocks establish mating hierarchies in which one cock will territorialize the center of a lek and will mate with upwards of 80% of hens that visit it leaving other cocks at lek peripheries for mating displays. While cock displays are important to GRSG population cycles and formed the basis of earlier CAP territorializations, hen population health shows a more dynamic focus that integrates their most important habitats into the CAP strategy. Wintering and brooding habitats are crucial to the survival of hens and their chicks that produce GRSG populations and this shows how scientific data can be incorporated into instrumental refinements and technonaturalization dynamics. Simply put, earlier CAP formulations emphasized habitats important to cock behavior without paying attention to the deeper and more complex population dynamics of hens. The CAP in all its iterations, shows how technology and population co-evolve in response to one another within technonaturalization.

technocratic security function. In particular, the CAP directs state agencies to monitor and adjust the results of implementation as a part of Wyoming's overall environmental strategy.<sup>52</sup> Most importantly, the data collection fits into an adaptive management strategy that forms an information feedback between local conditions, experimental success and State and Federal oversight "The State of Wyoming will engage in adaptive management that will include the involvement of state and federal land management and regulatory agencies as appropriate (see Attachment B)."<sup>53</sup> Attachment B is an instrumental evolution of the CAP and is concerned with understanding how landscape disturbance influences the reproductive viability of GRSG populations, is wholly concerned with how much disturbance is permissible within the CAP, and at sixteen pages is the most substantial piece of *EO 2015-4*.<sup>54</sup>

"Attachment B" to *EO 2015-4* concerns the development of Density/Disturbance Calculation Tool (DDCT) which is used in the permitting process to determine whether a project will encroach on GRSG territory. The DDCT is but one zoning instrument for siting development within the CAP and I should emphasize that other instruments have been developed for the same purpose. In particular, the Natural Resource and Energy Explorer is a GIS driven disturbance and siting instrument developed by Anadarko Petroleum - Wyoming's largest energy operator, and was deployed under Governor Mead's (WY-R) Energy Strategy Initiative. Mead's strategy "Leading the Charge: Wyoming's Action Plan for Energy, Environment and Economy," advances off-site mitigation as a cornerstone in the CAP and part of a national energy strategy.<sup>55</sup>

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<sup>52</sup> Office of the Governor, 2015. 2, 3, 5, 6.

<sup>53</sup> Ibid. 6.

<sup>54</sup> Ibid. "Attachment B."

<sup>55</sup> Mead, Matthew H. "Leading the Charge: Wyoming's Action Plan for Energy, Environment and Economy." Cheyenne, WY: Office of the Governor, 2016; Wyofile Staff. "Gov Mead releases statewide energy plan." *Wyofile*. May 13, 2013. Accessed, Oct. 15, 2019. <https://www.wyofile.com/gov-mead-releases-statewide-energy-plan/>

Off-site mitigation is discussed in more depth in the following chapter, however, this is important for the discussion at hand because it shows that the CAP is the instrumental bedrock for further instrumental development, and that it is tactically included within national energy strategy. To be sure, the Wyoming CAP did not do away with economic development within PHMAs or GHMAs but set parameters around development within each zone. Wyoming still allows for the CAP to be zoned for development and this allowance takes different forms depending on: the classification of the zone itself, the industry involved, management authority over the proposed land; and the duration and footprint of the project.

A 5% surface disturbance is allowed within the PHMAs, provided that disturbance meet certain conditions depending on the project type, and the habitat disturbed. This disturbance cap can be calculated through multiple instruments including the DDCT and the Energy Explorer, but the point is that this allowance is calculated by the square mile and not a range-wide aggregate through instruments that regulate relationships of humans and non-humans within technonaturalization processes.<sup>56</sup> I will not dwell on the fine details but this allowance is provided should the activity in question be coded as “unavoidable,” through mitigation hierarchies established within the CAP management zones. Those projects may include oil and gas well siting, and mining, as well as development of rights-of-way for power lines. A development buffer is built into the 5% disturbance allowance by forbidding any permanent installation to be placed within 0.6 miles of an occupied lek.<sup>57</sup> The above zoning requirement is

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<sup>56</sup> Thuermer, Angus M. Jr. “Greater sage grouse counts show 3-year downward trend.” *Wyofile*: Aug 6, 2019. Accessed Oct. 15, 2019. <https://www.wyofile.com/greater-sage-grouse-counts-show-3-year-downward-trend/>.

<sup>57</sup> This buffer has been studied and some have concluded that a half mile buffer is not adequate for well siting and anthropogenic disturbance in general. Current data compiled and reviewed by the U.S. Geological Survey suggest a minimum of 1.2 miles as a buffer for anthropogenic disturbances. See: Manier, Daniel J., Zachary H. Bowen, Matthew L. Brooks, Michael L. Casazza, Peter S. Coates, Patricia A. Deibert, Steven E. Hanser, and Douglas H. Johnson. “Conservation Buffer Distance Estimates for Greater Sage Grouse—A Review.” Reston, VA: U.S. Geological Survey, 2014–1239. 5. The CAP does not incorporate this research and continues to use a 0.6 mile buffer, however *EO 2019-3*, recoded projects sited within 1.2 miles of each other as “industrialized areas” within the

also flexible and can include non-permanent facilities, as well as projects that compensate for lost habitat at double the price of developments outside of the buffer in functional acres for each habitat acre lost.<sup>58</sup>

Habitat loss is calculated through a baseline condition read of the proposed site and then a comparative read after the damage has been done. The credit economy embedded within this plan is enabled by instrumental deployments from the CAP, and shows how technonaturalization is reliant on instruments for setting the conduct of conduct in synthetic environs. Mitigation requirements in the CAP as explored below, are coded and recoded through the translative power of instruments that enhance technocratic domination linking biopolitical networks to the real effects of technonatural development on the ground articulated as geopower. The notion that habitable acres can be swapped and traded already displays neoliberal economistic thinking and an embedded commodity consciousness that attempts to site markets in the production of technonature. Off-site compensatory mitigation already conceives of the organic as a machine with components that can be swapped for compensations elsewhere. The CAP as an instrument, therefore, already embeds machinic and commodity form consciousness in its disciplinary power that directs instrumentalized humans to pull matter and material into logistical commodity flows through extensions of market reasoning grounded in machinic thought materially embodied in technoscientific instrumentation and praxis.

The development cap of 5% within the CAP is adjustable, and while it sets stipulations on territorial disturbance, it is possible to reassemble disturbances through reclamation projects

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DDCT thus allowing for further disturbances to occur in habitat already coded as “disturbed.” See: Office of the Governor. “Greater Sage-Grouse Core Area Protection: Appendix C: Project-Level Habitat Definitions, Wildfire, Habitat Treatments, Monitoring and Reclamation.” *Executive Order 2019-3*, The State of Wyoming, 2019. 2.

<sup>58</sup> The State of Wyoming. “Greater Sage-grouse: Compensatory Mitigation Framework.” January 11, 2017. 9. The idea of “functional acre” is explained in the following chapter on the Wyoming Conservation Exchange.



that attempt to recreate the disturbed territory.<sup>59</sup> In effect, reclamation activities allow for the continual uprooting of protected territory through palliatives that mimic the conditions prior to disturbance and habitat destruction through the production of credits by private actors “Credit may be given for completion of habitat enhancements on bond release or other minimally functional habitat when detailed in a plan. These habitat enhancements may be used as credit for reclamation that is slow to establish in order to maintain the disturbance cap or to improve nearby Greater sage-grouse habitat.”<sup>60</sup> In other words, a potential developer has the option of creating habitat adjacent to a proposed site, or cleaning up after operations. The biomimicry cultivated is then fed back into the data collection apparatus and coded as suitable habitat for the birds regardless of whether it is habitable for the next breeding cycle. Sagebrush, GRSGs primary habitat, is notoriously difficult to reestablish once disturbed, and may never return to the landscape.<sup>61</sup> And the State knows this.<sup>62</sup>

The above dynamic displays how instruments are strategically important in technonatural construction as extractive industries benefit from simulations of restored habitat within the vision of power complexes coding, and creating synthetic environs. While on-the-ground conditions can be audited through surveys and data collection that do not rely on GIS mapping and layering, the ability to permit and site paleotechnic developments is enhanced through the synthetic vision of the State reliant on databases containing material lag times in their representation of territory. This displays how technoscientific production of knowledge is integral to the continued function

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<sup>59</sup> Ibid. 10. There is no disturbance cap within “non-core population areas” (GHMAs) but with the provision that the disturbance not occur within a quarter-mile of any occupied lek.

<sup>60</sup> Ibid.

<sup>61</sup> Wyoming Conservation Exchange. *Greater Sage-Grouse Habitat Quantification Tool: A Multi-Scaled Approach for Assessing Impacts and Benefits to Greater Sage-Grouse Habitat, Scientific Methods Document*. V.3.0. Environmental Defense Fund, 2014. 13.

<sup>62</sup> Office of the Governor. “Attachment B.” 2015. 9.

of the paleotechnic complex in Wyoming, because simulated restored territory is aggregated with functional GRGS habitat thus reducing developmental timelines based on future projections. Accelerating production through simulations within tactically deployed instruments allows for technonaturalization to establish its own dromoeconomy disembedded from the organic rhythms of the living thus enhancing the power of the Megamachine by safeguarding commodity production and circulation within the CAP.

The language within *EO 2015-4* displays the purpose of establishing the CAP strategy. It is chiefly concerned with maintaining the status quo by monitoring the response of the birds such that the population does not warrant an ESA listing

To ensure continued sustainability of Wyoming's economy, all efforts to encourage, enhance, and prioritize development outside of Core Population Areas shall be made. State and federal agencies, with other relevant stakeholders, should work collaboratively to develop a strategic plan to achieve a beneficial balance between Greater sage-grouse protection and Wyoming's economy. Incentives, prioritization of projects outside of Core Population Areas, and streamlining permitting processes should be considered.<sup>63</sup>

Wyoming's attempt to balance economy with ecology is through establishing baselines of ecological permissibility of habitat destruction and the production of new habitats to offset ecological degradation needed for trona and fossil fuel extraction.<sup>64</sup> Scientific management and the production of knowledge about GRSG is yoked to state mechanisms that support the continued development of extractive industry by zoning the species to central areas of concern with little attention paid to the long-term destructive consequences.

The augmentation of state vision in the CAP through the production of habitat offset credits allows Wyoming to issue and condone activities that may not wholly represent the on-

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<sup>63</sup> Ibid. 5.

<sup>64</sup> The State of Wyoming, 2017. 1.

the-ground affairs and daily life of GRSG populations but allowed it to skirt an ESA listing. In essence, the vision of the State reductively understands population and territory in the aggregate, and ignores the finer details of what comprises those populations and territories. The technological augmentation of range-wide vision necessary for a landscape approach smuggled in a reductive view that has led to misunderstanding ecological problems concerning population in the past.<sup>65</sup> While there are finer monitoring assurances in place that audit this vision, it is clear that the fate of the species on public lands is considered against the instrumental rationality of the State, and its development partners through an aggregative understanding that does not consider that “each individual patch has its own history, and the individual organisms (rather than the individual species) are each doing their best to survive, reproduce, and get their offspring into suitable locations for life.”<sup>66</sup> Merely setting the terms of the state-species quid-pro-quo in terms of habitat area that can be reduced to landscape features misses the idea of a reproductive community comprised of individuals with unique behaviors that allow for the reproduction of the community as well as the species as a whole. The plan to allow disturbance in the CAP within certain conditions pushes the problem around the map and does not address the larger problem of habitat fragmentation as technological surrogates stand in for lost and disturbed habitat.

“Compensatory mitigation,” as the above process is known, is coded within existing management practices as the “last resort” when development projects and surface disturbances “cannot be avoided.”<sup>67</sup> Compensatory mitigation includes the production of offsets to compensate for lost habitat either at the site of disturbance or “offsite” the location of which is to

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<sup>65</sup> Sale, Peter F. *Our Dying Planet: An Ecologist's View of the Crisis We Face*. Berkeley: University of California Press, 2011. 206.

<sup>66</sup> *Ibid.* 191-2.

<sup>67</sup> Office of the Governor. “Attachment H.” 2015. 1; United States Department of the Interior. “MS-1794 - Mitigation (P).” Bureau of Land Management, 2016. 5.

be determined through a conservation management plan. The use of offsets is part of the overall environmental policy at the state and federal level concerning GRS management. It falls on a continuum of management actions that collectively constitute the management hierarchy (avoidance, minimization, rectification, reduction/elimination, and compensation).<sup>68</sup> The directives for conservation offsetting are, in this instance, applied to management practices at the state and federal level, however, in the following chapter I show how this practice is articulated in the current formulation of habitat exchange. That the practice exists, and is codified within current state and federal practices is important because, to date, there is no standard method for operating a habitat exchange unlike other conservation tools such as conservation banks.<sup>69</sup> This shows how the CAP established a commodity frontier trading in simulated habitats regardless of GRS use and usability.

The mitigation hierarchy and the inclusion of development within the CAP influenced and was part of a larger national decision concerning national environmental policy. Most interestingly, the BLM, USFWS, USDA and USFS were presented with alternatives, and the CAP and subsequent strategy could have been otherwise. Notably, “Alternative C - Citizen’s Group’s Recommended Alternative One,” entered in the USFS’s *Greater Sage-grouse Record of Decision for Northwest Colorado and Wyoming* proposed the closure of federal and state lands to development. The language within the *Record* is telling of USFS and the USDA’s attitude

Alternative C limited commodity development in areas of occupied GRS habitat, and closed or did not allow large portions of the planning area to many land uses. This included all GRS habitat closed to livestock grazing, recommended for

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<sup>68</sup> United States Department of the Interior, 2016. 5.

<sup>69</sup> Hansen, Kristi, Anne Jakle, and Mary Hogarty. *Market-based Wildlife Mitigation in Wyoming: A Primer*. Laramie, Wyoming: Ruckelshaus Institute of Environment and Natural Resources, 2013. 23.

withdrawal, closed to fluid mineral leasing, closed to salable mineral and non-energy leasable mineral development, and no authorization of rights-of-way.<sup>70</sup>

The plan proposed by citizen groups was rejected due to BLM and USFS's "multiple-use mandate" established under the Federal Land Policy and Management Act of 1976, and Multiple-Use Sustained-Yield Act of 1960 respectively, both of which are concerned with extractive commodity production from the administration of public lands. However, it is clear that their concerns are only tangentially related to that mission "For example, this alternative closed all allotments to livestock grazing which is not required by best available science from GRSG and its habitats."<sup>71</sup> While it is true that GRSG populations face limited disturbance from grazing, it is a small objection to the plan proposed by those concerned with the conservation of GRSG compared to an alternative that opens core habitat areas to drilling and mining, even under compensatory mitigation strategies.

Oddly, "the best available science," was articulated by the BLM's National Technical Team (NTT) commissioned in 2011 to address the GRSG problem. Their findings - included in the *Record of Decision* under "Alternative B" - suggested similar measures for managing PHMAs without closing PHMA's to grazing, but requiring more oversight from managing authorities.<sup>72</sup> This plan, commissioned by the BLM, was rejected because "the majority of the conservation measures in the NTT Report, as appropriate and applicable, were applied primarily to PHMA, and few conservation measures in the Report were provided for in GHMA."<sup>73</sup> The organizational grousing by the USDA and USFS about the absence of how to manage GHMAs

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<sup>70</sup> U.S. Department of Agriculture. *Greater Sage-grouse Record of Decision for Northwest Colorado and Wyoming and Land Management Plan Amendments for the Routt National Forests, Thunder Basin National Grassland, Bridger-Teton National Forest and Medicine Bow National Forest*. U.S. Forest Service. September, 2015. 51.

<sup>71</sup> Ibid.

<sup>72</sup> Sage-grouse National Technical Team. *A Report on National Greater Sage-Grouse Conservation Measures*. The Bureau of Land Management, December 21, 2011. 11-27.; Ibid. 51.

<sup>73</sup> U.S. Department of Agriculture, 2015. 51.

in the NTT report would then, as they claim revert “back to the No Action Alternative,” in other words: do nothing and allow the status quo to continue, “which was found to not meet the purpose and need for the amendments.”<sup>74</sup> Clearly, the “do nothing,” alternative would not fly due to the dire economic consequences of inaction, but USFS’s rejection of the Citizen Groups, and NTT alternatives is based in the multiple use requirements embedded within the National Forest Management Act of 1976 despite the “best available science,” and the preferences of environmentally conscious citizen group proposals.

At bottom, the duty and need to preserve GRSG within its habitat was trumped by contradictory requirements embedded within organizational mandates and directives. The environmentality resulting from the assemblage of state and federal agencies would allow for the disturbance of GRSG habitat by developers through the use of offsets and disturbance caps in core population areas. This result infuses landscapes with commodity form consciousness through the geopower embedded in land management agencies. The *Record of Decision* credits the State of Wyoming, and *EO 2010-4* in particular, with the resulting Federal Land Management Plan (LMP)

In November 2010, the USFWS notified the State of Wyoming that their GRSG Core Area Strategy (EO 2010-4), ‘if implemented by all landowners via regulatory mechanism, would provide adequate protection for sage-grouse and their habitats in the state.’ As a result of this notification, the Forest Service’s Wyoming LMP amendment is largely consistent with the measures outlined in the State of Wyoming’s Core Area Strategy.<sup>75</sup>

Again, Wyoming’s CAP strategy was then adopted by the USFWS in their recommendation a month after the *Record of Decision* was published. The use of Candidate Conservation

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<sup>74</sup> Ibid.

<sup>75</sup> Ibid. 53.

Agreements with Assurances within the Wyoming CAP was noted as a success in garnering landowner support.

#### Candidate Conservation Agreements with Assurances: Establishing and Exploiting the Frontier

The production of territory, and the maintenance of GRSG populations through the CAP primarily concerns the duties of state and federal agencies whose overlapping jurisdictions create a network of managerial authority. While the largest portion of GRSG habitat is under either federal or state management, over a third of critical habitat is under private ownership. In order to plug the hole within the CAP strategy, *EO 2015-4* - carried from *EO 2008-2*<sup>76</sup> - included provisions for extending federal and state oversight to the individual level through an instrument called a “Candidate Conservation Agreement with Assurances,” (CCAA) that, in conjunction with “Candidate Conservation Agreements,” (CCA) provide the necessary instruments for state and federal environmentalism within Wyoming as well as the legal framework for the establishment of the mitigation credit economy.<sup>77</sup> CCAs and CCAs were heralded in the 2015 USFWS decision as an assurance that conservation activities would work, thus there was no need to list GRSG under the ESA within the Rocky Mountain range. I turn to both components with a primary focus on CCAs below.

Conservation agreements set the groundwork for coordinating the mass-scale, multi-layered environmental management initiative that has been noted as the largest by land area, species-focused conservation effort in United States history. This includes the reterritorialization of land through recoding administrative and managerial relationships to environmentalized power through the extension of legal instruments thus setting the conduct of conduct within

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<sup>76</sup> Office of the Governor, 2008. 2.

<sup>77</sup> Sale, 2011. 3, 6.

technonatural environs. The landscape approach would never have left the nest without the enrollment of private landowners within the national GRSG conservation assemblage. CCAs and CCAAs display the tactical power of instruments related to strategy through how they reorganize relationships by recoding the conduct of conduct between actors administering, managing and living off of the land. Though CCAs played a smaller role in the overall environmentality than did CCAAs, their ability to deterritorialize and reterritorialize administrative authority is important when considering the tactical power of instruments in setting the conduct of conduct between assemblages.

A Candidate Conservation Agreement (CCA) allows for greater interagency coordination through extending a voluntary conservation agreement between the USFWS, and another agency such as Wyoming Game and Fish Department (WGFD).<sup>78</sup> A CCA is used for conserving candidate species and does not permit incidental take but still permits development within species habitat.<sup>79</sup> The GRSG plan in Wyoming did not use CCA's as a primary instrument to coordinate agency action though they are noted as critical within GRSG environmentality because they compress administrative space across borders.<sup>80</sup> Instead, a Memorandum of Understanding between the DOI, BLM, and signatory Wyoming state agencies was used.

The MOU, as it is referred, outlined the responsibilities for both federal and state administration of lands in the CAP strategy. The use of the less restrictive MOU was presumably because it allows for incidental take of candidate species through establishing mitigation programs "In considering a proposed use in PHMA or GHMA [or other applicable habitat categories], if the BLM determines that compensatory mitigation is appropriate to address

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<sup>78</sup> Hansen, Et al., 2013. 23.

<sup>79</sup> U.S. Fish and Wildlife Services. "Candidate Conservation Agreements." U.S. Fish and Wildlife Ecological Services Program, October, 2017. 2.

<sup>80</sup> Wyoming Bureau of Land Management, Et. al., 2013. 57.



adverse residual impacts to GRSG or its habitat, then the BLM will coordinate with the [State agency] to identify the appropriate compensatory mitigation to consider through the NEPA and other analysis it may prepare for the proposed activity.”<sup>81</sup> The MOU does not include any legally binding agreements to promote GRSG conservation but instead establishes the framework necessary for compensatory mitigation coordination.<sup>82</sup> This is especially important because it creates coordinated networks that can be deterritorialized easier than using a legal instrument like a CAA while still maintaining control over how the parts of assemblages operate thus adding flexibility to GRSG geotechnics. The Trump administration, for example, has instructed the BLM to waive compensatory mitigation requirements thus leaving enforcement to the states that require it.<sup>83</sup> In other words, rather than using the more restrictive instrument of the CCA for the majority of land management in Wyoming, the BLM chose the MOU including the compensatory mitigation strategy that forms an I.O.U between the species habitat requirements and state interests in commodity production.

CCAA’s are designed to enroll private landowners within conservation frameworks for candidate species. Specifically, the instrument includes allowances, and assurances for private landowners should the candidate species become listed under the ESA, and, in many circumstances, allows for the continued operation of private property that may not be allowed otherwise should the species become listed. While these provisions are of clear benefit to the landowners, the species, and their operations, it displays how relations are conditioned among actors through instruments and in this case shows localized responsabilization of private citizens

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<sup>81</sup> U.S. Department of Interior. “Memorandum of Understanding Between the U.S. Department of the Interior, Bureau of Land Management, Wyoming State Office, and State Agency Responsible for Mitigation to Promote the Conservation of Greater Sage Grouse Habitat.” Interagency Memorandum, no date. 4.

<sup>82</sup> Ibid.

<sup>83</sup> U.S. Department of the Interior. Bureau of Land Management. *Wyoming Greater Sage-Grouse Approved Resource Management Plan Amendment and Record of Decision*. March 2019. 6, 25.

within conservation frameworks while shifting the burden of conservation from state and federal authorities. In essence, CCAAs are an instrument for allowing larger development initiatives to continue as usual, while establishing the groundwork for habitat offsetting.

The CCAA acts as a precursor to “credit” development that displays a financialization dynamic related to a crisis created by commodity production. The lands administered under CCAAs can be fed or transformed into conservation banks which can then sell credits to developers as debtors. As discussed, the CAP sees GRSG habitat as a balance sheet supported by promissory notes of simulated habitat. The visions of a habitat offset credit economy begins with the establishment of the market within land use and species conservation by incentivizing market participation through the creation of eco-entrepreneurs conceived as private landowners. In this way the CCAA is an instrument that allocates responsibility to private citizens, and mobilizes the “productive” potential of eco-modernization to support the underlying political economy fragmenting and destroying GRSG habitat. The CAP instrumental complex therefore, supports neoliberal environmentality by inscribing “the market” within its synthetic environs.

The 1973 ESA includes provisions for the establishment of CCAAs as a conservation instrument under sections 2, 7, and 10.<sup>84</sup> For brevity’s sake, I will not break down and discuss the ESA in the above sections. However, it should be noted that CCAAs are agreements between USFWS and private landowners that allow for incidental take protection of species in the event that it is listed under the ESA.<sup>85</sup> This is a transference of Federal biopower to the landowner that is atomized as microbiopower and managed through microgeopower. A landowner enters into an agreement with the provision that they will act on enrolled lands to conserve the species. In

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<sup>84</sup> Wyoming Bureau of Land Management, et. al., 2013. 20.

<sup>85</sup> Ibid. 16.

Wyoming, CCAAs are designed to mitigate the threat of habitat fragmentation, and indeed, this is the primary stipulation.<sup>86</sup> Landowners are not allowed to subdivide their property and maintain enrollment in the CCAA. CCAAs are voluntary, however, and there is no penalty should a landowner decide to leave the agreement before their 20-year renewal cycle. Doing so, however, would result in the loss of incidental take coverage, and the landowner may be subject to penalties should the species become listed.

This shows how microbiopower can be instrumentalized through marketization and the threat of economic sanctions. The Wyoming CAP uses CCAAs to collect and draw-in the microbiopolitical power granted to landowners through the 1973 ESA as part of Federal environmentalism that then protects the logistical commodity flows of the paleotechnic complex. This displays neoliberal environmentalism through the atomic focus on the individual as central to biopolitical projects while instrumentalizing them as productive forces for and within a market. “The market,” is then centralized within the production of territory relative to the production of subjectivities operating through instrumental logic thus inscribing a self-disciplined model of market subjectivity.

CCAAs allow for an enhanced surveillance by environmentalized authorities on private lands while reinscribing disciplinary power within the landowner through the establishment of the conduct of conduct.<sup>87</sup> The production of knowledge about the landscape occurs in three primary stages: (1) is the landscape suitable for supporting the candidate species, and does it already do so; (2) what are the primary threats to the species on the land under review, and what can be done to mitigate and compensate for those threats; and (3) once entered into, has the

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<sup>86</sup> Ibid. 28.

<sup>87</sup> Ibid. 29.

landowner upheld their end of the bargain and are benefits to the species in evidence? The above extends biopolitical projects through the production of micropolitical spaces that feed into larger conservation information circuits.

The landowner is instrumentalized in the production and protection of land as part of the biopolitical security apparatus through reinscribing commodity consciousness into their managerial duties to the land and the network. Landowners entering into CCAAs are instrumentalized by the machine as commodity production is enhanced by the networked workforce that forms part of the mitigation credit economy. Tactical power in dominating the production of synthetic environs through instrumentalizing landowners and their property is channeled upwards to Federal environmentality through the strategic control of information flows concerning the production of habitable area for GRSG. The more landed humanity that can be instrumentalized within technonaturalization increases network durability through the production of commodities by a disciplined and surveilled workforce. This increases the production of certainty about the conservation of the species within governmental decision making as it did in the 2015 GRSG decision and, indeed, regulatory certainty is one of the CCAA's primary purposes.<sup>88</sup>

While there is no penalty for not enrolling one's land in a CCAA, the incentive is there to avoid potential future punishments with mild requirements for participation. Some infrastructural changes may be necessary for landowners, and some land management practices may change, but the driving force behind those changes are not government mandates or coercive directives such as banning the use of DDT, but economic incentivization for the landowner should the species become listed. Most tellingly, the Wyoming CCAA does not require enhancement of the

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<sup>88</sup> Ibid. 20.

species any further than minimum conditions of programmatic enrollment. The enrolled properties can then be aggregated into a larger conservation calculus that can then be used to influence political decision making, and can help avoid an ESA listing.

CCAA enrollment allows for continued commodity development by pushing conservation responsibilities downward to private citizens while governmental authorities can open federal and state lands to development. While there is limited to no financial compensation for private landowners (there is some federal assistance in enrollment and upkeep) enrolled landowners lose some of their autonomy in how they would develop their land.<sup>89</sup> This dynamic shows that CCAA enrollment, while possibly beneficial to the species and to the private citizen, is part of a larger framework in service to the production of capital and the paleotechnic commodity complex supported by GRSG environmentality. CCAAs, therefore, are part of workforce creation as well as the ecological/economic balancing act of neoliberal environmentality mobilized to maintain Federal environmental power and protect the paleotechnic commodity flows of the Megamachine.

CCAAs in Wyoming and across the Rocky Mountain range are feathered with other conservation measures such as CCAs, and while there are no requirements for landowners to enhance land enrolled in CCAAs beyond meeting the minimum conditions for enrollment, the extension of CCAAs displays the breakdown of administrative borders for conservation efforts. The conservation of GRSG requires the elimination of political borders to administer GRSG populations as stated in the WAFWA plan. Breaking down political borders as well as conventional private/public distinctions central to modernist/liberal ideology allows the establishment of administrative spaces that enhances the power of federal authority through the

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<sup>89</sup> Ibid. 37.

aggregation of previously distinct spheres. The administration of the Rocky Mountain population requires capitulation from local, private, state and tribal authorities thus centralizing authority in the hands of the U.S. Federal Government by deterritorializing and reterritorializing assemblages critical to neoliberal environmentality and the continued survival of the paleotechnic complex.

In addition to the centralization of authority, these new administrative zones act as frontiers to the generation of commodities and are ready reserves for commodity production. This is exhibited in at least two ways: (1) compensatory mitigation favors developers willing and able to pay for conservation credits to develop within newly created conservation zones; and (2) the enrollment of private landowners through CCAAs lays the groundwork for conservation banking and credit production crucial to the political economy of the state. The CCAA framework allows for additional agreements to be layered over it including the enrollment of lands within conservation and mitigation banking, and habitat exchanges.

By expanding administered land area previously outside of federal and state control, governmental authorities can extend a lifeline to paleotechnic commodity production within Wyoming. More “conserved” land and habitat, equals larger reserves of abstract capital - mitigation credits. CCAAs provide incentives for enrolled landowners to augment their productive potential by enrolling in conservation or mitigation banks, or, as the next chapter shows, the experimental schemes of habitat exchanges. Enrollment in any of the above programs allows private landowners to act as credit producers for would-be debtors that belong to trona mining or fossil fuel extraction as Chapter Four argues. CCAAs can then act as an insurance policy against incidental take that may include fines and litigation should the species become listed. The system is designed to capitalize on conservation efforts and extend the power of

capital into previously untapped spaces. Not only does extractive industry continue its ecologically destructive practices, but landowners become willing participants in offsetting that destruction through biopolitical assimilation to the Megamachine. In effect, the CCAA lays the groundwork for the continued development of paleotechnics under the guise of ecological modernization. The conserved spaces for GRSG and the species itself are technonatural formations imprinted with the commodity form in service to the Megamachine.

### Conclusion: The Laboratory as Hydrocarbon Security

The above was an exploration of the CAP as a tactical instrumental deployment part of a neoliberal environmentality geo-engineering spaces, places, humans and non-humans for continued commodity production in Wyoming. Specifically, I have shown how, and why GRSG was articulated as a problem within and through a biopolitical network and became the focus of one of the largest conservation initiatives in United States history. In reviewing the policy and practice frameworks mobilized to address the GRSG problem, I have shown how the process of environmentality formed around a species, and the political economy operating through it. Specifically, I have shown how the newly formed GRSG conservation initiative allows for the expansion of neoliberal environmentality through the tacticalization of conservation instruments intended to mitigate the effects of an Endangered Species Act listing. This excavation has shown how neoliberal power complexes mobilize to protect hydrocarbon industry through the production of technonature and technological adjustments to the environment.

By instrumentalizing the biological and ecological needs of GRSG, technoscience has provided the operating parameters for continued hydrocarbon extraction in Wyoming by the grouse's destructors. In this way, the space of Wyoming is enrolled in continued instrumental development concerning GRSG while acting as a laboratory to increase the reach of biopolitical

security networks for the Megamachine. The construction and management of Wyoming as a space of power is accomplished through deterritorializing and reterritorializing administrative authority beyond political boundaries down to the individual landowner. The Wyoming CAP, as an instrument is chiefly concerned with the production of technonature relative to the desires of the commodity networks that support Wyoming's economy and not GRSG as a species. GRSG is instrumentalized within the CAP and used to extend managerial power of power complexes that instrumentalize Wyoming as a laboratory.

The laboratory of Wyoming located the market as the central driver of technonatural production in terms of workforce instrumentalization within hydrocarbon commodity networks. In essence, the instability created by the GRSG problem created a new frontier for capital's development and expansion through the use of CCAAs acting as an instrumental foundation for a mitigation credit economy. The ironic result of the dialectic between tactical power and protective species frameworks, such as the ESA, is a new space for capital growth while protecting the operations and flows of commodity networks responsible for biodiversity loss and the death of GRSG populations. Seen against this relief, it will become evident that the Wyoming Conservation Exchange is an evolution in neoliberal environmentality, and instrumental tactics pioneered by the Environmental Defense Fund, and that EDF is supporting and defending the global environment constructed by hydrocarbon civilization.



### **Chapter 3:** **Fictitious Materiality: An Examination of the Wyoming Conservation Exchange**

This chapter examines a new technological contribution to conservation management propagated, and developed by the Environmental Defense Fund (EDF), and their partners. Specifically, EDF has laid the operational framework for a new market-based conservation instrument (MBI) termed a *conservation exchange* that compliments and builds on the Wyoming Core Area Protection strategy discussed in the previous chapter. This chapter displays how the Wyoming Conservation Exchange (WCE) is an instrument deployed to assist neoliberal environmentality connected to the Megamachine through the production and protection of commodity flows. The following study is an analysis of the WCE and some of the networks to which it is connected as well as how it functions as a conservation instrument based on EDF's proposal. That the idea of a conservation exchange is proposed as a market-based approach to environmental conservation - biodiversity loss, specifically - and focuses attention to two primary functions such instruments must fulfill: the production of commodities, and the formation of, or entrance into markets. I contend that the Wyoming Conservation Exchange, while entrenching and extending market logics into the realm of conservation, does not produce any real commodities, but instead circulates fictitious commodities in the Polanyian sense.<sup>1</sup> The production and circulation of fictitious commodities implies that any market formed around and through them is, at best, an incomplete market that relies on state intervention for the circulation of its currency, and the stability of exchange.

The following chapter argues that the "functional acre," (FA) used as currency within the WCE is a fictitious commodity, and, as such, indicates the presence of an incomplete market that

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<sup>1</sup> Polanyi, Karl. *The Great Transformation: The Political and Economic Origins of Our Time*. Boston: Beacon Press, 2001. 75-76.

simultaneously displays a neoliberal environmentalism. The production of commodities through workforce formation displays a tactical capacity of the WCE as an instrument of labor. The actions carried out in the production, circulation, and exchange of functional acres have real material effects, and shows how fictitious commodities, and incomplete markets can shape, and reshape technonatural topographies for the expansion of capital. As an instrumental complex, the WCE advances how instruments operate tactically that form and cement the conduct of conduct by fixing “the market” and market strategy to discourses of conservation and the production of technonature. Thus, the WCE serves as a case study within environmentalism and technonature, and contributes to the literature concerning market-based conservation instruments.

The WCE contributes to studies in environmentalism through the production of territory related to the circulation, exchange and stability of commodities that form the basis of a mitigation credit economy. This is accomplished via the production of environmentalized subjectivities through establishing the conduct of conduct concerning relationships to nature by reinscribing the commodity form through the circulation of capital conceived as habitat credits. This assists the translation of biopower into geopower through the accumulation of labor and land for species specific conservation practices committed by a workforce guided by the WCE as an economic and technoscientific instrument. The production of milieux is assisted through the accumulation of information regarding the success of ecological management techniques, and the entrenchment of neoliberal knowledge/power regimes. The WCE therefore, appears as an instrument of a larger environmentalism security apparatus.

The WCE is submitted as an instrument in conservation that is locally sited in Wyoming but has global reach as the model itself may become globalized if the Wyoming test is successful. The production, and administration of milieux through the WCE displays how EDF is

enrolled in environmental surveillance, and policing in service to the neoliberal GRGS conservation assemblage discussed in the previous chapter. The importance of exploring the contours of the WCE is accented by the possibility of widespread, if not global adoption of conservation exchange instruments.<sup>2</sup> Thus, recognizing the WCE as an experimental instrument within neoliberal environmentality may help critical scholars preempt global trends in environmental management.

This chapter is divided into sections. First, I chart the historical development of *conservation exchanges* as an experimental instrument within EDF's bailiwick. EDF's conservation exchange has its beginnings through a partnership between EDF, and the DoD at Fort Hood in Killeen, TX. The concept then traveled to the Great Plains in an effort to manage the Lesser Prairie Chicken. This attempt did not leave the ground before it traveled to Wyoming. In particular, this should focus the reader's attention to how the device grew out of conservation offsetting that has been a practice within the compensatory mitigation programs that form the basis for the exchange itself, and how these characteristics connect to the Wyoming CAP strategy analyzed in the previous chapter.

Second, I show how the WEC is a tactically deployed instrumental complex related to neoliberal environmentality. I show how it produces workforces and landscapes through knowledge/power applications and argue for why it trades in fictitious commodities. The reader is asked to recall the role of instruments within environmentality and the production of technonature from Chapter One, and I connect the WCE as a labor instrument to display the

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<sup>2</sup> Apostolopoulou, Evangelina, Elisa Greco, and William M. Adams. "Biodiversity Offsetting and the Production of 'Equivalent Natures': A Marxist Critique." *ACME: An International Journal for Critical Geographers* 17, no. 3 (2018): 861-92; Boisvert, Valérie. "Conservation Banking Mechanisms and the Economization of Nature: An Institutional Analysis." *Ecosystem Services* 15, March 12, 2015. pp. 134-42. doi: 10.1016/j.ecoser.2015.02.004; Hrabanski, Marie. "The Biodiversity Offsets as Market-based Instruments in Global Governance: Origins, Success and Controversies." *Ecosystem Services* 15, January 16, 2015. pp. 143-51. doi: 10.1016/j.ecoser.2014.12.010.

perception fixing qualities of instruments within experimentation, and the production of knowledge. This supports the notion of the WCE as part of a security assemblage because environmentalized subjectivities are reinscribed with the commodity form and megamachinic consciousness through its disciplinary power. This displays instruments as sites of normative conditioning that help reproduce economies of force grounded in the production of truth.

Finally, the chapter ends with a further elucidation of how the WCE fits into the larger project of neoliberal environmentality by showing how the WCE functions within a larger environmentally focused security assemblage through the translation of marketized biopower into geopower that allows for the construction and administration of synthetic environs. The reader should notice that the WCE assists in the production of technonatural spaces through reterritorializing and hybridizing human and non-human populations within the production of territory and extractive permissibility. This analysis, in particular shows how the experimental instrument of the WCE fits into a scheme of surveillance and policing through adaptive management in attempts to stabilize the production, circulation, and exchange of fictitious commodities through state-supported incomplete markets that form part of Wyoming's conservation milieux.

#### From Environmentality to Instruments and Back Again: Materialized Self-Reference

I have argued that technonatural formations - i.e. topographies or lifeforms that have been technologically metabolized, and display human activity within their being - are the result of a process termed *environmentality*. Environmentality is concerned with the production, and administration of environs through the establishment of the conduct of conduct within milieux, and the extension of politics and power through human and nonhuman populations through the formation of knowledge/power regimes that simultaneously create norms for scientific

evaluation, and domination of populations through synthetic milieux while rendering them legible within scientific knowledge. Environmentality, therefore, is concerned with the administration of things through the technologization of populations, and territories such that they become objects and subjects of power.

Instruments, I have argued are related to the extension of power, domination, and legibility of objects within knowledge production, the norms conditioning their use, and interpretation of results. Instruments are sites of disciplinary power and normalization seen through the production of territories and the administration of populations. Their effects are part of a feedback between materiality, and the production of synthetic environs related to the hybridization of the organic with the artificial. Their role is the translation of information across media that extends power through creative, managerial and scientific processes. Instrumental translative power helps cement the conduct of conduct through amplifying manipulatable qualities that are reified within productive processes while dampening the contexts of discovery such as autarkic economies of the organic contained within and exhibited through the object via alienation.<sup>3</sup> In short, instrumental translation allowing information to flow across media is a process of coding, decoding and recoding that draws objects out of their conditions of discovery and renders them manipulatable for synthesis through identification within synthetic assemblages.

Instruments can be deployed tactically for the construction of environs by assisting in knowledge production that translates power into material force. Knowledge, and the way it is produced is articulated within materiality, and scientific discourse is embodied through

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<sup>3</sup> Ihde, Don. *Postphenomenology: Essays in the Postmodern Context*. Evanston, Ill: Northwestern University Press, 1993. 54-55; Lukács, György. *History and Class Consciousness: Studies in Marxist Dialectics*. Translated by Rodney Livingstone. London: The Merlin Press, 1971. 87; Mumford, Lewis. *The Myth of the Machine: The Pentagon of Power*. New York: Harcourt Brace Jovanovich, Inc., 1970. 58.

instruments specifically, and synthetic objects, their manipulation, circulation and production as inscriptions of power.<sup>4</sup> Instruments are able to reinscribe power into synthetic milieux through truth claims grounded in normative authority (scientific, technological, sovereign, economic, cultural, ethical, and etc.,) and these inscriptions are seen within milieux as synthetic environs taken as containing natural relations among things.<sup>5</sup> Thus, perception, knowledge, and “the natural” are reified, and circulated within and through instruments as well as by the objects they produce and are indexed to them.<sup>6</sup>

The circulation and production of commodities within milieux is conditioned by “the market” as a site of veridiction and reinscribes commodity form consciousness within synthetic environs as a matter of naturalized subjectivation based on the material conditions of existence.<sup>7</sup> The production and circulation of commodities is assisted through machinic consciousness understood through the self-referential production of scientific knowledge within and through instruments.<sup>8</sup> Thus, the unification of megamachinic consciousness with the commodity form is accomplished via tactically deployed instruments that allow for power’s inscription within materiality forming a closed feedback between perception, and instrumentalized production of “nature” within synthetic environs.<sup>9</sup> Thus, the production of technonature shows the circulation of economies of force conceived above as owing their power to instrumental deployments that territorialize, deterritorialize and reterritorialize the organic and synthetic as a matter of

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<sup>4</sup> Ihde, 1993. 43; Foucault, Michel. *"Society Must Be Defended": Lectures at the Collège De France, 1975-76*. Edited by Mauro Bertani, Alessandro Fontana, and François Ewald. Translated by David Macey. New York: Picador, 2003. 9, 28.

<sup>5</sup> Lukács, 1971. 38.

<sup>6</sup> Ihde, Don. *Technology and the Lifeworld: From Garden to Earth*. Bloomington, IN: Indiana University Press, 1990. 33-4, 167, 171, 186; Lukács, 1971. 97-98.

<sup>7</sup> Lukács, 1971. 100; Foucault, Michel. *The Birth of Biopolitics Lectures at the Collège De France, 1978-1979*. Edited by Michel Senellart. Translated by Graham Burchell, Picador, 2008. 30.

<sup>8</sup> Ihde, 1990. 29-30, 40; Lukács, 1971. 233; Mumford, 1970. 81.

<sup>9</sup> Ihde, 1993. 17-18; Mumford, 1970. 93.

geotechnics. Geotechnics is reinforced within and through instrumental deployments conditioned by normative regimes of knowledge production that code, decode and recode representations of *the real*, *the natural* and *the true* as resulting from technoscientific praxis verified against the self-referential environments it creates.

Population and milieu thus, are technoscientific objects that can enter into economies of force through specific instrumental deployments and the normative regimes conditioning their use. Instrumental deployments contain the tactical power to shift perception by amplifying and dampening “objective” attributes of population and milieu such that novel manipulations result within regimes of technics that recode subjectivity within synthetic environs. The decoding, and recoding of milieu, and population can be performed as security functions when threats are articulated, and identified within environs as I argued in the previous chapter. Security is concerned with the health, maintenance and domination of populations through the production and articulation of milieux that form the material conditions supporting the existence of population. In short, security is concerned with the problem of society. Thus, as institutions and actors create information about populations and territories, that information may be enrolled in environmentalized security strategies to police them.

Security concerns itself with the maintenance of commodity circulation, and the production of milieu through the identification of dangerous elements within it as a function of surveillance,<sup>10</sup> and acts as a disciplinary apparatus through the maintenance of underlying political economies.<sup>11</sup> The functions of security are enhanced through technological development and tactical instrumental deployments that assist in the production of territory through the

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<sup>10</sup> Foucault, Michel. *Security, Territory, Population Lectures at the College De France, 1977-78*. François Ewald, Alessandro Fontana, and Michel Senellart, eds. Basingstoke: Palgrave Macmillan, 2007. 12-13, 19-22.

<sup>11</sup> *Ibid.* 19.

sensory capacities of security assemblages in the task to discipline populations.<sup>12</sup> Disciplinary power concerns itself with acting on specific bodies in corrective acts of normalization that are linked to regimes of truth and knowledge production.<sup>13</sup> This implies that the study of disciplinary power and security are linked to tactical deployments of instruments, in their specificity, to understand the production of milieu and the administration of things. Thus, instruments enrolled in the production of knowledge about territory, and population are self-referential sites of normalization and disciplinary power as connected to regimes of truth, political economy, and the conduct of conduct.

Instrumentalization is the reification, and alienation of an object in service to power through disciplinary regimes. As demonstrated in the previous chapter, GRSG was identified as a threat to the paleotechnic order within Wyoming. It was then made an object of strategic inquiry through instruments, and representations of it and its habitat circulated through economies of force that were translated across assemblages simultaneously linking them together forming a securitized synthetic environ. GRSG, thus, was tacticalized within environmentalized discourse for the production of milieux that could be accumulated and recoded with commodity form consciousness in service to the Megamachine. Instrumentalization of GRSG thus, is connected to environmentalized security assemblages concerned with the reproduction and circulation of hydrocarbon economies within Wyoming and globally. Therefore, instruments form the basis of the relations among things within synthetic environs, and their use exhibit the regime of technics they cement gesturing to strategies they support while conditioning milieux through the

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<sup>12</sup> Ibid. 8-11.

<sup>13</sup> Foucault, 2003. 38.



circulation of perception, truth, and the real as economies of force allowing for power's inscription within materiality.

My argument concerns one instantiation of environmentality - *neoliberal environmentality* - which I characterize as extending the formation and domination of markets within synthetic environs, and the production of commodities through processes of de-politicization, individuation, monetization, and technocratic management that incentivizes the adoption of instrumental thinking relating to environment. Given the above, an examination of EDF's environmentality can and should include an examination of their proposed solutions to environmental problems through their instruments. All instruments can be enrolled in strategies of domination and I theorize the WCE as an instrument of labor following Marx.<sup>14</sup>

EDF has been at the forefront of programs such as cap-and-trade, carbon markets, wetland mitigation proposals, safe harbor programs and offset credit production. The history of their environmentality includes programs to monetize and offset ecological degradation, and their programmatic developments have led to new conservation instruments that have been adopted across the United States and abroad. Their latest addition - the conservation exchange - was nested and incubated in compensatory offsetting strategies, and environmental economics concerning payments for ecosystem services (PES). Their new instrument is characterized as market-based, and indeed their hope is that the establishment of conservation exchanges across the U.S. will lead to the creation of new markets, while addressing the problem of biodiversity loss through incentive programs that make the project of species conservation more attractive to private landowners.

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<sup>14</sup> Marx, Karl. *Capital: A Critique of Political Economy*. Edited by Friedrich Engels. Vol. II. Moscow: Foreign Languages Publishing House, 1961. 51.

I discuss the historical development of conservation exchanges below to show how the apparatus builds from previous experiments in market-based conservation, and displays the self-referential dynamics of instrumentalization within environmentality. This discussion traces the development of conservation exchanges from a related experiment in habitat offsetting at Fort Hood, in Killeen, Texas in the early 2000s that focused on the administration of Golden-Cheeked Warbler populations - an avian still listed as endangered.<sup>15</sup> This shows that the conservation exchange has its roots in tactical instruments deployed for military strategy and represents the militarization, and militancy of “the market” and EDF. The Golden-Cheeked Warbler experiment was tied to the production of space through enrollment of private landowners in conservation efforts for the United States military.

As discussed below, the development of conservation offsetting is significant for the present study because EDF is acting as a policy entrepreneur that stands on “the best science available,” as a part of its brand. As corporate conservationists, EDF mobilizes their past experiments as a history of successes that are “the ways that work,” which highlights a deep-seated notion that conservation must be pragmatic in that it cannot unseat regimes of technics. The production of milieu, for EDF, is girded by, as Lukács would put it, the *commodity form*, and displays their organizational consciousness through the deployment of instruments to create technonatural topographies. Additionally, their instrument shows a technical consciousness to the organic and autarkic that instrumentalizes it and sees it as composed of machinic automata.

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<sup>15</sup> U.S. Department of Interior. *Endangered and Threatened Wildlife and Plants; 90-Day Findings on Two Petitions: Evaluation of a Petition to Remove the Golden-Cheeked Warbler from the List of Endangered and Threatened Wildlife*. U.S. Fish and Wildlife Service. Washington; National Archives and Record Administration, June 2016. (Federal Register, Vol. 81, No. 107). 35700.

Thus, the territories created by and administered through EDF's exchange bear the inscription of the commodity form, and the Megamachine within their being while displaying the self-referential expansion of technonature.

#### State-of-the-Art in Market-Based Instrumentalization: Legacies of the Golden-Cheeked Warbler

The Wyoming Conservation Exchange (WCE) is a result of collaboration, and endorsement by the Nature Conservancy, University of Wyoming, the Wyoming Stock Growers Association, the Sublette County Conservation District, Environmental Incentives, and EDF. Founded and incorporated in 2016, the WCE received 501(C)3 status as a non-profit entity in September, 2016.<sup>16</sup> Though still in its early operational stages at the time of writing, the WCE aims at creating “profitable opportunities for private and public landowners and land managers to conserve and restore ecosystem services across Wyoming,” through the production of a credit system that tracks the technonaturalization of land relative to the production of habitat for GRSG.<sup>17</sup>

The exchange is a multi-stakeholder project that attempts to combine the interests of industry, landowners, and environmentalists into the administration of territory, and the viability of GRSG populations through compensatory mitigation strategies. The epistemic network included in the WCE is displayed through their board membership that speaks to the topology of voices, and organizational interlocks in WCE governance. Though officially incorporated with seven board member seats divided between two representatives for industry, landowners, environmentalists, and one seat at-large, the WCE currently operates with two landowners, one

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<sup>16</sup> "Wyoming Conservation Exchange." Wyoming Conservation Exchange. Accessed April 08, 2019. <http://www.wyomingconservationexchange.org/>.

<sup>17</sup> "Frequently Asked Questions." Wyoming Conservation Exchange. January 05, 2015. Accessed April 08, 2019. <http://www.wyomingconservationexchange.org/about/frequently-asked-questions/>.

industry representative, and one environmentalist.<sup>18</sup> The day-to-day operations are overseen by Eric Peterson who acts as the exchange administrator and is instrumental in connecting the WCE to Federal biopower.

Peterson is a manager for the Sublette County Conservation District's (SCCD) enrollment in the Sage Grouse Initiative (SGI).<sup>19</sup> The stated mission of the Sublette County Conservation District is to:

work[s] locally with landowners and permittees to promote the health, safety and general welfare of the citizens, while also protecting the customs and cultures of the community to assist and meet the needs of a community which relies on a multiple use, federally managed dominated landscape, while also promoting private property rights and providing technical assistance. The local nature, along with being a non-regulatory entity allows the District to aide in bridging the gap between private property owners and land managers.<sup>20</sup>

As the point of contact for the Sage Grouse Initiative, Peterson forms a link between the mission of the SCCD, and the SGI spanning eleven states in GRSG conservation efforts and is led by the USDA's Natural Resources Conservation Service (NRCS).<sup>21</sup> Peterson's position at the WCE therefore, represents the compression of administrative space that extends Federal biopower to local milieux.

SGI displays the articulation of locally managed biopower connected to federal administration, and has enrolled "1,474 ranchers to conserve 5.6 million acres across 11 western states."<sup>22</sup> Its purpose is to enroll landowners in the production, and conservation of sagebrush-steppe habitat that is beneficial to GRSG through providing funding for juniper removal,

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<sup>18</sup> "WCE's Board of Directors." Wyoming Conservation Exchange. April 04, 2017. Accessed April 08, 2019. <http://www.wyomingconservationexchange.org/about/wces-board-of-directors/>.

<sup>19</sup> "Partners." Sage Grouse Initiative. Accessed April 08, 2019. <https://www.sagegrouseinitiative.com/about/partners/>.

<sup>20</sup> "Sublette County Conservation District." Sublette County Conservation District. Accessed April 08, 2019. <https://www.sublettecd.com/>.

<sup>21</sup> "New Paradigm." Sage Grouse Initiative. Accessed April 08, 2019. <https://www.sagegrouseinitiative.com/about/new-paradigm/>.

<sup>22</sup> Ibid.

conservation easements, GRSG friendly fencing, and rotational grazing.<sup>23</sup> Easements assist the conservation assemblage through providing financial and tax benefits for ranches that do not subdivide their allotments, thereby helping to maintain existing sagebrush habitat connectivity. As shown in the previous chapter, landowner enrollment is critical to the continued function of the GRSG conservation assemblage as it is currently coded.

Juniper encroachment has been a problem for GRSG, and ranchers as the sagebrush-steppe faces “invasions” from flora that are coded as neither good for grazing, nor for leking thus threatening the viability of GRSG populations, and ranch activities.<sup>24</sup> Without dwelling much longer on SGI activities, it is clear that this organization works to link the on-ground production of territory with federal initiatives thus increasing the reach of federal power to the local level while creating greater regulatory certainty within the GRSG conservation assemblage. The organization’s influence in the West is increasing, and enrolled acres in Wyoming dwarfs the next largest holdings in Montana at 267,323 acres to 106,009.<sup>25</sup>

SGI as an instrument provides regulatory, and scientific guidance to landowners enrolled in their initiatives, and landowners are expected to follow SGI guidelines to maintain enrollment. In this way, federal biopower is extended to landowners and organizations partnered with SGI that translate it into geopower for the reterritorialization of milieux. SCCD is a legal subdivision of the Wyoming state government, and is charged with overseeing conservation activities within Sublette County. Sublette County is the 6th largest county by land area in Wyoming at 4,943 square miles. 40 percent of that land area is under BLM control, 30 percent under the Forest

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<sup>23</sup> "For Landowners." Sage Grouse Initiative. Accessed April 08, 2019. <https://www.sagegrouseinitiative.com/about/for-landowners/>.

<sup>24</sup> Ibid.

<sup>25</sup> United States Department of Agriculture. Natural Resources Conservation Service. *Greater Sage-Grouse 2018 Progress Report*. Working Lands for Wildlife, 2018. 2.

Service, 4 percent under Wyoming, with 18 percent under private ownership and the rest split nearly evenly between the Bureau of Reclamation, and Sublette County.<sup>26</sup>

SCCD's function as an instrument is to centralize administrative authority by reterritorializing distinct assemblages to recode conservation interests:

Sublette County Conservation District has the mandate to assist and promote the protection and preservation of public lands, natural resources, soil, water, and wildlife; the development of water and prevention of floods; stabilization of the ranching and agriculture industries; protection of the tax base; and providing for the public safety, health, and general welfare of the citizens within Sublette County.<sup>27</sup>

Historically, conservation districts were formed in Wyoming to combine interests of various agencies into locally oriented conservation efforts that inform, and are informed by on-the-ground local needs.<sup>28</sup> The SCCD, resulted from administrative reterritorialization merging the Big Piney and Pinedale Conservation Districts. It was incorporated in 1986, and has since partnered with the USDA and their NRCS subsidiary to promote conservation activities in range management, habitat and wildlife quality management, and water resource management.<sup>29</sup>

SCCD has contributed to GRS monitoring - one lek monitored, and another identified, but it is their function as an instrument within a regime of federal management that is most interesting.<sup>30</sup> Chiefly, their function as a conservation district connects federal interests to on-the-ground realities through enrolling local communities in conservation efforts. The interests of the community align through federal funding, and the SCCD, in turn, reports and monitors activity throughout its territory. Their feedback allows for federal agencies to tailor conservation plans

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<sup>26</sup> Sublette County Conservation District. *Sublette County Conservation District: Annual Report 2018 and Plan of Work 2019*. By Sublette County Conservation District. Pinedale, WY: Sublette County Conservation District, 2018. III.

<sup>27</sup> *Ibid.* XVIII.

<sup>28</sup> *Ibid.*

<sup>29</sup> *Ibid.* V.

<sup>30</sup> *Ibid.* IX.

for landowners, thereby increasing regulatory certainty within the production and administration of space.<sup>31</sup> To be sure, there are more conservation districts in Wyoming - 34 in Wyoming's 23 counties - but it is SCCD's mission to work for and coordinate with federal agencies including the BLM, USFS and NRCS at the local level that shows how federal power is extended within Wyoming through such instruments.<sup>32</sup> Peterson's role within the WCE as the day-to-day manager is interesting because it displays an instrumental nexus with federal, state, and local initiatives for GRSG conservation and range management.

The Exchange Administrator is accountable to the Board of Directors, and is chiefly concerned with credit production and distribution as well as adaptive management functions to adjust WCE's operational viability.<sup>33</sup> It is a technocratic position that oversees the development of accounting tools, as well as the production of a credit registry to provide regulatory certainty in the production of credits through credit developers and the sale of those credits to debit projects.<sup>34</sup> The administrator's function within the exchange includes the mobilization of, and engagement with stakeholders to either solicit new territories to be enrolled within the exchange, or to ensure that things are running smoothly. Peterson, therefore, is instrumental in bringing a network of stakeholders into the WCE through his position as the Exchange Administrator, and can be seen as a node within an epistemic network tasked with producing, and administering territories as commodities.

The economy Peterson is charged with administering is based on habitat credits. Credits are produced through the quantification of habitat quality judged against a standardized metric.

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<sup>31</sup> Ibid. XIV.

<sup>32</sup> Sublette County Conservation District. *Sublette County Conservation District Long Range Plan 2014-2019*. Pinedale, WY: Sublette County Conservation District, 2013. 5.

<sup>33</sup> Wyoming Conservation Exchange. *Wyoming Conservation Exchange Manual. V. 2.0*. Environmental Defense Fund, 2016. 49.

<sup>34</sup> Ibid.

EDF has been pushing the use of their Habitat Quantification Tool (HQT) as the instrument to judge, and measure habitat quality relative to the perceived needs of target species populations.<sup>35</sup> Labor performed by landowners on their respective properties are judged against the HQT or any other habitat quantification metric, then their property is evaluated based on its perceived use-value to GRSG by the acre, and aggregated into a score for the total property. The score is then converted into functional acres by project type, as elaborated below, and sold at auction to debit projects occurring proximally to the credit project (though no real measure of proximity has been specified). Habitat credits, therefore are commodified territory that is represented as an exchange-value determined at auction that can then be accumulated by debtors as capital. This displays one tactical function of the WCE as an instrument of labor through the commodification territory necessary for the production of workforces for industrial capital within and through the GRSG conservation assemblage.<sup>36</sup>

The commodification dynamic above shows the transmutation of capital through a labor instrument within a commodity circuit. The WCE functions as a labor instrument when it connects credit producers with debit projects thus shaping the economic praxis of synthetic production.<sup>37</sup> As part of the Exchange's mission, credit producers are private, or public landholders that can include private ranchers or government-controlled lands. The projects that produce credits are broken into three categories: enhancement, restoration and stewardship. Broadly, the credits produced from the above projects are fed into the Exchange Registry, which is the ledger of projects and their productivity, and are then available for sale to debtors. The

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<sup>35</sup> Wyoming Conservation Exchange. *Greater Sage-Grouse Habitat Quantification Tool: A Multi-Scaled Approach for Assessing Impacts and Benefits to Greater Sage-Grouse Habitat*, Scientific Methods Document. v.3.0. Environmental Defense Fund, 2014.

<sup>36</sup> Marx, 1961. 160.

<sup>37</sup> Ibid. 34.



credit functions as a sort of contract between buyer and seller, and, as explored below, risk is assumed by the credit producer financially for the production and maintenance of GRSG-friendly territory.

The WCE website explicitly states that this service aims at providing financial incentives for landowners to enroll in credit production to sell through the Exchange to energy and mineral development companies who are required to offset surface disturbances in core habitat areas.<sup>38</sup> This shows that the WCE is developed for and connected to paleotechnic commodity networks. The Exchange is sold as a win-win solution to balancing the need for conservation and ecological protection with capital's developmental logic for continued land accumulation, and extraction. The economic-ecological balancing act running through the internal credit economy of the Exchange, and their administrator at the helm of the accounting, is accomplished through approval functions that evaluate both the stability of the credit economy, and the viability of creditor and debtors. Peterson, as a district manager for SCCD is quoted as saying "By using tools that encourage collaboration and forward thinking like conservation exchanges, everyone — including the greater sage grouse — wins. That's a great outcome for ranchers, industry, and Wyoming."<sup>39</sup>

The above "win-win," strategy for conservation based on credit production is nothing new in the conservation world,<sup>40</sup> nor is it a new move by EDF. EDF had piloted a program at

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<sup>38</sup> "Frequently Asked Questions." Wyoming Conservation Exchange. January 05, 2015. Accessed April 08, 2019. <http://www.wyomingconservationexchange.org/about/frequently-asked-questions/>.

<sup>39</sup> "Wyoming Conservation Exchange." Wyoming Conservation Exchange. Accessed April 08, 2019. <http://www.wyomingconservationexchange.org/>.

<sup>40</sup> Froger, Géraldine, and Marie Hrabanski. "Biodiversity Offsets as Market-based Instruments for Ecosystem Services?" *Ecosystem Services* 15, 2015. pp. 123-24. doi: 10.1016/j.ecoser.2015.09.001; Gamarra, Maria Jose Carreras, and Theodore P. Toombs. "Thirty Years of Species Conservation Banking in the U.S.: Comparing Policy to Practice." *Biological Conservation* 214, 2017. pp. 6-12. doi: 10.1016/j.biocon.2017.07.021.; Gómez-Baggethun, Erik, Rudolf De Groot, Pedro L. Lomas, and Carlos Montes. "The History of Ecosystem Services in Economic Theory and Practice: From Early Notions to Markets and Payment Schemes." *Ecological Economics* 69, no. 6, 2010. pp. 1209-218. doi: 10.1016/j.ecolecon.2009.11.007; Pirard, Romain. "Market-based Instruments for Biodiversity

Fort Hood, in an effort to protect the Golden-cheeked Warbler populations that inhibited base use and development in the buildup, and heyday of the second Iraq War, and the occupation of Afghanistan:

In partnership with the Texas Department of Agriculture and a coalition of other organizations, Environmental Defense Fund coordinated the development of a market-based credit exchange. It allowed Fort Hood to quickly obtain offsets from nearby landowners to counteract losses from live-fire training activities and troop movement through core habitat areas.<sup>41</sup>

Operation Warbler, as it was known, was a pioneering experiment in Recovery Credit Systems, and habitat offsetting that aimed at enrolling private landowners in the production, and maintenance of territory, and has been named as the progenitor to the WCE, and the idea of a habitat exchange.<sup>42</sup>

Operation Warbler selected the United States government as its primary debtor, and adjacent landowners as credit producers. In exchange for the preservation of warbler habitat on private lands, the federal government through the Department of Defense (87% of total spending) and the NRCS in concert with the National Fish and Wildlife Foundation (13% split equally) paid for the maintenance, and continuance of critical habitat for the Golden-cheeked Warbler.<sup>43</sup> The project, to be clear, was less concerned with the production of space necessary for the species, and, it should be added, the species is still endangered. However, Operation Warbler was a success in that it showed how to enroll landowners in conservation offsetting

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and Ecosystem Services: A Lexicon." *Environmental Science & Policy* 19-20, 2012. pp. 59-68. doi: 10.1016/j.envsci.2012.02.001.

<sup>41</sup> Wolfe, David. "Operation Warbler: How Fort Hood and Local Ranchers Teamed up to save a Bird." Environmental Defense Fund. July 15, 2015. Accessed April 08, 2019.

<https://www.edf.org/blog/2015/07/15/operation-warbler-how-fort-hood-and-local-ranchers-teamed-save-bird>.

<sup>42</sup> Kreuter, Urs P., David W. Wolfe, Kenneth B. Hays, and James R. Conner. "Conservation Credits—Evolution of a Market-Oriented Approach to Recovery of Species of Concern on Private Land." *Rangeland Ecology & Management* 70, no. 3, 2017. pp. 264-72. doi: 10.1016/j.rama.2016.10.012.

<sup>43</sup> Ibid. 266.

schemes through monetary incentives for conservation thus advancing neoliberal environmentalism.

The Recovery Credit System (RCS) was a development in “market-based” instrumentation compared to federally funded land management programs: “As a result, the RCS provided a novel mechanism for more efficiently allocating resources among private land managers than other federally funded land improvement cost-sharing programs that do not incorporate economic competition among landowners for limited conservation resources.”<sup>44</sup> This shows how “the market” is the site of veridiction for the survival of a species. Rather than allocating responsibility to the Department of Defense for the care and maintenance of the warbler, EDF devised a system to shift that responsibility to individual landowners through financial incentivization.

The system worked and landowners bought into the nascent system of commodification and workforce production. The competitive element named in the above quotation (a study authored in part by David Wolfe, EDF’s director of conservation strategies<sup>45</sup>) refers to the mechanism used in the acquisition of credits by the federal government. Competition was between landowners for the opportunity to develop, and conserve their lands for the Golden-cheeked Warbler through bid proposals that solicited funding: “The competitive elements in this process included 1) contract term (the longer the better); 2) cost per recovery credit year (credits determined for the property multiplied by contract term); and 3) landowner’s cost share for the land improvement actions (higher landowner cost sharing was more competitive).”<sup>46</sup>

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<sup>44</sup> Ibid.

<sup>45</sup> Environmental Defense Fund. "David Wolfe." Environmental Defense Fund. Accessed April 08, 2019. <https://www.edf.org/people/david-wolfe>.

<sup>46</sup> Kreuter, et. al., 2017. 266.

The Recovery Credit System generated \$3,442,074 in spending over a three year proof of concept period between 2006-09, 57% of which was spent to improve or conserve Golden-cheeked Warbler habitat (3,143 acres), with the remaining monies spent on research and administrative costs - 28% and 15% respectively.<sup>47</sup> While the landowners did benefit from another income stream, the clear benefit was to the debtors - the Department of Defense: “Between 2006 and 2009 the cost per recovery credit declined from about \$800 to \$600 per credit, while landowners cost share of the contracted land management practices increased from 15% to 30% and the contract period increased from 10 to 25 yr. (the maximum allowed under the program).”<sup>48</sup> This displays how EDF devised a new way to harvest surplus value through the commodification of land by mobilizing biopower through an instrument of labor.

While money was generated for landowners, and costs for conservation were lessened, it is clear that the responsibility for stewardship was forked onto private land for the best price possible to the Department of Defense. This scheme has seen little benefit to the species while being hailed as a success. Success, in this sense is merely capital referring to itself in that the commodity circuit functioned, manifesting newly territorialized synthetic warbler environs. Operation Warbler pushed habitat around the map, contributed to the United States war machine, and was an experiment in EDF’s development of MBIs with a clear attempt to “transform at-risk species from a liability to an asset for private landowners.”<sup>49</sup> This is an example of geo-engineering subjectivity through the instrumentalization of an avian, and the financialization of relationships to the organic through the production of habitat. This was accomplished through creating a regulatory environment that lessened perverse incentives to rid territories of species

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<sup>47</sup> Ibid.

<sup>48</sup> Ibid.

<sup>49</sup> Ibid. 271.

that might become listed, and displays cost shifting for conservation away from governmental authorities through the instrumentalization of habitat on private land.<sup>50</sup> The program also selected and benefitted large landowners the most, thus displaying a transfer of public monies for private gain - another common feature of market-based conservation instruments.<sup>51</sup>

Operation Warbler provided some lessons for EDF that are cashed out in the structure of their habitat exchanges. While an attempt to start one for the Lesser-prairie Chicken never materialized due to lack of regulatory frameworks to channel intensivities of capital, the WCE is argued as an improvement in some of the elements lacking from the RCS. In particular, improvements in credit accounting and species surveillance are included within the exchanges themselves as attempts to provide more administrative oversight in the production and conservation of territory:

Improvements of the Habitat Exchanges over previous credit-based systems include the use of functional acres, establishment of a credit reserve to offset unanticipated losses, independent third-party verification of all credits generated, ability to permanently conserve habitat through dynamic permanent arrangements, increased accessibility to sites and information for USFWS, and web-based accessibility of transaction activity and conservation progress to the general public.<sup>52</sup>

The above improvements within the WCE are concerned with the security of the Exchange through attempted stabilizations of the common currency used within them - the functional acre.

Below, I turn to the functional acre, and the processes of credit production, circulation, and

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<sup>50</sup> A quick but interesting discussion of cost-shifting and perverse incentives is provided in Narain, Divya, and Martine Maron. "Cost Shifting and Other Perverse Incentives in Biodiversity Offsetting in India." *Conservation Biology* 32, no. 4, 2018. pp. 782-88. doi:10.1111/cobi.13100. Additionally, one should not be too quick to judge the supposed reduction in perverse incentives such as the preemptive killing of candidate species prior to USFWS decisions in the case of the Golden-cheeked Warbler as the species has been listed under the ESA since 1990. Indeed, it seems that the Warbler only became a real concern for the DoD in the build up to Operation Iraqi Freedom as more frequent tank maneuvers, and artillery training were needed at Fort Hood without the impediment of Warbler nesting seasons.

<sup>51</sup> Gómez-Baggethun, Erik, and Roldan Muradian. "In Markets We Trust? Setting the Boundaries of Market-Based Instruments in Ecosystem Services Governance." *Ecological Economics* 117, 2015. pp. 217-24. doi: 10.1016/j.ecolecon.2015.03.016.

<sup>52</sup> Kreuter, et. al., 2017. 269.

accumulation within the WCE paying attention to industries targeted as the primary buyers, and the dynamics involved in that political economy. I argue that the functional acre is a fictitious commodity that only refers to itself, and that the market EDF hopes to create is, at best, incomplete because it builds on the regulatory frameworks of the Wyoming CAP, and federal instruments.

#### Fictitious Conservation and the Production of Materiality: Simulated Habitat

Thus far, I have examined only one instrumental nexus in the role of the WCE's Exchange Administrator, Eric Peterson, as well as his primary responsibilities within the exchange - accounting for, and distributing credits as well as vetting potential buyers and sellers, and reporting to the Board of Directors on the success of the project. I have said little about what a credit is within the WCE, how they are produced, and how they are enrolled in a greater scheme of security and surveillance that relies on fictitious commodities. Below, I explore two more instrumentalized actors through the Board of Directors to show who and what industries dominate the administration of the Exchange, and thus the production of technonatural formations produced through its activities. Additionally, I link this discussion to how credits are produced, how they circulate, and how they are accumulated to show who potentially benefits from the establishment of the WCE. Finally, I argue that the "currency" circulating through the WCE is ultimately a fictitious commodity and thus rests on state intervention for its viability. Regulatory frameworks are necessary for the production of EDF's conservation exchange as the failure of the Lesser-prairie Chicken Exchange shows. The "markets" that EDF hopes to create through their new MBI is, therefore, incomplete and parasitic on the State for establishment, and stability.

Landowners in the WCE are represented by James Hellyer - President of the WCE, and Wes Sibert, who acts as Director. Hellyer has been active in the ranching community within Wyoming, and his family ranch primarily concerns cattle, and uses public and private land for drives and grazing.<sup>53</sup> Sibert is a math teacher at Mountain Valley Middle School, Mountain Valley, WY, and holds a family ranch in Fort Bridger, WY at the southwest corner of the state.<sup>54</sup> Neither appear as prolific in environmental governance as Peterson, but both provide insight into the needs and desires of landowners who are critical in the functioning of the WCE as they are the primary targets for EDFs attempted establishment of an offset credit economy as industrial workforces.

Recall that a stipulation in the 2015 USFWS decision to de-list GRSG as a candidate species was predicated on the ability of government to pull in private landowners into GRSG conservation efforts in an effort to create regulatory certainty. The use of CCAAs was cited as a primary instrument in the production of that certainty, as discussed in the previous chapter. CCAAs provide assurances and protections for landowners should a candidate species become listed as threatened or endangered. Federal management authorities, in turn, gain in regulative certainty because landowners agree to specific sets of practices - in the case of GRSG they are concerned with landowners subdividing their properties thus leading to habitat fragmentation - and can better control territories relative to critical habitat necessary for the candidate species survival. CCAAs, therefore, are instruments used to connect federal power to on-the-ground

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<sup>53</sup> Beale, Colin. "Hellyer's Fall Drive." *Real Ranchers*. December 27, 2011. Accessed April 08, 2019. <https://realranchers.com/2011/12/27/the-fall-drive/>.

<sup>54</sup> "Wes Sibert - Mountain View Middle School." Go to Mountain View Middle School. Accessed April 08, 2019. [http://mvms.uinta4.com/faculty/wes\\_sibert](http://mvms.uinta4.com/faculty/wes_sibert); "Wesley Glenn Sibert." Whitepages.com. Accessed April 08, 2019. <https://www.whitepages.com/name/Wesley-Glenn-Sibert/Fort-Bridger-WY/17iamsvk>.

local knowledge of private landowners, and thus form a critical link in the production of knowledge, and the generation of regulatory certainty.

Regulatory certainty, in this case, shapes economic certainty as industrial actors need not concern themselves with running afoul of the ESA as they expand operations within the sagebrush-steppes of Wyoming. ESA listings can create economic uncertainty as new information is gained about a listed species, and new understandings of their habitat requirements can interrupt logistical flows of capital.<sup>55</sup> The mitigation requirements codified in the Wyoming CAP strategy are not subject to shifting federal regulatory requirements as GRSG is no longer a species of concern for USFWS, therefore, industry is only subject to the conservation guidelines within the CAP, and the mitigation requirements therein. Thus, the primary task of a company wishing to develop within CAP areas is securing the necessary territories for compensatory mitigation.

The need for territories to offset the costs of development girds the production of GRSG habitat in Wyoming, and already sets the stage for the development of conservation banks,<sup>56</sup> and

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<sup>55</sup> Pidot, Justin R. "Public-Private Conservation Agreements and the Greater Sage-Grouse." *Public Land & Resources Law Review* 39, 2018. 184.

<sup>56</sup> Sweetwater, now Pathfinder Ranches is the first GRSG conservation bank and is now owned by a venture capital firm, Sammons Enterprises, Inc. - an \$86 billion global holding company headquartered in Dallas, TX. Their acquisition of the Sweetwater River Conservancy included the purchase of 122,395 mitigation credits that Sweetwater had produced and certified for use in GRSG conservation. Then entire enterprise and investment of Pathfinder Ranches to predicated on the need for energy companies to offset their surface disturbances under the CAP. Pathfinder Ranches is geared to the sale of GRSG habitat mitigation credits to offset energy development elsewhere in the state. Pathfinder Ranches expressly states that it wants to bring more energy development into Wyoming and accelerate fossil fuel extraction through the sale of credits within the regulatory environment of the CAP: "We're confident that this team's approach to mitigation banking will bring business to Wyoming in the form of more energy development projects, supporting Wyoming's economy and future conservation efforts." Anderson, Christine "Wyoming Based Sweetwater River Conservancy Announces Rebrand to Pathfinder Ranches, Invests in Wyoming-Focused Business Strategy." Press Release. Sammons Enterprises, Inc., December 20, 2017. For more information see: "Sammons Enterprises Acquires Sweetwater Ranches Conservancy and Pathfinder Land and Ranch Management." Sammons Enterprises Inc., February 8, 2016. <https://sammonsenterprises.com/sammons-enterprises-acquires-sweetwater-ranches-conservancy-and-pathfinder-land-and-ranch-management>; U.S. Department of the Interior: U.S. Fish and Wildlife Service, and Sweetwater River Conservancy. "Sweetwater River Conservancy Conservation Bank Frequently Asked Questions." U.S. Fish and Wildlife Service. No Date; "Wyoming Based Sweetwater River Conservancy Announces Rebrand to Pathfinder Ranches, Invests in Wyoming-Focused Business Strategy." Wyoming Based Sweetwater River Conservancy Announces Rebrand to Pathfinder Ranches, Invests in



other forms of mitigation to service industrial capital. Proximal siting of credit development projects increase the mobility of industrial capital across the range and accelerate capital's development within the conservation assemblage. EDF has suggested conservation exchanges to fill the gaps in the space created by the CAP strategy by extending financial compensation to private, and public landowners who enroll their lands for compensatory mitigation. Indeed, recent research in EDF's attempts at forming conservation exchanges in Colorado, and Nevada failed in the absence of compensatory mitigation requirements, and models such as the Wyoming CAP strategy.<sup>57</sup> Thus, the WCE builds upon regulatory biopower in producing a "market" because the absence of regulatory requirements - in this case, compensatory mitigation through CAP - does not produce the incentives necessary for credit production within the WCE. The WCE, therefore appears as an instrumental extension of neoliberal environmentality within the conservation assemblage.

The long-term vision of the WCE is to "establish a self-sustaining program in Wyoming that will support the stewardship, enhancement, and restoration of the state's wildlife, water and range resources through investments by entities concerned with conservation and mitigation of the impacts of development, as well as other non-regulated entities seeking conservation for other reasons."<sup>58</sup> It seeks to cement the hegemony of the market in the production of environment through creating a conservation machine, and the dream of a self-sustaining market system relies on the enrollment of landowners within a conservation framework valuing land that

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Wyoming-Focused Business Strategy | Sammons Enterprises Inc., December 20, 2017.

<https://sammonsenterprises.com/wyoming-based-sweetwater-river-conservancy-announces-rebrand-pathfinder-ranches-invests-wyoming>.

<sup>57</sup> Large, Daniel, and Steven Wolf. "How the Endangered State Acts: Reverse Regulatory Threat and Market-Based Conservation Policy." Lecture, The American Association of Geographers: Meeting 2019, Delaware Room A, Marriott, Washington D.C., April 05, 2019.

<sup>58</sup> Wyoming Conservation Exchange, 2016. 5.

is perceived friendly to GRSG populations in order to offset the compensatory mitigation requirement set by the CAP. While GRSG was not listed under the ESA though up for review in 2020, EDF is still attempting to garner support for the foundation and operation of habitat exchange infrastructure through providing financial incentives for landowner enrollment.

Indeed, a study authored in part by Melanie Purcell of the SCCD - an associate of Peterson's, and the WCE technical advisory team, probed the possibility of conservation through financial incentives in Wyoming, and the results of her study informed the development of the WCE.<sup>59</sup> The study credits regulatory frameworks for spurring local interests in participating in a payment for ecosystem services program:

Local interest in sage grouse remains strong in spite of the 2015 USFWS decision not to list sage grouse because of the threat of a future listing remains, and because the State of Wyoming and BLM have policies in place requiring compensatory mitigation protections for the sage grouse (Mead 2015; BLM, 2016). These regulatory drivers help to create the demand that any PES program needs to be viable. Our initial feasibility analysis sufficient demand to support a PES program, though a fuller demand-side analysis of company willingness to pay for mitigation in the location would shed further light.<sup>60</sup>

Company willingness to pay for offset credits is currently a non-issue because the Wyoming CAP requires their purchase for any project within the GRSG habitat areas. Any company wishing to exploit the natural resources of GRSG habitat is required to purchase offset credits. In other words, the economy that supports the WCE is, at best, an incomplete market in that the stability of it rests on regulatory frameworks that make participation in those markets compulsory.<sup>61</sup> The WCE is, in this view, fixed instrumental capital supported by inputs from industrial capital for the production of technonature because those inputs catalyze workforce

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<sup>59</sup> Hansen, Kristiana, Esther Duke, Craig Bond, Melanie Purcell, and Ginger Paige. "Rancher Preferences for a Payment for Ecosystem Services Program in Southwestern Wyoming." *Ecological Economics* 146, 2018. 240-49. doi: 10.1016/j.ecolecon.2017.10.013.

<sup>60</sup> Ibid. 248.

<sup>61</sup> Vatn, Arild. "Markets in Environmental Governance — From Theory to Practice." *Ecological Economics* 117, 2015. pp. 225-33. doi: 10.1016/j.ecolecon.2014.05.005.

formation. Therefore, a market, defined as including *voluntary* transactions does not fit the actual functioning of the WCE, and the compulsory requirements to purchase offsets for developers.<sup>62</sup>

In order for lands to be enrolled within the exchange, and thus to be enrolled in credit production, they must meet minimum eligibility requirements set by the WCE. Specifically, they must be located within a “service area” - that is, an area determined to be of political and ecological significance within Wyoming, and show evidence of GRSG activity. Service areas are “mapped geographic sub-regions with unique ecological or political significance where credits are tracked and reported. Service areas ensure that conservation benefits are located within an appropriate proximity to impacts.”<sup>63</sup> Tracking credits through service areas allows for the Exchange Administrator to appropriately allocate credits to offset debits thus fulfilling CAP requirements to create proximal benefits to the species. Tracking credits as a matter of surveillance, therefore, allows for a more precise production of technonatural topographies relative to the project type.

The WCE is also reliant on labor capital as an input to support technonaturalization. There are three credit project types: (1) habitat stewardship, (2) habitat enhancement, (3) habitat restoration.<sup>64</sup> Each project proscribes specific management functions for the credit developer, but all project types are treated as credits as a matter of accounting. However, each project type has its own criteria for whether credits are produced and when they are released. The timing of release is important for the stability of the currency itself relative to the actions taken by the credit developer proscribed by WCE guidelines. Credit release is authorized by the Exchange

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<sup>62</sup> Hausknot, Daniel, Nelson Grima, and Simron Jit Singh. "The Political Dimensions of Payments for Ecosystem Services (PES): Cascade or Stairway?" *Ecological Economics* 131, 2017. pp. 110. doi: 10.1016/j.ecolecon.2016.08.024.

<sup>63</sup> Wyoming Conservation Exchange, 2016. 32.

<sup>64</sup> *Ibid.* 17.

Administrator in concert with third party verification. The stability of the currency, and thus the credit economy of the WCE is dependent on whether specific management plans have been fulfilled judged against the material effects inscribed in the land itself, and whether credit developers have the funds to insure the continued maintenance of the land. In other words, underwriting the currency of the exchange is the ability of credit developers to both participate in the WCE as a matter of proximity to debit sites, and their fiscal ability to continue producing credits.

The financial requirements for credit developers already favors some lands over others, and shows how the instrument allocates responsibility for the development of the credit economy. Credit developers are instrumentalized by the WCE in that they assume the financial risk of credit development prior to third party verification or credit allocation “The Exchange requires that Credit Developers establish and show evidence of appropriate financial assurances for each credit project in order to sell credits. Financial instruments must be held by a qualified third-party institution that is approved by the Exchange Administrator.”<sup>65</sup> Financial requirements already game credit production, and thus an alternative funding stream for potential developers, to those with the means to underwrite the development of the credit economy. The minimum requirements are stringent, and credit developers must show that their funds are sufficient to “Cover all anticipated costs to perform standard management and maintenance of the project as defined in the Management Plan for the duration of the contract including monitoring and verification.”<sup>66</sup> The WCE, in other words, reproduces economic inequalities through passively selecting workforces appropriate to the assimilation to the machine. Lands that are produced

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<sup>65</sup> Ibid. 23.

<sup>66</sup> Ibid.

through the WCE, therefore, display economic inequalities within their materiality relative to the project type and duration.

Stewardship projects, which do not require enhancement of lands, are the most financially stringent projects, and require the establishment of a stewardship fund or trust similar to that found in conservation banking.<sup>67</sup> Stewardship projects favor federally managed lands, and the WCE seeks to enroll state and federal lands within their credit economy through connecting financial incentives for offsetting debit projects.<sup>68</sup> “The Exchange seeks to encourage improved management of lands for habitat and natural resources by allowing credit projects on federal- and state-owned and managed lands.” This displays how the WCE is an instrument acting to link assemblages together within the GRSG conservation assemblage to produce territories in support of Wyoming’s hydrocarbon economy. Additionally, this shows another avenue for how hydrocarbon development can be underwritten by taxpayer monies should federal or state lands become enrolled in mitigation credit production.

The WCE offers two types of credits: mitigation, and non-mitigation credits. Both credit categories apply to the above three management types, but non-mitigation credits do not require ongoing verification except for pre- and post-project completion. Non-mitigation credits are banked, and can be bought, and sold through the WCE, but do not require financial assurances, nor are they bound to meet requirements for additionality or durability because they do not offset industrial activity.<sup>69</sup> Additionality refers to whether a credit project has created additional benefits to a resource such that it would not have done so without project enrollment. An easement on top of a stewardship project, for example, would meet the criteria for additionality

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<sup>67</sup> Ibid. 23-24.

<sup>68</sup> Ibid. 18.

<sup>69</sup> Ibid. 17.

as it creates a deeper benefit to the target habitat by “alleviating the threat of future development and degradation.”<sup>70</sup> Durability refers to the term length of a project, and it requires that appropriate term length is assigned to the right project. A sagebrush restoration project, for example, would require a long-term development contract as it can take fifty years to see any real results from attempted restoration.<sup>71</sup>

Additionality and durability are required for all mitigation credit production as mitigation credits are used to offset economic activity that damages, and degrades habitat, or interrupts GRSG behavior including leking. Additionality requirements include methods and instruments for establishing what changes ought to take place on potential lands through the production of a baseline, whether changes on lands are progressing, and whether they have taken place. The WCE includes flexibility within the credit production through additionality by allowing for a plurality of different resource assessment methods, or RAMs. RAMs must be consistent with federal or state guidelines for assessing habitat quality, but it is important to notice that instruments can differ in their ways of producing knowledge about resources. Any differences between measurements are erased as credits are split solely between mitigation and non-mitigation categories with subdivisions by project type. Thus, the standardization of measurement that underlies the production, and stability of WCE currency is incomplete in the production of lands and the commodities of offset credits.

Recognizing that there are variations of measurement underlying credit production and thus commodity circulation within and through the WCE is important for two reasons: (1) there exists conflicting measurement frameworks that include some habitat qualities while excluding

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<sup>70</sup> Ibid. 19.

<sup>71</sup> Ibid. 20.

others; and (2) because the variations in measurement influence the debt requirements for would-be debtors from the WCE. It is because of the two reasons above that recognizing the erasure of standardized measurement conceals a larger problem inherent in the circulation and production of credits: they produce a notion of false equivalents through their structure that does not adequately reflect differences in on-the-ground realities for the credit producers, debtors, or GRSG.

The WCE operational handbook signals differences in measurement metrics concerning the production of false equivalents concealed in the mitigation credit commodity through recognizing differences in impact and habitat quality assessments between governmental organizations. As government agencies are targeted for enrollment through the WCE, the variations between organizational metrics becomes a site of friction within instrumentation, and thus environmentality. The BLM and U.S. Forest Service both have jurisdiction within GRSG range within Wyoming, and their data collection methods rely on the LANDFIRE system for broad scale sagebrush density sensing which is critical for establishing habitat quality, and thus calculating both impacts for debit projects, and credit production based on the landscape scale functional acre approach embedded within the WCE.<sup>72</sup> LANDFIRE datasets are also used in EDF's HQT to produce broad landscape scale scores, however, it is the impact site, and local habitat quality scores that shows the differences in credits produced by BLM and USFS measurements.<sup>73</sup> At the time of writing, the BLM and USFS do not have a standard measure or method for evaluating finer-scale habitat quality relative to GRSG needs.<sup>74</sup> Discussed in the

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<sup>72</sup> Ibid. 141.

<sup>73</sup> Wyoming Conservation Exchange. *Greater Sage-Grouse Habitat Quantification Tool: A Multi-Scaled Approach for Assessing Impacts and Benefits to Greater Sage-Grouse Habitat, Scientific Methods Document*. v.3.0. Environmental Defense Fund, 2014. 25.

<sup>74</sup> Ibid. 162.

introduction, the high habitat fidelity of GRSG makes fine-grained measurement the crux of their management and habitat offsetting.

The HQT is a candidate method for both organizations, and the WAFWA GRSG plan indicates the need for a standard measure to apply management actions consistently across the range. The HQT is one standard of measure against many including the Wyoming BLM's Density Disturbance Calculation Tool (DDCT). Most importantly, the HQT only tracks habitat qualities perceived as important to GRSG populations, and not the populations themselves. Thus, HQT is more interested in translating geopower into capital for circulation in its commodity circuits. Should BLM or USFS decide to track populations at a finer scale, measurement methods will conflict as suggested by a study funded by the Sweetwater River Conservancy - now Pathfinder Ranches, the largest GRSG conservation bank in the United States.<sup>75</sup>

The field methodology used in the Sweetwater study conflicts with how the HQT envisions habitat use, and benefit to GRSG. Specifically, it evaluated habitat value on actual use by radio-marked females over the course of a year to judge what habitats, and when mattered to the survival of the species.<sup>76</sup> The selection patterns of female GRSG included grasses - Nebraska sedge, specifically - that are not included during the summer under the HQT.<sup>77</sup> The study also destabilized sweeping notions of habitat selection through broad scale instruments such as LANDFIRE, and found variations among individuals that makes it difficult, at best, to judge which habitat qualities matter when and for what populations "In addition, sage-grouse habitats and sage-grouse use of these habitats vary across the range of the species (Connelly et. al., 2011).

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<sup>75</sup> Lebeau, Chad W., M. Dale Strickland, Gregory D. Johnson, and Michael S. Frank. "Landscape-Scale Approach to Quantifying Habitat Credits for a Greater Sage-grouse Habitat Conservation Bank." *Rangeland Ecology & Management* 71, no. 2, 2018. pp. 149-58. doi: 10.1016/j.rama.2017.10.004.

<sup>76</sup> Ibid. 151-152.

<sup>77</sup> Ibid. 155.



Typical habitat selection for one population may not necessarily apply to other populations, which is why future sage-grouse conservation banks should consider the specific habitat selection patterns associated with the affected population.”<sup>78</sup>

The findings in the Sweetwater study provide further insights into the behavior of GRSG on the ground, and how to understand GRSG conservation through a recognition of individual behavior, and selection patterns. Their study undermines the methodology inherent in the HQT, and thus WCE’s ability to produce credits that are treated as equivalent within the WCE economy:

The Stiver et. al. (2010) framework is primarily based on a habitat equivalency analysis (HEA) that does not incorporate population-specific sage-grouse use data and is therefore less accurate in defining habitat use and quality than the RSF analysis...We demonstrated that habitat preferences between populations may differ; thus, it is important to consider population-specific habitat selection patterns when establishing habitat conservation credits.

The Stiver study criticized above is a critical piece in the construction of the HQT, and also BLM and USFS evaluation metrics.<sup>79</sup> This disagreement, and criticism speaks to the importance of instruments within the construction of milieu, and the administration of populations. More importantly, the methods used in the Sweetwater study are approved for use by the BLM, thus undermining the stability of WCE currency, while showing how variations in instrumentality can be erased within the commodity nexus of that currency.

Without an established standard to measure, and track developments on the ground, and the specificity of those developments within the production and circulation of WCE currency, the WCE cannot accurately account for debit projects relative to the needs of GRSG populations. Habitat offsetting within the WCE economy is monitored and judged against metrics agreed

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<sup>78</sup> Ibid.

<sup>79</sup> Wyoming Conservation Exchange, 2014. 101.

upon in individual management plans. The success, and continuance of projects, be they stewardship, enhancement, or restoration rests on the agreed upon instruments that assess whether credit producers have fulfilled their end of the bargain. The variations in landscape are erased within the commodity nexus of WCE currency. Therefore, the debit projects requiring the purchase of mitigation credits are not trading in standardized habitat offsets save for the illusion that species specific habitats can be reproduced, rather than understanding variegated needs of local GRSG populations relative to the proximity of industrial disturbance.

The question remains, what is the commodity being traded and circulating within the WCE? I argue that they are fictitious commodities in the Polanyian sense. Karl Polanyi argues that land, labor, and currency are not *real* commodities but belong to a class of *fictitious* commodities. A real commodity for Polanyi “are here empirically defined as objects produced for sale on the market; markets, again, are empirically defined as actual contacts between buyers and sellers.”<sup>80</sup> While functional acres (FA) within the WCE look like real commodities at first blush, it is important to bear in mind that the market through which they circulate is incomplete as it relies on regulatory frameworks to compel actors to purchase offsets. The demand for FAs, in this sense, is manufactured by regulatory mandates, and thus cannot be said to be produced through voluntary associations. While labor combines with land to produce the FA, and the FA is then fed into the WCE, the supply is not trading in anything that can be properly said to be a material object and is simply capital referring to itself.

What is being traded is a sign value which contains within its nexus a use-value but only insofar as that use-value is relative to the consumptive needs of the buyer. As argued above, the currency conceals whether there is any use-value to GRSG, and thus the modifications of

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<sup>80</sup> Polanyi, Karl, 2001. 75.

landscape made by a credit producer may not create any benefit for the populations affected by development. Within the circulation of the FA currency, then there is merely the mediation of exchange based on what a buyer is willing to pay for a certified credit. The currency itself functions as a contract between buyer and seller, as the seller promises certain landscape conditions based on the project length relative to the offset needs of the buyer whose project durability is reflected in the currency purchased. This is a political economy of the sign that is consumed within the commodity assemblage producing it as Baudrillard suggests, and refers only to the transmutation of capital within the commodity circuit.<sup>81</sup>

Materially, durability and additionality requirements bound up in the credits purchased create ephemeral conditions on the ground that expire, or degrade over time and only have consumptive value as long as the GRSG conservation assemblage demands it. Thus, the credits purchased do not necessarily refer to anything but capital itself, as contracts between buyer and seller that form the basis of WCE market infrastructure through their circulation. In this sense, the objects that are produced are merely verified signs that do not refer to anything but the labor of the credit producer relative to the land over time judged against the internal standards of the commodity circuit. The ephemerality of consumer capitalism is seen within the commodity circuit as nothing truly durable is made within the environ of the conservation assemblage except monocultural reproduction of capital intensive synthetic habitat conditions skipped across a technological register of environmental accounting.<sup>82</sup> The credit economy within the WCE, therefore, is a product of regulatory standards against the backdrop of promises and contracts to be fulfilled bound up in the consumptive value of the sign.

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<sup>81</sup> Baudrillard, Jean. *For a Critique of the Political Economy of the Sign*. St. Louis, MO.: Telos Press, 1981. 65.

<sup>82</sup> Luke, Timothy W. *Capitalism, Democracy and Ecology: Departing from Marx*. Urbana and Chicago: University of Illinois Press, 1999. 63.

Without industrial capital, the degradation of the landscape, and compulsory regulatory standards of the Wyoming CAP the system of consumption cannot survive.<sup>83</sup>

Technonaturalization is merely a self-replicating process of capital's circulation through the virtual diagram of the GRSG conservation assemblage in Wyoming. Fed into the WCE, the data collected by the allowed RAMs becomes pure abstraction for sale within an incomplete market. The sign's use-value is purchasing power translated into the ability to degrade habitat within the Wyoming CAP. The labor bound up in the FA is only part of the abstraction, and signifies another income stream for the credit developer who works the land.

The land itself is reified into tradable abstractions taking the form of a contract between buyer and seller and alludes to the benefits of GRSG as plants, and bushes are moved around the map in the fulfillment of contractual obligations. In short, bound up within the sign of the FA is extra industrial input from credit developers as laborers functioning under the WCE as a labor instrument. The developers themselves become part of an industrial labor force that allows for the continued extraction of paleotechnic commodities, and thus the continued degradation of the land, and its wildlife.

#### Conclusion: The Circulation of the Commodity Form

In the final analysis then, the currency that courses through the WCE cannot be said to be anything more than a fictitious commodity flowing through an incomplete market detached from ground conditions or benefits to the species. That which is traded is the ability to degrade land and habitat. Without a way to manufacture demand, the WCE would collapse, and the FA commodity would refer only to efforts to attract capital through the manufacture of sign-values through false notions of equivalence bound up in them. In this way, the FA displays the power of

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<sup>83</sup> Baudrillard, 1981. 86.

the commodity form, or as Lukács would have it “Its basis is that a relation of people takes on the character of a thing and thus acquires a ‘phantom objectivity’, an autonomy that seems so strictly rational and all-embracing as to conceal every trace of its fundamental nature: the relation between people.”<sup>84</sup>

The obfuscation of relationships to nature, to GRSG specifically, is completed within the political economy of the FA sign as it is meant to represent compensation to the species in the production of habitat. However, that which is compensated is capital as it expands within the commodity circuit leaving the birds on the ground as reification conceals real qualitative meaning inherent within the production of place. The fictitious commodity of the FA represents the contractual obligations between capital, and not compensation to the species as its production relies on a megamachinic consciousness in which the qualitative is only important as long as it is removable, replaceable, tradable, and consumable, and not the fine adjustments of individuals necessary for the survival of populations. Within the form of the commodity, then, is abstracted logics that instrumentalize nature into components than can be disassembled and reassembled at will, while obfuscating the qualities inherent in habitat through quantification, and the need for standardization inherent in currency production.

In the above sense, the currency within the WCE, and thus the political economy constructed, and embodied by it displays the political-economics of capital that treats the death of species as something to be avoided only when it creates significant fiscal burdens or inhibits the use of space. Operation Warbler as a proof of concept shows the legacy inherited by the Wyoming Conservation Exchange in the production of space, and the inconvenience of

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<sup>84</sup> Lukács, 1971. 83.

qualitative variations to capitalist logics. The functional acre commodity displays the organizational logics of the actors involved in the administration of the WCE as a nexus, and shows the tactical power inherent in the production of truth relative to strategy. The attempted geo-engineering of instrumental attitudes toward nature - to the Greater sage-grouse - is seen in how the FA commodity displays contractual relationships for conservation within its form, and not the imperative to truly lessen the damage done to the species.

The manufactured permissibility of destruction through offsets is given new life within the notion of the functional acre currency, and the life histories of individuals affected by it are erased and reified within its production and circulation. In this way, the WCE creates regulatory certainty for machines and their instruments to continue producing the environment through abstracted tit-for-tat notions of quantifiable territory. The territories produced under the labor of the fictitious commodity display the inscriptions of capital's desire for territory, and unrestrained search for profit and exploitation. Fed into incomplete markets such as the WCE, the habitat upon which GRSG depends is an abstraction, and a free-floating signification of promissory notes of capital to repay the debts of others while continuing to profit from exploiting the land. In this way, EDF has done a service to industrial capital and the paleotechnic complex in the formation of the Wyoming Conservation Exchange. The responsibility for repairing the damage done by extractive industry is paid for at a bargain through the land and labor of others reified and alienated within commodity circuits of the industrial machine through the extension of contracts, and wages. In this way, the FA is capital referring to itself, and is part and parcel of a process designed to construct and administer territory through the enrollment of human populations in the hope of managing systems of degradation relative to the species being of GRSG.

The grip of neoliberal environmentalism is extended through the instrument of the WCE itself as it de-politicizes the problems inherent in the continued exploitation of the land, and its resources. It attempts to draw in as much labor as possible through the extension of instrumental logics and the opportunity to make money by designing synthetic environs that reinforce notions of industrial need. It relies on state intervention in the formation of its incomplete market under the guise of conservation activities, and concern for the species. It extends the production of fictitious commodities into new territories, and in turn, produces a notion of false equivalence among qualitative differences. Perhaps most importantly, it attempts to continue the flow of paleotechnic commodities through the construction of milieus in the face of crisis. Therefore, the WCE fits into a scheme of neoliberal environmentalism as an instrument that tacticalizes the production of truth relative to conservation efforts, and the perceptions of actors involved. It fulfills a security function within neoliberal environmentalism as it attempts to discipline human populations through the normalization of instrumental relationships to nature, and people bound up in the commodity form of the functional acre.

In the chapter to follow, I examine a dense node within the administration of the Wyoming Conservation Exchange to display more fully the industrial, and epistemic network that the exchange exhibits. Specifically, Wanda Burget provides a window into the question of who benefits from this instrument. Half of Burget's relevant connections will be explored in the following chapter as her network is extensive. If the greater sage-grouse is an instrument in the experimental apparatus of the Wyoming Conservation Exchange, then it remains to be seen who benefits from its continued function. As Lewis Mumford wrote "In a world of machines, or of creatures that can be reduced to machines, technocrats would indeed be gods."<sup>85</sup>

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<sup>85</sup> Mumford, 1970. 72.

## **Chapter 4:**

### **Localized Instruments: Epistemic Networks and the Environmental-Industrial Complex**

This chapter is an analysis of the industrial connections within Wyoming through the Wyoming Conservation Exchange. I argue that the WCE is an instrumental complex developed, and administered by tactically inserted instrumentalized humans working on behalf of the paleotechnic complex. The argument uses Wanda Burget, the WCE's Vice President as an entry point for an elite network analysis, and examines her organizational interlocks that point to specific actors with vested interests in the development, and function of a habitat offset credit economy for the greater sage-grouse in Wyoming. The industry under consideration is Wyoming's biggest export, the trona/natural soda ash industry, though the chapter foreshadows the conclusion by showing how soda ash is connected to the hydrocarbon complex at the heart of the Megamachine through Burget.

Burget has deep organizational connections to the mining and chemical industry in Wyoming's Green River Basin that revolves around the production of natural soda ash through the extraction of trona ore deep under the surface, as well as direct ties to some of the most strategically important coalfields on the planet in the Powder River Basin. Her associations reveal a commodity network of machinic assemblages connected to the Megamachine that make GRSG in Wyoming a global concern for its expansion. Though seemingly less important than the hydrocarbon complex for the Megamachine, soda ash is projected to become a multibillion-dollar industry as it supports urban infrastructural development in the global South. Numerically less impressive as an industry though geopolitically important, the dynamics within Wyoming concerning soda ash production are nevertheless critical to understanding how biopower is articulated through the GRSG conservation assemblage, and how this supports megamachinic expansion.



This chapter focuses on the informational networks created by the localization of environmentalism through the development of environmental non-governmental organizations (ENGO) and Wyoming Local Sage-grouse Working Groups (LWG). In particular, it shows how power was articulated at the local level through the tactical insertion of technocrats who aided and protected the paleotechnic complex in the Green River Basin (GRB) in Southwestern Wyoming. Wanda Burget provides the linkages to the Southwestern Wyoming Local Sage-grouse Working Group (SWLWG) through her association with Julie Lutz, her partner at Burget's Accord Resource Solutions consultancy, and her Chairman of the Board on one of her ENGO associations, the Wyoming Mining Natural Resources Foundation. For reasons of space, I cannot reveal Burget's full network which extends into the largest coal field on the planet in the Powder River Basin (PRB). However, future work should include her associations with Peabody Coal - her former employer of 29 years,<sup>1</sup> the National Coal Council, the Northeast Wyoming Local Sage-grouse Working Group, and the Thunder Basin Grasslands Prairie Ecosystem Association as she is a signatory on each and displays connections that go deeper than a cursory mention can highlight.<sup>2</sup> This chapter, as a result, takes the SWLWG as a focal point to discuss how the natural soda ash industry instrumentalized local conservation to serve their ends.

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<sup>1</sup> "Wanda Burget." *Linked In*. No Date. Accessed May 08, 2019. <https://www.linkedin.com/in/wanda-burget-84a5857>

<sup>2</sup> National Coal Council. *Advancing U.S. Coal Exports: An Assessment of Opportunities to Enhance Exports of U.S. Coal*. National Coal Council. Washington, D.C., 2018; National Coal Council. "MEMBER ROSTER – 2019: Revised 04-01-19 Chair's Advisory Council Members" National Coal Council. Washington, D.C., 2019; "The Board." The Board - Thunder Basin Grasslands Prairie Ecosystem Association. Accessed November 15, 2019. <https://www.tbgspea.org/who-we-are/the-board>; The Northeast Wyoming Sage-grouse Working Group. *Northeast Wyoming Sage-grouse Conservation Plan*. The Northeast Wyoming Sage-grouse Working Group, August 15, 2006. 2; Thunder Basin Grasslands Prairie Ecosystem Association and U.S. Fish and Wildlife Service. *Candidate Conservation Agreement with Assurances for Sagebrush Steppe Assemblage Greater Sage-grouse (Centrocercus urophasianus) Sagebrush Sparrow (Artemisospiza nevadensis) Brewer's Sparrow (Spizella breweri) Sage Thrasher (Oreoscoptes montanus) and Shortgrass Prairie Assemblage Black-tailed Prairie Dog (Cynomys ludovicianus) Mountain Plover (Charadrius montanus) Burrowing Owl (Athene cunicularia) Ferruginous Hawk (Buteo regalis) with integrated Candidate Conservation Agreement and Conservation Agreement*. U.S. Fish and Wildlife Service. February 8, 2017; U.S. Fish and Wildlife Service, Bureau of Land Management, U.S. Forest Service, and Thunder Basin Grasslands Prairie Ecosystem Association. "Appendix G Current Association Membership for Candidate

The SWLWG is an articulation of state and federal biopower and administers land important to mining and fossil fuels production. In particular, their service area includes the largest proven reserve of trona - the mineral precursor to soda ash - in the world and its deposits are projected to become more important and valuable as global urbanization increases. LWG's, I argue are part of an instrumental network that is technocratically administered for the continued reproduction of extractive industry within Wyoming, and their conservation activities include assisting the paleotechnic complex by reinforcing the economic status quo. Tracing the organizational interlocks of Wanda Burget reveal an instrumental network that assists neoliberal environmentality security functions for the reproduction of the paleotechnic complex in Wyoming.

This chapter proceeds in sections. First, I characterize how technocratic power is articulated within assemblages through defining technocrats as a form of instrumentalized humans that co-evolved alongside machinery. Second, I show how technocratic power is connected through environmental organizations by exploring some of Wanda Burget's associations that link together separately operating machines and then draw them into the GRSG conservation assemblage. Third, following my beginning with Burget, I show how Julie Lutz is a tactically inserted technocrat in the SWLWG and expose the politics behind the formation of LWGs as technocratic instruments within adaptive management informational networks that are fed into the GRSG conservation assemblage. And finally, I show how the SWLWG tactically translated biopower from the GRSG conservation assemblage into geopower that strategically favors and protects the natural soda ash industry as part of the paleotechnic complex. The

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Conservation Agreement with Assurances and integrated Candidate Conservation Agreement and Conservation Agreement." U.S. Fish and Wildlife Service. February 8, 2017.

conclusion then organizes the results of my network analysis, and foreshadows the concluding chapter as an exploration of the hydrocarbon complex within the WCE instrument.

### Tools of the Trade: The Greater Sage-grouse and Technocratic Power

This section develops a notion of instrumentalized humanity through elite network analysis that focuses on technocratic power within Wyoming GRSG conservation networks.<sup>3</sup> I characterize the technocrat as a species of instrumentalized human that supervises the formation of technonature instead of merely acting as a sort of input as explored in the previous chapter. The technocrat is a type of instrument that connects assemblages together, and, as the analysis below reveals, is primarily responsible for translating tactical power into force through a supervisory role within machinic networks.

Technocrats are tactically important within machinery and their labor is that of a supervisor ensuring that the machines have the materials necessary for their continued reproduction.<sup>4</sup> They are a segment of labor entrusted by capital to maintain its continued expansion and circulation through maintaining material embodiments of it in the form of the machine as fixed capital.<sup>5</sup> Labor, as discussed in the previous chapter, is critical to maintaining the function and flow of capital through the production of commodities that simultaneously commodify their being through reification and monetization of energy, time and skill as a

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<sup>3</sup> Domhoff, G. William. *Who Rules America?*. Englewood Cliffs, NJ: Prentice-Hall, 1967; Harvey, David. *The Limits to Capital*. Chicago: The University of Chicago Press, 1982. 398-399; Mills, C. Wright. *The Power Elite*. Oxford: Oxford University Press, 2000; Slaughter, Sheila, and Gary Rhoades. *Academic Capitalism and the New Economy: Markets, State, and Higher Education*. Baltimore: Johns Hopkins University Press, 2004. 25-6, 155, 157, 207, 250-252, 254, 307; Sweezy, Paul, M. *The Theory of Capitalist Development: Principles of Marxian Political Economy*. New York: Monthly Review Press, 1956. 260-261.

<sup>4</sup> Djilas, Milovan. *The New Class: An Analysis of the Communist System*. London: Thames and Hudson, 1957. 42; Harvey, 1982. 31; Marx, Karl *Grundrisse: Foundations of the Critique of Political Economy*. Translated by Martin Nicolaus. London: Penguin Books, 2005. 692-93; Sweezy, 1956. 258.

<sup>5</sup> Harvey, 1982. 20; Marx, Karl. *Capital: A Critique of Political Economy*. Edited by Friedrich Engels. Vol. II. Moscow: Foreign Languages Publishing House, 1961. 32; Marx, 2005. 694.

process of alienation.<sup>6</sup> The commodity contains the history of labor and thus the history of alienated social organization within its being, while submerging and erasing that history through a semiotic economy of false equivalents mediated through monetary exchange.<sup>7</sup> The commodity form, as discussed, obscures relationships of humans to one another, humans to nature, and humans to capital through abstractive logics necessary for the continued alienation of labor from the fruits of production thus reproducing materiality and constructing an environment of circulating commodities bearing its inscription.<sup>8</sup>

The above process is accomplished within the commodity circuit and the transmutation of capital from the valuation of time and energy in the form of wages, to the production of exchange values embodied by commodities.<sup>9</sup> The flow of commodities thus represent real material flows of human labor that combines the organic and synthetic together through machinery in the production of exchange values.<sup>10</sup> While labor can be taken as necessary industrial input and is included within the circulation of commodities but disguised behind the commodity form, technocrats are extensions of machinery and thus display both machinic logic in the production of reality, and the commodity form in how they frame relationships.<sup>11</sup> They are not sacrificed to the machine as labor, but are its necessary components as their labor is to maintain commodity flows and discipline labor to feed the machines.<sup>12</sup> Technocrats, thus, are tasked with the maintenance of fixed capital materially embodied as machines while being

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<sup>6</sup> Lukács, György. *History and Class Consciousness: Studies in Marxist Dialectics*. Translated by Rodney Livingstone. London: The Merlin Press, 1971. 248.

<sup>7</sup> Lukács, 1971. 170; Marx, 1961. 43.

<sup>8</sup> Lukács, 1971. 85-86, 93; Sweezy, 1956. 51.

<sup>9</sup> Lukács, 1971. 99; Marx, 1961. 47-48; Sweezy, 1956. 57, 79.

<sup>10</sup> Harvey, 1982. 131; Lukács, 1971. 90, 100, 166, 176; Luke, Timothy W. *Capitalism, Democracy and Ecology: Departing from Marx*. Chicago: University of Illinois Press, 1999. 64.

<sup>11</sup> Luke, Timothy W. "At the end of Nature: Cyborgs, 'Humachines', and Environments in Postmodernity." *environment and Planning A*, vol. 29, 1997, pp.1367-1380. 1376.

<sup>12</sup> Harvey, 1982. 109-110; Luke, 1999. 50; Marx, 1961. 170-171, 173; Marx, 2005. 694; Sweezy, 1956. 339.

extensions of the machine and thus extensions of capital. Therefore, the technocrat is a type of instrument that is both human, and machine owing its life history to human-machine coevolution.<sup>13</sup>

Technocratic labor includes harnessing and directing the technoscientific production and expansion of capital into new regions by instrumentalizing the organic for synthetic production. Disciplining labor includes the manipulation of symbolic orders forming political economies of signs that circulate as discourse in the production of truth used to justify relations among things as a function of force.<sup>14</sup> This is accomplished through the production of models that are then applied to reality simultaneously remaking milieux while justifying technocratic intervention.<sup>15</sup> Thus, technocrats are socially endowed beings who use their position as a form of expert labor to advocate on behalf of capital expansion, or they may organize inquiries into new areas for capital's expansion.<sup>16</sup> The technocrat, above, is tactically important to machinic reproduction through executing technonatural formation in relation to strategy indexed to the demands of logistical commodity circuits. Their function within productive networks, therefore, is that of security as they are concerned with the production of milieux relative to commodity flows.<sup>17</sup> They are, thus a sort of elite in that they are not consumed by fixed capital as labor, but age as a part of it as they are critical to its reproductive capability.<sup>18</sup>

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<sup>13</sup> Bookchin, Murray. *Post-scarcity Anarchism*. Berkeley: Ramparts Press, 1971. 133; Harvey, 1982. 108, 118; Luke, 1999. 39.

<sup>14</sup> Konrád, György, and Szelényi, Iván. *The Intellectuals on the Road to Class Power*. Translated by Andrew Arato and Richard E. Allen. London: Harvester, 1979. 32; Luke, 1999. 50.

<sup>15</sup> Luke, 1999. 50-53.

<sup>16</sup> Gouldner, Alvin Ward. *The Future of Intellectuals and the Rise of the New Class: A Frame of Reference, Theses, Conjectures, Arguments, and an Historical Perspective on the Role of Intellectuals and Intelligentsia in the International Class Contest of the Modern Era*. London: Macmillan, 1979. 33; Luke, 1999. 9, 50-51.

<sup>17</sup> Sweezy, 1956. 248.

<sup>18</sup> Harvey, 1982. 32; Marx, 1961. 32, 159, 170-171, 173, 449; Sweezy, 1956. 339.

Technocratic lives are different from the precarity of the worker, and they exist within elite networks that link together seemingly different, if not contradictory machines that reproduce the conditions of living.<sup>19</sup> Their lives are not consumed within the commodity but evidence of their being is shown in linkages between commodity flows that enable the continued circulation of capital.<sup>20</sup> The networks they create are thus linked materially through their being, as well as the environments they inhabit, and their material consciousness is embodied in their political, economic, and cultural positions as managers for the machines of capital.<sup>21</sup> As instruments, they condition the conduct of conduct through the construction of milieux that is accomplished both materially and semiotically through the translation and manipulation of information in service to commodity networks.<sup>22</sup>

Organizationally, technocrats exist within decision-making structures that direct the activities of organizations.<sup>23</sup> As instruments, the technocrat is entrusted with the reproductive viability of organizations beyond the bureaucrat whose duty is to transmit orders and follow procedure.<sup>24</sup> The technocrat translates the desires of the machines from the virtual to the actual by mobilizing, and directing flows of capital toward further instrumentalization of reality.<sup>25</sup> This displays their managerial power through agenda setting that is critical to the reproduction of the material conditions necessary for machinic living to continue.<sup>26</sup> Their organizational positionality seats them within what John Kenneth Galbraith referred to as the *technostructure*

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<sup>19</sup> Lasch, Christopher. *The Revolt of the Elites and the Betrayal of Democracy*. New York: W. W. Norton & Company, 1996. 19-20; Luke, 1999. 17, 21, 45; Sweezy, 1956. 313.

<sup>20</sup> Harvey, 1982. 32, 118; Lukács, 1971. 38; Luke, 1999. 53.

<sup>21</sup> Lukács, 1971. 93; Luke, 1999. 3, 5, 21; Marx, 1961. 166.

<sup>22</sup> Luke, 1999. 1, 32, 33, 69.

<sup>23</sup> Ibid. 17, 32-33.

<sup>24</sup> Gouldner, 1979. 51-5.

<sup>25</sup> Mills, C. Wright. *The Sociological Imagination*. London: Oxford University Press, 1959. 101.

<sup>26</sup> Luke, 1999. 70, 72-73.

and their technical and organizational power is expressed through their network densities as nodes within technostructures.<sup>27</sup>

Following Mumford, the Megamachine is composed of multiple technostructures all working to reproduce the material conditions of the paleotechnic complex operating as the material basis of global environs. The mass coordination of labor is critical to megamachinic function as labor converts the organic into the synthetic conditions of living through the creation and circulation of commodities.<sup>28</sup> However, as there are multiple technostructures, there is no necessity for class unification among technocrats and they can diverge as they service their machines. Divergence, for my purposes is only relevant when machinic assemblages conflict with the maintenance of the paleotechnic complex and thus with the maintenance of the Megamachine as a form of fossil fueled extractive consciousness seen through the global circulation of commodities bearing its inscription. Thus, the paleotechnic model advanced by the technocrat is critical to the maintenance of the Megamachine, displays a global consciousness, and often invokes a technocratic ethos harnessing the discourse of science and technology to universalizing logics grounded in an absolutist discourse of progress.<sup>29</sup>

*Progress* is invoked discursively to reproduce the semiotic and material conditions necessary for technonaturalization and the domination of the organic within the commodity circuit. Progress as a regulative ideal is, therefore, often used by technocrats to justify further invasion, and subjugation of the organic to megamachinic circuitry under the guise of a universal humanism that promises freedom from want while failing to criticize the status quo.<sup>30</sup> Discourses

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<sup>27</sup> Galbraith, John Kenneth. *The New Industrial State*. New York: Houghton Mifflin Company, 1967. 60-1; Luke, 1999. 67.

<sup>28</sup> Lukács, 1971. 93, 100, 176.

<sup>29</sup> Harvey, 1982. 122; Luke, 1999. 220; Mills, 1956. 113.

<sup>30</sup> Harvey, 1982. 122; Luke, 1999. 69, 79, 99, 101, 127; Mumford, Lewis. *The Myth of the Machine: The Pentagon of Power*. New York: Harcourt Brace Jovanovich, 1970. 272.

of progress are materially embodied in the production and development of instruments that allow the further territorialization of materiality for the Megamachine.<sup>31</sup> Thus, the technocrat and its efforts are shown through the production of instruments and commodities perceived as alleviating conditions of scarcity simulated through the distributional patterns of capital's uneven development and technocratic market rhetoric.<sup>32</sup> Technocrats, therefore, appear to speak for the machine while simultaneously delivering its cornucopia through discourses of progress while submerging the vicissitudes of machinic reproduction through the commodity form.<sup>33</sup>

Technocrats exhibit their discursive power through their technostructural positions as elite functionaries speaking on behalf of the machine as a sort of priesthood.<sup>34</sup> Their lives are dependent on the continued function of their machines, though they are able to move between them and connect them as an instrumental nexus.<sup>35</sup> They are thus instruments of their machines and can connect others together discursively as part of networking.<sup>36</sup> Their relative importance to their machines is shown through their network densities as nodes and tracing their connections, therefore reveals the diagrammatic plan of the machines they serve. Thus, beginning with one instrumentalized technocratic assemblage, such as the Wyoming conservation Exchange, should reveal a network of associations that show linkages between distinct machinic networks. Wanda Burget shows the WCE as embedded within a paleotechnic commodity network that enables the global reproduction of the Megamachine. Dovetailing with previous efforts concerning elite network analysis, and technoscientific development, the analysis below reveals who benefits

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<sup>31</sup> Mumford, Lewis. *Technics and Civilization*. New York: Harcourt Brace Jovanovich, 1934. 189, 215; Mumford, Lewis. *The Myth of the Machine: Technics and Human Development*. New York: Harcourt Brace Jovanovich, 1966. 3; Luke, 1999. 70, 96.

<sup>32</sup> Mumford, 1932. 192-193; Luke, 1999. 50-51, 94-95.

<sup>33</sup> Luke, 1999. 64, 72; Mumford, 1934. 182-185; Mumford, 1970. 222.

<sup>34</sup> Mumford, 1970. 30, 73, 199, 300; Sweezy, 1956. 339.

<sup>35</sup> Mumford, 1970. 24, 301.

<sup>36</sup> Luke, Timothy W. "At the end of Nature: Cyborgs, 'Humachines', and Environments in Postmodernity." *Environment and Planning A*, vol. 29, 1997b. 1371-1372.



most from the development, and administration of the Wyoming Conservation Exchange, and its mitigation credit economy by connecting the local on-the-ground realities within Wyoming's synthetic environs to the global reach of the Megamachine.<sup>37</sup>

C. Wright Mills teaches us to look for elite power, and influence within local society.<sup>38</sup> More precisely, he argued that within local society there will be cliques that form “whose members decide the important community issues, as well as many larger issues of state and nation in which ‘the community’ is involved.”<sup>39</sup> Local society, in its upper echelons of decision-makers, technocrats, and the bureaucratic circles that support the reproduction of social relations are bound to networks of national power that have formed through the gradual obliteration of urban/rural social boundaries.<sup>40</sup> Moreover, this process has accomplished the formation of symbiotic relationships between national economic interests, and the development of local economies.<sup>41</sup> This transformation accompanied the entrance of corporate prestige into the upper echelons of local society through the perception that those belonging to a national corporation articulate both the local, and national economic interests. Thus, he concludes “the example of the managerial elite of the national corporation cause local societies everywhere to become satellites of status and class and power systems that extend beyond their local horizon.”<sup>42</sup>

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<sup>37</sup> Best, Steven, Richard Kahn, Anthony J. Nocella, II, and Peter McLaren, eds. *The Global Industrial Complex: Systems of Domination*. Lanham: Lexington Books, 2011; Domhoff, G. William. *Who Rules America?*. Englewood Cliffs, NJ: Prentice-Hall, 1967; Haraway, Donna J. *Modest\_Witness@Second\_Millennium. FemaleMan\_Meets\_OncoMouse: Feminism and Technoscience*. New York: Routledge, 1997; Mills, C. Wright. *The Power Elite*. Oxford: Oxford University Press. 2000; Mumford, 1970. 257, 262; Suarez-Villa, Luis. *Technocapitalism: A Critical Perspective on Technological Innovation and Corporatism*. Philadelphia: Temple University Press, 2009.

<sup>38</sup> Mills, 2000. 36.

<sup>39</sup> Ibid.

<sup>40</sup> Ibid. 37-41, 45.

<sup>41</sup> Ibid. 39.

<sup>42</sup> Ibid. 46.

G. William Domhoff found that local power often includes elite interests through the control of local regulatory agencies, as well as through influencing elected officials, office holdings, and dominating the boards of regulatory bodies.<sup>43</sup> Domhoff's interest focuses on corporate influence, and control of regulatory bodies through an insertion of elites within the networks described by Mills. Quoting Robert Dahl's research in New Haven he writes:

[M]embers of the power elite often take a direct interest in one aspect of local politics, that aspect which concerns business prosperity. Dahl, for example, notes that in New Haven the mayor's finance committee is numerically dominated by big businessmen. The final influence of representatives of the upper class on local government is through their control of nongovernmental resources which partially shapes the general framework within which political decision-making takes place.<sup>44</sup>

Domhoff attempts to disambiguate the power elite from the upper class by grounding the power elite within institutional hierarchies controlled by members of the American upper class resulting in a definition that allows him to say "any particular member of the power elite may or may not be a member of the upper class."<sup>45</sup> This definition is useful as it allows for an institutional understanding of power grounded in authority, hierarchy, and decision-making rather than simply wealth, and income that could include the idle rich with no interest in public affairs. Further, it allows for a definition of the power elite that can show how those without extreme riches came to be key decision-makers, and act as agents within local institutions for interests that may be expressed at the state, federal, or transnational level. This works well with Mills who recognized that board members for local organizations may not be members of the upper classes themselves, but are working as their agents through stacking advisory power with

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<sup>43</sup> Domhoff, 1967. 135-37.

<sup>44</sup> Ibid. 137.

<sup>45</sup> Ibid. 8.

industry faithful.<sup>46</sup> In short, the people named in the analysis below are themselves corporate instruments- technocrats - tools for producing technonature for the Megamachine.<sup>47</sup>

Taking Domhoff and Mills together, my focus is not the power elite as humans, but their agents working within and through institutions to safeguard interests through the construction of technonatural formations. As Mills writes concerning his power elite it “often seems less a collection of persons than of corporate entities, which are in great part created and spoken for as standard types of ‘personality.’”<sup>48</sup> For my analysis, the power elite are corporations that form the basis of material culture within synthetic environs.<sup>49</sup> Soda ash and hydrocarbon production are both global commodity flows that enable the construction and operation of global infrastructure. Therefore, the continued operation of corporation that produce, and direct the flows of the above commodities are cast as a power elite and display gradations of power within their relationships to one another. This definition allows for an analysis of instrumentalized humans as technocrats that are reliant on their respective machine for their continued existence while displacing the anthropocentric view within the construction of environment to that of machines conceived as machines of capital.<sup>50</sup>

The instrument that is the Wyoming Conservation Exchange, and its attendant technologies is worth examining as it is presented as part of an environmental-industrial complex comprised of fossil fuels, mining, and some of the biggest players in environmentalism. I explore its connections to the American Natural Soda Ash Corporation (ANSAC) below though its

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<sup>46</sup> Ibid. 37-38.

<sup>47</sup> Mumford, 1970. 348.

<sup>48</sup> Mills, 2000. 15.

<sup>49</sup> Luke, 1999. 60-61, 69-70; Mumford, 1970. 113.

<sup>50</sup> Luke, Timothy W. “Cyborg Enchantments: Commodity Fetishism and Human/Machine Interactions.” *Strategies*: Vol. 13, No. 1, 2000. 44, 59; Luke, Timothy W. “Liberal Society and Cyborg Subjectivity: The Politics of Environments, Bodies and Nature.” *Alternatives: Global, Local, Political*: Vol. 21, No. 1, Jan-Mar, 1996. 10, 11.

technostructure which shows Wanda Burget as an instrument linking together multiple machines in the production of technonature. The control of instruments through board membership, and advisory discretion, that can decide the fate of GRSG in Wyoming, such as the WCE have the power to construct milieux through experimentation, and implementation within the production of knowledge in service to power. The Greater Sage-grouse himself, emerges as a way for power to inscribe its desires into the landscape of Wyoming, and the annals of biotic history through the instrument of the Wyoming Conservation Exchange and the network of assemblages connected to it.

As institutions of the US and global economy mineral extraction, and environmentalism are shown to be working together to construct technonature within Wyoming through strategic membership within local sage-grouse working groups which feed into the larger GRSG conservation assemblage including the WCE. As an assemblage of what should be contradictory institutions, and interests, the Wyoming Conservation Exchange leadership echoes Mills “as the institutional mechanics of our time have opened up avenues to men pursuing their several interests, many of them have come to see that these several interests could be realized more easily if they worked together, in informal as well as in more formal ways.”<sup>51</sup> The women below, and the networks of which they are a part, shows that the Wyoming Conservation Exchange is part of a security apparatus for the Megamachine through the attempted control of milieux through which the problem of GRSG is articulated.

Wanda Burget provides an entrance into a vast mining network that runs from the Green River Basin in Southwestern Wyoming, to the Powder River and Thunder Basins in the Northeastern corner of the state. Both the Green River and Powder River basins are critical for

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<sup>51</sup> Ibid. 20.

mining interests in Wyoming, and, as the next section shows, the United States through global trade in natural soda ash in Southwestern Wyoming. Both the Green River and Powder River basins are critical habitat for the GRSG, and are managed by local sage-grouse working groups derived from the federal and state partnerships created through the Greater Sage-grouse Initiative discussed in the previous chapter. These working groups are an articulation of federal, and state power at the local level, and are tasked with managing GRSG populations in their respective territories. While I cannot give a full exposition of the groups in the Powder River Basin below, I explore the formation of the LWGs and their importance to the GRSG conservation assemblage of state and federal biopower.

Wyoming's GRSG populations are carved into eight administered territories through the local working groups, thus representing eight instrumentalized localities concerned with the balance of economic development, and the reproductive stability of GRSG populations. However, as this, and the next section argue, the local working groups do not simply include local peoples concerned with GRSG conservation, but actors responsible for the destruction of GRSG habitat, and thus the destruction of the species itself. With that in mind, I turn to the first network of technocratic elites serving their machines below through Wanda Burget and her associate, Julie Lutz.

#### Wanda Burget: The Greater Sage-grouse in the Mines

Wanda Burget, Vice President of the WCE, has been active in the Wyoming mining community for over three decades. She has helped develop “conservation agreements, initiatives and strategies designed to balance industrial development and provide protections for sensitive wildlife species including the greater sage grouse,” as a conservation operative for mining

interests in Wyoming.<sup>52</sup> Her non-profit network includes serving as a board member - representing mining - for the Thunder Basin Grasslands Prairie Association from 2000 to 2013, membership on the Partnership Council for the Cooperative Sagebrush Steppe Initiative from 2007 to 2013, and serving as a mining representative for the Northeast Wyoming Local Sage Grouse Working Group from 2004 to 2013. She is also Executive Director of the Wyoming Mining Natural Resources Foundation.<sup>53</sup>

Burget's business associations revolve around her consulting group, Accord Resource Solutions LLC which interfaces with extractive industry in Wyoming to develop corporate conservation plans that are "designed to balance industrial development and agricultural production with protections for wildlife and important ecosystems. Additional specialties include mineral leasing and permitting; due diligence investigations; air emission inventory, control, and permitting; regulatory and government policy; community relations and sustainable natural resource development."<sup>54</sup> Accord's mission statement is telling of the company's orientation to economic development and conservation in Wyoming "Accord Resource Solutions, LLC is dedicated to supporting natural resource users, managers, developers, agencies and partners in conservation to develop and implement cooperative, practical, science-based solutions that benefit the land and its people."<sup>55</sup> It should be noted that concern for any species aside from humans, and more importantly industry is mentioned nowhere in Accord's mission statement, and their adherence to "the Code of the West," cements Burget and her consulting company as

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<sup>52</sup> "Wanda Burget." *Linked In*. No Date. Accessed May 08, 2019. <https://www.linkedin.com/in/wanda-burget-84a5857>

<sup>53</sup> "Current Members." Wyoming Mining Natural Resource Foundation. Accessed May 08, 2019. <http://www.wmnr.org/current-members.html>.

<sup>54</sup> "Meet the Team." Accord Resource Solutions, LLC. Accessed May 8, 2019. <http://www.accordresourcesolutions.com/meet-the-team.html>.

<sup>55</sup> "Our Mission." Accord Resource Solutions, LLC. Accessed May 08, 2019. <http://www.accordresourcesolutions.com/our-mission.html>.

largely concerned with brand management. The Code of the West<sup>56</sup> plugged into the Accord Mission Statement tellingly includes “Ride for the brand,” as a prime directive within their corporate culture and ethics.<sup>57</sup> Her non-profit and consulting work, therefore, are intimately tied to her ability to survive as an operative for mining interests in Wyoming, and her network reveals whose interests she represents as she serves as WCE’s Vice President.

I focus on two important interlocks within Burget’s network below that show she is connected to powerful extractive interests in Wyoming. In particular, her association with the Wyoming Mining Natural Resources Foundation connect her to the SWLWG and her associations reveal that she is embedded within a mining network that includes the extraction of trona ore - the mineral precursor to natural soda ash. This analysis reveals who benefits from sage-grouse conservation initiatives through Burget’s efforts as a brand manager, and corporate conservationist. Most importantly, it reveals how local working groups can, and do support the paleotechnic complex in Wyoming through technocratic domination of the landscape through resource conservation. Those who benefit most from the activities of the local sage-grouse working groups reviewed below are global players in energy production, and US natural soda ash.

Burget is one seat on the WCE board of directors whose purpose is to represent “industry,” so the networks to which she belongs is nothing startling. However, the industrial

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<sup>56</sup> The Code of the West is a business ethics initiative started in 2004 that uses the iconic cowboy, and the unwritten code they supposedly followed to influence business development. The author recognizes that this initiative is important to understanding business practices of Accord Solutions LLC, but for the purpose of analysis and reasons of space cannot explore the code, or its adherents any further than the recognition that Accord Solutions LLC is bound to represent the brands they consult as best as possible. This means that Accord Solutions LLC is an advocate for their customers and will do their best to influence others as part of corporate public relations strategy. While this point is not explored in greater detail, it has been a standard practice in corporate public relations ethics to always protect the brand, and, as a result, corporate public relations specialists, such as Burget, should be seen as a type of symbolic manager whose task is to manipulate public perception in favor of the brands she represents. For more information on the Code of the West, see the organization’s website: <http://cowboylethics.org/>.

<sup>57</sup> Ibid.

interests represented within the WCE is interesting in that the WCE serves as a nodal point within networks concerned with brand management, corporate conservation, and experimentation concerning GRSG related to Wyoming's paleotechnic complex. Burget's activities as a corporate conservation consultant, as well as her involvement in non-profit conservationism connects her to epistemic networks concerned with knowledge production about GRSG, and industrial development within the state. Her specialties include up-to-date knowledge about industry best practices as well as federal and state wildlife law tied directly to the use of CCAAs. Thus, Burget represents real, practical knowledge concerning GRSG conservation from the local to the federal level tied directly to her economic incentives as an industry consultant. The technostructure of the WCE, therefore, contains at least one person of five who has a vested interest in maintaining the status quo related to extractive industry - mining of coal, and trona in the case of Burget.

The Wyoming Mining Natural Resource Foundation is an ENGO dedicated to collaborative enterprises between the mining industry, and environmental stewardship initiatives. Their strategy is similar to the WCE in that they seek to partner with landowners, and other stakeholders, and enroll them in conservation strategies that purportedly benefit sensitive species while catering to mining interests "The Foundation has developed an initial conservation strategy which is designed to engage landowners and land managers, agencies, academia and stakeholders to work together with the mining industry to implement durable conservation practices on the ground."<sup>58</sup> At the time of writing, the Foundation's environmental efforts have focused on the removal and prevention of invasive flora in Wyoming.<sup>59</sup>

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<sup>58</sup> "Mission and Strategy." Wyoming Mining Natural Resource Foundation. Accessed May 27, 2019. <http://www.wmnr.org/mission-and-strategy.html>.

<sup>59</sup> "Invasive Plant Resources." Wyoming Mining Natural Resource Foundation. Accessed May 20, 2019. <http://www.wmnr.org/invasive-plant-resources.html>.



The removal of invasive species, such as cheatgrass - commonly a byproduct of agricultural grazing practices, is important to maintaining the health of the sagebrush steppe as described in the last chapter, and fits into the overall reclamation strategies advanced by industry, and the WCE itself. Credits can be generated through the WCE's scheme by removing plants deemed undesirable for supporting GRS, and programmatic enrollment in the WCE can be achieved regardless of whether landowners have enrolled their lands in other conservation initiatives. That the Foundation serves as an educational outlet for invasive species management is interesting in that it focuses attention away from the larger impacts of mining - such as roads, noise, dust, infrastructural rights-of-way, effluent, and other surface disturbances - to individual efforts committed by concerned citizens, and private landowners. The threats posed by invasive species, such as cheatgrass, to the sagebrush steppe, and its obligate species is primarily through wildfire as invasive flora die, and create a veritable tinderbox of the landscape.<sup>60</sup> Wildfire, though important in the lifecycle of the steppes, allows for more conifer encroachment as the slow to re-grow big sagebrush (*Artemisia tridentata*) struggles for a foothold in the short growing seasons of the Wyoming high plains against the heartier juniper bushes that provide little to no benefit for GRS. However, in terms of threats to the sage-grouse, and the sagebrush steppe on which it depends, cheatgrass, and other invasives are of relatively low priority compared to habitat fragmentation caused by the direct and indirect effects of mining, and fossil fuel extraction.

The Foundation was formed through the efforts of the trona/soda ash industry in Southwestern Wyoming in the Green River Basin (not to be confused with the Upper Green

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<sup>60</sup> Meador, Brian A., Rachel D. Meador, Windy K. Kelly, Dylan A. Bergman, Shayla A. Burnett, Travis W. Decker, Beth Fowers, Mollie E. Herget, Cara E. Noseworthy, Jennifer L. Richards, Cynthia S. Brown, K. George Beck, and Maria Fernandez-Himenez. *Cheatgrass Management Handbook: Managing an Invasive Annual Grass in the Rocky Mountain Region*. Laramie, WY: University of Wyoming, 2013. 7.

River Basin discussed later), and includes the Westmoreland Coal Company - that operated the now bankrupt Kemmerer pit mine and is facing \$1.4B of debt<sup>61</sup> - and chemical giants Tata, Solvay, and Genesis Alkali all tied to the Ciner Resources Corporation that mines trona ore.<sup>62</sup> Together, Tata, Genesis Alkali and Ciner form a national soda ash cartel,<sup>63</sup> ANSAC, the American Natural Soda Ash Corporation for global distribution of natural soda ash sourced solely from Green River, WY.<sup>64</sup>

Founded in 1984, and headquartered in Westport, CT, ANSAC is the largest soda ash exporter in the United States and the largest exporter of natural soda ash in the world. Soda ash is used in the production of glass (48% of production), soap and detergent (5%), baking (6% under miscellaneous uses), and is used as a chemical reagent for industrial purposes (30%) to name some of its major applications. The Green River Basin is the largest deposit of trona, and thus natural soda ash on the planet with an estimated 47 billion tons of recoverable deposits out of the 56 billion tons in the basin.<sup>65</sup> The domestic industry was valued at \$1.8B in 2018, and accounted

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<sup>61</sup> Associated Press. "Coal Company in Bankruptcy Court Asks to Sell Wyoming Mine." *AP NEWS*. January 24, 2019. Accessed June 27, 2019. <https://www.apnews.com/24b759d3354349c99dea1b568d00f8a5>; Kohler, Judith. "Workers of Bankrupt Westmoreland Coal Take Fight to Protect Retirees to Company's Englewood Doorstep." *The Denver Post*. January 11, 2019. Accessed June 27, 2019. <https://www.denverpost.com/2019/01/10/westmoreland-coal-protests-retiree-benefits/>; Reynolds, Nick. "Federal Judge Approves Sale of Kemmerer Coal Mine." *Casper Star-Tribune Online*. June 11, 2019. Accessed June 27, 2019. [https://trib.com/business/energy/federal-judge-approves-sale-of-kemmerer-coal-mine/article\\_2880f318-6091-5ccb-9c50-3d43932e3510.html](https://trib.com/business/energy/federal-judge-approves-sale-of-kemmerer-coal-mine/article_2880f318-6091-5ccb-9c50-3d43932e3510.html); Rogers, Alan. "Photos: Westmoreland Coal's Bankruptcy Leaves a Southwest Wyoming Community on the Brink." *Casper Star-Tribune Online*. May 29, 2019. Accessed June 27, 2019. [https://trib.com/business/energy/photos-westmoreland-coal-s-bankruptcy-leaves-a-southwest-wyoming-community/collection\\_c7ad9deb-9142-5297-bc9c-e7a7dfd0be9f.html#1](https://trib.com/business/energy/photos-westmoreland-coal-s-bankruptcy-leaves-a-southwest-wyoming-community/collection_c7ad9deb-9142-5297-bc9c-e7a7dfd0be9f.html#1).

<sup>62</sup> "Wyoming Mining Natural Resource Foundation." Wyoming Mining Natural Resource Foundation. Accessed May 20, 2019. <http://www.wmnrf.org/>.

<sup>63</sup> I am using the technical definition advanced by Sweezy, and do not mean to imply negative connotations the word has taken since the U.S. War on Drugs. See: Sweezy, 1956. 264.

<sup>64</sup> "Member Companies." ANSAC. Accessed May 20, 2019. <http://www.ansac.com/about-ansac/member-companies/>.

<sup>65</sup> United States. United States Geological Survey. *Mineral Commodity Summaries. Mineral Commodity Summaries, February 2019: Soda Ash*. Wallace P. Bolen. U.S. Geological Survey, February 28, 2019. 152-53.

for 2% of the U.S. non-fuel mineral economy.<sup>66</sup> This number, however, does not express the actual contribution of natural soda ash to production as it is consumed within processes that advance industrial development in metropolises, such as glass panes for buildings and automobiles, and metallurgy for girders.<sup>67</sup> Thus, natural soda ash is a critical part of urban material culture globally, and directing its flows is of geopolitical importance to megamachinic and technonatural development as Earth becomes increasingly urbanized.<sup>68</sup>

Globally, the United States is the largest producer and exporter of natural soda ash, and produced 12,000,000 metric tonnes in 2018 with the Green River Basin contributing 8,300,000 tonnes to that production.<sup>69</sup> The total estimated production of natural soda ash globally was 15,000,000 tonnes with Turkey being a distant second at 2,200,000, Kenya as the third largest global producer (320,000) and Botswana (who sued ANSAC in South Africa in 1999 under South African anti-trust laws with ANSAC settling for \$1,000,000)<sup>70</sup> at a negligible fourth (230,000 tonnes) in 2018.<sup>71</sup> The U.S. predominantly exports to Germany (48%) that which is not consumed domestically - though it is estimated that 90% of all soda ash consumed in the United States comes from Wyoming.

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<sup>66</sup> Bolin, Wallace P. "National Minerals Information Center." Soda Ash Statistics and Information. Accessed May 21, 2019. [https://www.usgs.gov/centers/nmic/soda-ash-statistics-and-information?qt-science\\_support\\_page\\_related\\_con=0#qt-science\\_support\\_page\\_related\\_con](https://www.usgs.gov/centers/nmic/soda-ash-statistics-and-information?qt-science_support_page_related_con=0#qt-science_support_page_related_con).

<sup>67</sup> Ibid.

<sup>68</sup> Brenner, Neil, ed. *Implosions/Explosions: Towards a study of Planetary Urbanization*. Berlin: jovis Verlag GmbH, 2014.

<sup>69</sup> United States Geological Survey. *Mineral Commodity Summaries. Mineral Commodity Summaries, February 2019: Soda Ash*. Wallace P. Bolin. U.S. Geological Survey, February 28, 2019. 153.

<sup>70</sup> Reuters. "U.S. Soda Ash Firms Settle S. African Cartel Case." *Reuters*. November 04, 2008. Accessed May 21, 2019. <https://www.reuters.com/article/safrica-sodaash/u-s-soda-ash-firms-settle-s-african-cartel-case-idU5L45044520081104>.

<sup>71</sup> United States Geological Survey. *Mineral Commodity Summaries. Mineral Commodity Summaries, February 2019: Soda Ash*. Wallace P. Bolin. U.S. Geological Survey, February 28, 2019. 153.

The global soda ash market is dominated by synthetic soda ash coming primarily from China (26,000,000 tonnes by some reports)<sup>72</sup> and India and their combined production outpaces U.S. natural soda ash at roughly 40,000,000 tonnes in 2018.<sup>73</sup> The global soda ash market is expected to increase by \$23B by 2022 and American natural soda ash is expected to become more competitive in the long-term as production of natural soda ash is less expensive than the creation of synthetic sodium bicarbonate.<sup>74</sup> Most of the growth is projected to be driven by increased industrialization, and urbanization, particularly in South America and the Asia-Pacific Region.<sup>75</sup> U.S. exports in natural soda ash are projected to grow as synthetic soda ash production becomes less competitive against the mines in Southwestern Wyoming.<sup>76</sup> Thus, Wyoming soda ash is globally positioned to help increase urbanization and the global circulation of commodities necessary for the growth of the Megamachine.

On March 7, 2017, U.S. Senators John Barrasso (R-WY) (sitting on the Senate Energy and Natural Resources Committee), and Ron Wyden (D-OR) introduced the American Soda Ash Competitiveness Act which seeks to lower federal royalties on soda ash production, and products from the current 6% to 2% on all federal lands.<sup>77</sup> The Senate bill has attracted a bipartisan coalition of 21 cosponsors, and a replica of the bill was introduced in the House of

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<sup>72</sup> Trent, Norah. "Global Soda Ash Market 2018 Industry Key Players, Trends, Sales, Supply, Demand, Analysis." Reuters. March 18, 2019. Accessed May 21, 2019. <https://www.reuters.com/brandfeatures/venture-capital/article?id=91504>.

<sup>73</sup> Sawant, Abhishek. "Soda Ash Market Research Report- Global Forecast to 2022 | MRFR." Research Report- Global Forecast to 2022 | MRFR. September 28, 2018. Accessed May 21, 2019. <https://www.marketresearchfuture.com/reports/soda-ash-market-2339>; United States Geological Survey. Mineral Commodity Summaries. *Mineral Commodity Summaries, February 2019: Soda Ash*. Wallace P. Bolen. U.S. Geological Survey, February 28, 2019. 153.

<sup>74</sup> Sawant, 2018.

<sup>75</sup> Sawant, 2019; Trent, 2019; U.S. Geological Survey, 2019. 153.

<sup>76</sup> Ibid.

<sup>77</sup> Mena Report. "United States: Barrasso, Wyden Introduce Bill to Help American Soda Ash Producers Compete in Global Market." *Mena Report*. March 09, 2017. Accessed May 21, 2019. [http://link.galegroup.com/apps/doc/A486121009/ITOF?u=viva\\_vpi&sid=ITOF&xid=b799f758](http://link.galegroup.com/apps/doc/A486121009/ITOF?u=viva_vpi&sid=ITOF&xid=b799f758).

Representatives by Paul Cook (R-CA-8) (Committee on Natural Resources member) on the same day attracting 31 cosponsors.<sup>78</sup> ANSAC foreshadowed the announcement in 2015 and pushed for it to reach the Senate floor under the auspices of competing with Chinese soda ash.<sup>79</sup> Senators Barrasso and Wyden have agreed with ANSAC by casting it as necessary to counter “unfair” trade practice by the Chinese:

‘For too long, American producers have had to battle unfair foreign trade practices of China and other countries,’ said Barrasso. ‘The last thing Washington should do is raise costs here at home. Our bipartisan bill will give American soda ash producers the certainty they need to stay competitive in the global market and keep these jobs here in the United States.’<sup>80</sup>

The Congressional Budget Office (CBO) has estimated that there would be no significant impact on revenues collected as soda ash production would increasingly move to federal public lands to take advantage of the lower rents.<sup>81</sup> This move may conflict with Greater Sage-grouse populations across the sage-brush steppe as soda ash production moves into habitat areas in California, Colorado, Utah, and Wyoming which CBO has predicted will see the most significant impact of the bill and would see a reduction in federal payments to those states by \$60 million over 2018-2022.<sup>82</sup> The BLM would oversee the increased transfer of public lands to extractive industry, and under the Trump administration, BLM has no compensatory mitigation requirements for surface impacts except where state regulations require them, such as in Wyoming.<sup>83</sup>

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<sup>78</sup> H.R. 1399 - American Soda Ash Competitiveness Act, H.R. H.R. 1399, 115 Cong., U.S. G.P.O. (2017).

<sup>79</sup> ANSAC. "Soda Ash Royalty Reduction Legislation Critical to U.S. Exports." ANSAC. September 16, 2015. Accessed August 06, 2019. <http://www.ansac.com/news/2015/09/16/>.

<sup>80</sup> Ibid. The threat that jobs might be outsourced seems overblown in that ANSAC could not pick up and move to a richer mining site if it wanted.

<sup>81</sup> U.S. Congress. House. Committee on Natural Resources. *American Soda Ash Competitiveness Act: Report Together with Dissenting Views (to Accompany H.R. 1399) (including Cost Estimate of the Congressional Budget Office)*. By Robert Bishop. 115th Cong., 1st sess. H. Rept. 115-455. 6.

<sup>82</sup> Ibid. 8. CBO assumed the bill would be enacted by 2018 for the purposes of their report.

<sup>83</sup> U.S. Department of the Interior. Bureau of Land Management. *Wyoming Greater Sage-Grouse Approved Resource Management Plan Amendment and Record of Decision*. March 2019. 6, 25.

Dissent against the bill was lodged by Representatives Grijalva (D-AZ-3), Huffman (D-CA-2), Napolitano (D-CA-32), and Hanabusa (D-HI-1) claiming that it amounts to nothing but a corporate handout. Their opinion marshals historical evidence from the industry that argues previous reductions have done nothing but enrich the wealthy at the expense of taxpayers:

Similar royalty relief for the soda ash industry was enacted in 2006, and after five years of the lower royalty, the Department of the Interior concluded that the royalty rate reduction, “does not appear to have contributed in a significant way to the creation of new jobs within the industry, to increased exports, or to a notable increase in capital expenditures to enhance production.” (Report appended to these views.)<sup>84</sup>

Their dissent includes an explanation for why federal payments to the states would fall and is wrapped in a more damning criticism of the plan itself “The official CBO score of \$50 million in automatically lost revenues to the federal government is only half of the issue. Since royalties are split with states, California and Wyoming also stand to lose \$50 million.”<sup>85</sup> Perhaps more importantly the shift in rents on federal land could have an adverse effect of shifting production from state lands, where the states reap 100% of the rents collected, to federal lands where they collect merely half as they have in the past creating a race to the bottom between states and the Federal Government.<sup>86</sup>

Whether a defensive tactic against synthetic soda ash, or a race to the bottom in rents collected from common lands, the introduction of this bill shows that the maintenance of American dominance in natural soda ash is a bipartisan issue at the federal level. Thus, the continuance of soda ash production within Wyoming extends from the upper reaches of the federal government to the local on-the-ground realities of mine expansion and sage-grouse

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<sup>84</sup> House, Committee on Natural Resources, *American Soda Ash Competitiveness Act: Report Together with Dissenting Views (to Accompany H.R. 1399) (including Cost Estimate of the Congressional Budget Office)*, by Robert Bishop, 115th Cong., 1st sess., H. Rept. 115-455. 10.

<sup>85</sup> *Ibid.*

<sup>86</sup> *Ibid.* 11.

protective strategies, and provides another example of the symbiotic relationship between national economies and local elites. This displays how neoliberal strategy directs power complexes to support the paleotechnic commodity complex through increased rent-seeking behavior on public lands through tax breaks for corporations and de-regulation.

The acceleration of development in and around GRSG habitat is underscored by the instrumental networks connecting federal interests to the manipulation of milieux by channeling biopower generated through federal, state, and local sage-grouse conservation activity. The Wyoming Mining Natural Resources Foundation is merely one instrument in the production of milieux and the assimilation of human components within the Megamachine. Burget's role as ED at the foundation connects the WCE to the trona/natural soda ash industry. However, the depth of her network and connections to quotidian realities within GRSG synthetic environs does not stop there. I explore two more connections below to reveal the larger network of mining and fossil fuels integrated within the WCE through Burget. An associate of Burget's, Julie Lutz serves as a bridge into the Southwest Wyoming Local Sage-grouse Working Group, and their conservation plan articulates the importance of continued mine activity in, and around critical sage-grouse habitat. I explore the formation and importance of the LWGs through their funding networks and then connect them back to the on-the-ground reality of technocratic environmental administration in Southwestern Wyoming. The SWLWG is examined as a study in how technocratic administration is related to the construction of technonature before providing a bridge into the concluding chapter.

Local Knowledge and Adaptive Management: Sage-grouse in Epistemic Networks

Julie Lutz is Burget's Chairman of the Board, and founding member of the Wyoming Mining Natural Resources Foundation, and an environmental engineer for Genesis Alkali.<sup>87</sup> She has worked in the Trona industry for the past 20 years, and has served on the Foundation's board since its inception in 2016. Her profile states a telltale sign that the Foundation, and Lutz are interested in the production of milieu "Serving on the founding board of the Foundation is a professional highlight, as the creation of the Foundation exemplifies the impact a truly collaborative process can have on a landscape."<sup>88</sup> Her collaborative activities do not stop with the Foundation as she represents mining interests through her membership in the Southwest Wyoming Local Sage-grouse Working Group (SWLWG), and is thus instrumental in communicating on-the-ground realities of sage-grouse conservation through her broader network connected to Burget while simultaneously influencing the activities of the SWLWG that have a direct impact on the landscape and the species. Thus, Lutz connects the global interests of ANSAC to the local machinations of GRSG conservation within their critical area of concern in Wyoming. Therefore, she can be taken as a tactically inserted instrument through her role in the production of knowledge about the landscape, and SWLWG's activities while extending biopower connected to mining in Wyoming.

The Wyoming local sage-grouse working groups were formed in 2003 as a state parallel to the federal Sage-grouse Implementation Team (SGIT) discussed in the previous chapter. Their mandates vary by state regulations in which they were incorporated, but each LWG in Wyoming is tasked with monitoring, managing, and reporting on sage-grouse populations within their specific localities to the WGFD. Their group membership can be split into two categories, open

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<sup>87</sup> "Current Members." Wyoming Mining Natural Resource Foundation. Accessed August 08, 2019. <http://www.wmnr.org/current-members.html>.

<sup>88</sup> Ibid.



and representative membership, and their authority to change and implement conservation strategies and actions can vary between highly autonomous and experimental groups leading the way from the ground-up, or a top-down management hierarchy in which all actions are subordinated to state plans.<sup>89</sup> In Wyoming, all LWGs are subordinated to state planning, and all group membership is representative. That is, all sage-grouse local working groups in Wyoming are stacked with Wyoming industry faithful advocating for their respective companies and industries within the planning, and implementation of sage-grouse conservation. Thus, all LWGs are sites of technocratic management concerning the production of milieux through GRSG biopower and the technocrat is tasked with applying the state management model with a local accent.

LWGs in Wyoming are subject to the stipulations provided in the 2003 “Wyoming Greater Sage-grouse Conservation Plan.” The plan serves as the overarching framework from which LWGs were to form their respective local conservation plans that were reactive to the on-the-ground realities of sage-grouse populations, and industry needs within each LWG’s management zone. Their purpose is to bring together major stakeholders within the Wyoming economy in order to manage sage-grouse populations through local articulations of the state conservation plan.<sup>90</sup> Additionally, they inform the larger decision-making apparatus housed within the state and report on the success of sage-grouse conservation activities related to the health of grouse populations, their responses to management actions, and the results of experiments funded by actors ranging from industry, to non-profits, to federal and state governments. The above actors sometimes work together on large scale projects concerning

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<sup>89</sup> Belton, Lorien R., and Douglas Jackson-Smith. "Factors Influencing Success among Collaborative Sage-grouse Management Groups in the Western United States." *Environmental Conservation* 37, no. 3 (September 2010): 253.

<sup>90</sup> Wyoming Game and Fish Commission. *Wyoming Greater Sage-grouse Conservation Plan*. Cheyenne, WY: Wyoming Game and Fish Commission, 2003. 4.

experiments within sage-grouse populations, and as discussed below, often share information with one another through local sage-grouse groups. Thus, the local working groups can be seen as laboratories in designing, implementing, and developing instruments, and techniques related to sage-grouse management.

The LWGs represent the installation of technocracy at the local scale within Wyoming. Each representative serving on the board of a LWG is vetted by the industry whose interests they represent.<sup>91</sup> Thomas Christiansen, the former Wyoming sage-grouse program coordinator for WGFD provides an explanation for how representatives are selected for membership within LWGs:

Criteria for selection included the ability and standing to be influential within their constituent group, together with the ability to work effectively and cooperatively with those representing other interests. The LWG nominees were contacted individually and in person to determine their willingness to serve, and were each provided a copy of the LWG charter. Names of persons willing to serve on LWGs were vetted to other local leaders within the respective constituency groups, and then by statewide leaders. For example, the director of the Wyoming Department of Agriculture reviewed and advised on all of the LWG agricultural representatives.<sup>92</sup>

Nominations for membership were submitted by local WGFD personnel who suggested two to three names from each stakeholder category such as mining, agriculture, or oil and gas.<sup>93</sup>

Technocratic structures inherent in the construction of LWGs within Wyoming are indexed to the needs of industry and are designed to sustain Wyoming's "resource extraction-based economy," through maintaining grouse populations healthy enough to avoid an ESA listing.<sup>94</sup>

Industry, therefore, is allowed to design, and implement conservation models that will be of the most benefit to their continued function within Wyoming through the control of state and local

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<sup>91</sup> Christiansen, Thomas J., and Lorien R. Belton. "Wyoming Sage-grouse Working Groups: Lessons Learned." *Human-Wildlife Interactions* 11, no. 3, Winter, 2017. 277.

<sup>92</sup> Ibid.

<sup>93</sup> Ibid.

<sup>94</sup> Christiansen and Belton, 2017. 274; Wyoming Game and Fish Commission, 2003. 4.

regulatory bodies tasked with crafting local conservation plans, as well as monitoring GRSG population responses to experiments performed within local sage-grouse populations.

LWGs crafted local conservation plans which have seen two revisions since their inception in 2004. Wyoming had planned to divide its territory between 11 work groups in 2003, but in 2004, then Governor Dave Freudenthal - fearing an ESA listing if sufficient regulatory mechanisms were not in place - demanded WGFD accelerate their formation. Wyoming has eight LWGs administering sage-grouse populations through the control and formation of territory relative to their individualized conservation plans reactive to the needs of industry stakeholders. All LWGs were funded by \$7 million in state legislatively appropriated funds, but, due to “state budget shortfalls,” the program is no longer supported by the statewide coffers, and, as of 2017, are now partially funded through the WGFD that draws from hunting licenses and fees.<sup>95</sup> As Christiansen and Belton remark “This action will shift the funding burden from the state as a whole, based largely on mineral severance taxes, to hunters and anglers, the primary funding source of the WGFD.”<sup>96</sup> This means that the Wyoming legislature has shifted the burden of funding GRSG conservation activities from mineral extraction (that kills populations of the bird), to the extraction of the sage-grouse’s body. WGFD quoting a report conducted by the University of Wyoming concerning hunting, and fishing as an industry in 2016 and its contribution to Wyoming’s economy estimates a total of \$778 million in total contributions.<sup>97</sup> The study includes data from WGFD that estimates licensing accounted for \$30,964,616 of the

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<sup>95</sup> Christiansen and Belton, 2017. 279.

<sup>96</sup> Ibid.

<sup>97</sup> "Hunting, Fishing and Wildlife Viewing Are Economic Drivers for Wyoming." Wyoming Game and Fish Department. March 05, 2018. Accessed August 14, 2019. <https://wgfd.wyo.gov/News/Hunting,-fishing-and-wildlife-viewing-are-economic>.

above total with \$7,813,223 coming from Wyoming residents, and \$23,151,393 from non-resident hunting and fishing licenses.<sup>98</sup>

Wyoming's extractive economy does not stop at the minerals in the ground. Hunting and fishing are a significant economic driver and nonresident permitting is typically 11 times more expensive than a residential hunting permit. This means that sage-grouse conservation is dependent on attracting out-of-state revenue as hunting quotas are divided between residents and non-residents. The budgetary shortfalls mentioned by Christiansen and Belton underscore the imperative to continue attracting out-of-state hunters who pay top dollar for the opportunity to hunt in Wyoming. This implies that those who can afford to pay for a hunting expedition in Wyoming are typically wealthy (sub)urbanites, and this reveals a collapse of the urban/rural split in technonature as the urban comes to support sage-grouse populations due to neoliberalization of wildlife protection.<sup>99</sup>

This dynamic shows local biopolitical marketization of life that is ironically supported by its death and extraction through fixing the market as the site of veridiction for the survival of the species.<sup>100</sup> The survival of GRGS conservation frameworks in through the instrument of LWGs thus, is a function of individualized market demand for their bodies and WGFD is incentivized to attract out-of-state hunters to extract them. Unfortunately, the permits specific to GRSG are bundled together with general upland bird permitting which makes individual revenue collection

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<sup>98</sup> Ibid.

<sup>99</sup> Brenner, Neil. "Introduction: Urban Theory without an Outside." In Brenner, 2014. 15; Lefebvre, Henri. "From the City to Urban Society." In Brenner, 2014. 36; Meili, Marcel. "Is the Matterhorn City?" In Brenner, 2014. 107, 109; Michael, Mike Chapter 3: "The Cellphone-in-the-Countryside: On Some of the Ironic Spatialities of Technonatures." In White, Damian F., and Chris Wilbert, eds. *Technonatures: Environments, Technologies, Spaces, and Places in the Twenty-first Century*. Waterloo, Ont.: Wilfrid Laurier University Press, 2009; Schmid, Christian. "Networks, Borders, Differences: Towards a Theory of the Urban." In Brenner, 2014. 76; Swyngedouw, Erik. "Circulations and Metabolisms: [Hybrid] Natures and [Cyborg] Cities." In White and Wilbert, eds., 2009. 61-62, 73-74.

<sup>100</sup> Foucault, Michel. *The Birth of Biopolitics Lectures at the Collège De France, 1978-1979*. Edited by Michel Senellart. Translated by Graham Burchell, Picador, 2008. 30-32.

based on licensing difficult, if not impossible to track. However, the instrumentalization of the grouse through funding channels based on permitting its death shows how conservation commodities are assemblages embedded in networks that contain contradictory parts. The grouse itself is reified and commodified through conservation networks as a necessary link for its species survival ironically supported by birdshot penetrating their individual bodies. This reveals another technonaturalization dynamic as it incentivizes the collection of capital within the body of the grouse such that the species in Wyoming is less supported without those intensivities.<sup>101</sup>

Annual reports from WGFD specify budgetary allocation based on revenue for wildlife management by species. While generally speaking, regional terrestrial wildlife management - a general function that includes sage-grouse monitoring and habitat improvement - has hovered just below 23% of WGFD annual expenditures since 2016, the budgetary shortfall of 2017 cut those numbers to 20.8%. The loss seems minuscule; however, the difference is that Wyoming is no longer contributing nearly \$1 million annually to sage-grouse management. The numbers for revenue spent on sage-grouse shows that in 2017 WGFD allocated \$1,426,455 of total revenue to GRSG management while the 2018 annual report shows a nearly 75% decrease at \$568,770.<sup>102</sup>

The 2016 WGFD annual report foreshadowed the budgetary slash by reporting that their Local Project Development Teams (that help with funding, logistics, and labor for GRSG local working groups) “in the face of shrinking budgets, have realized that they can develop large projects, with many agencies, rather than competing against one another for limited project

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<sup>101</sup> Hinchliffe, Steve and Sarah Whatmore. “Living Cities: Towards a Politics of Conviviality.” In White and Wilbert, eds., 2009. 108-109; Luke, Timothy W. “The Property Boundaries/Boundary Properties in Technonature Studies: ‘Inventing the Future.’” In White and Wilbert, eds., 2009. 207; Swyngedouw in White and Wilbert, eds., 2009. 70-74, 79.

<sup>102</sup> Wyoming Game and Fish Department. *2017 Comprehensive Management System Annual Report for the U.S. Fish and Wildlife Service*. B-18.; Wyoming Game and Fish Department. *2018 Comprehensive Management System Annual Report for the U.S. Fish and Wildlife Service*. B-19.

dollars.”<sup>103</sup> The largest contributing agency has been the BLM which, prior to the Trump administration, allocated unobligated funds toward project implementation of the local working groups, and the WGFD’s Wyoming Landscape Conservation Initiative (WLCI) focusing specifically on development in Southwestern Wyoming. By 2017, the WLCI, which worked with the SWLWG, was under budgetary review by the new administration’s Department of Interior and reported being clipped the previous year:

The new administration in Washington D.C., specifically the Secretary of the Department of the Interior, is reviewing both Federal Advisory Committees and Non-Federal Advisory Committees. Since mid-April the BLM has not been able to participate in any new decision making meetings. The Secretarial Order has hindered the operation of WLCI. The review is expected to be complete in October 2017.<sup>104</sup>

By 2018, the language concerning the local work groups, implementation teams or the WLCI in Southwestern Wyoming had all but disappeared from the WGFD annual report, and in its place, a new category was added “Habitat Protection,” that specifically named Governor Matt Mead’s CAP strategy as its *raison d’être*.

The Habitat Protection program is housed under the Office of the Director of WGFD, rather than a general fund under Fish and Wildlife, and its first budget posting was \$737,577 for 2018. Its purpose is to coordinate “project proposal and land management plan reviews and recommend[s] appropriate wildlife stipulations and mitigation strategies to protect important game and non-game habitats and to facilitate the implementation of the Wyoming’s Greater Sage-grouse Executive Order 2015-4.”<sup>105</sup> However, the language concerning Southwest Wyoming, specifically, is gone and presumably this division is for statewide monitoring while

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<sup>103</sup> Wyoming Game and Fish Department. *2016 Comprehensive Management System Annual Report for the U.S. Fish and Wildlife Service*. 41.

<sup>104</sup> Wyoming Game and Fish Department. *2017 Comprehensive Management System Annual Report for the U.S. Fish and Wildlife Service*. 40.

<sup>105</sup> Wyoming Game and Fish Department. *2018 Comprehensive Management System Annual Report for the U.S. Fish and Wildlife Service*. 44.

serving at the discretion of the Director of WGFD. Importantly, however, it is tasked with developing and negotiating “planning and mitigation strategies regarding energy development,” as well as implementing “the Wyoming Greater Sage-grouse Executive Order which includes review of all federal and state permitted projects within Greater Sage-grouse Core Areas.”

The above shifts, though fairly recent, are germane to the analysis of the WCE and the SWLWG through the personage of Julie Lutz because the LWGs are part of a greater monitoring apparatus tied to adaptive management practices embedded within the CAP strategy. Adaptive management mechanisms and adjustments to on-the-ground deployments in GRSG management form a feedback between the local work groups, environmental impacts tied to economic development within core habitats permitted by state and federal agencies, and sage-grouse populations. The LWGs, while having no authority to adjust state conservation plans, are responsible for sending information up the chain regarding GRSG population health. The feedback from local management zones that may trigger soft, or hard adjustments related to permitting and continued economic development. Notification of population decline may trigger an adaptive management response that may adjust management practices related to permitting and leasing within habitat areas, and recommendations are submitted to the Adaptive Management Working Group (AMWG) created through the SGIT that serves as a node for local, state and federal authorities.

There are two categories for adaptive management responses - soft triggers and hard triggers, and these responses are related to baseline population counts (lek counts of strutting males in Wyoming) calculated and monitored by the LWGs. Soft triggers are tripped when

“there is any deviation from normal trends in habitat or population in any given year.”<sup>106</sup> The baseline for normal trends are “calculated as the five-year running mean of annual population counts...The Forest Service, with the assistance of the BLM, local Wyoming Game and Fish Department offices, and local sage-grouse working groups, will evaluate the metrics [for population counts] with the Adaptive Management Working Group on an annual basis.”<sup>107</sup> As shown in the above, the LWGs are integral not only to the statewide Wyoming management plans, but also the federal management plans housed in national agencies such as the BLM, USFWS, and USFS. The feedback from the LWGs may be fed into the statewide Adaptive Management Working Group that then makes recommendations to the Forest Service and BLM concerning land management and population trends in the hope of avoiding a hard trigger response.<sup>108</sup>

The metrics used in evaluating the health of GRSG populations in Wyoming are: number of active leks, acres of available habitat, and population trends based on lek counts.<sup>109</sup> A hard trigger is tripped when “two of the three metrics exceed 60 percent of normal variability for the area under management in a single year or when any of the three metrics exceed 40% of normal variability for a 3-year time period within a 5-year range of analysis. A minimum of 3 consecutive years in a 5-year period is used to determine trends.”<sup>110</sup> This trigger is clearly in response to significant declines that happen very rapidly. In response, the BLM and USFS will issue a halt to all discretionary leasing on their lands for a minimum of 90 days while the cause

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<sup>106</sup> Bureau of Land Management, U.S. Department of Agriculture. USDA Forest Service. *Greater Sage-grouse Record of Decision for Northwest Colorado and Wyoming and Land Management Plan Amendments for Routt National Forest, Thunder Basin National Grassland, Bridger-Teton National Forest, and Medicine Bow National Forest*. 2015. 98.

<sup>107</sup> Ibid.

<sup>108</sup> Ibid. 35.

<sup>109</sup> Ibid. 98.

<sup>110</sup> Ibid.



for the hard trigger is assessed through federal consultation with the AMWG.<sup>111</sup> Adaptive management triggers are hamstrung without proper funding for monitoring GRSG on the ground, and the above budgetary cuts within WGFD, as well as DoI affect the capacity for local monitors (such as WGFD personnel) to operate through the local working groups. This is significant because the collaborative consensus decision-making structures, and group composition within LWGs stack the deck in favor of extractive industry for making decisions regarding GRSG habitat and populations.

The disconnect between local knowledge and top-down management is important when considering recent changes to DoI policy regarding development projects within GRSG habitat areas. On December 27, 2017, the BLM was instructed to prioritize all oil and gas leasing within GRSG habitat areas above other possible land uses. The four-page Instruction Memorandum stipulates:

The GRSG Plans established an objective to prioritize oil and gas leasing and development outside of GRSG habitat management areas, but to allow for leasing with appropriate stipulations on all BLM mineral estate designated in the GRSG Plans as “open” for leasing. In effect, the BLM does not need to lease and develop outside of GRSG habitat management areas before considering any leasing and development within GRSG habitat.<sup>112</sup>

The above IM rides on the coattails of adjustments made to the Wyoming CAP compensatory mitigation framework in July of the same year:

If a project complies with the stipulations contained in EO 2015-4 for Greater sage-grouse conservation (for example, in Non-Core Population Areas: 0.25 mile No Surface Occupancy, timing limitations; and, for example, in Core Population Areas: 0.6 mile No Surface Occupancy, 5% surface disturbance threshold), no compensatory mitigation is required by the State of Wyoming because impacts to the species have been mitigated through actions of the project proponent.<sup>113</sup>

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<sup>111</sup> Ibid. 35-36.

<sup>112</sup> “Instruction Memorandum No. 2018-26”. Department of the Interior. Bureau of Land Management. December 27, 2017. 2.

<sup>113</sup> “Revised Greater Sage-Grouse - Compensatory Mitigation Framework.” The State of Wyoming. July 10, 2017. 1.

The severance of local knowledge in the administration of GRSG territory is underscored by the abstracted logics embedded within the evaluation of habitat areas based on evaluative metrics mentioned above as well as ensconced in the deployment of calculative tools (such as EDF's HQT or Wyoming's DDCT) that favor oil and gas development within occupied territory. As I show later, much of the mineral estate occupied on the surface by GRSG is BLM territory. Thus, LWGs were set up to support the paleotechnic complex, and then grounded in their ability to meet, communicate and monitor the health of GRSG populations.

#### Information on Tap: Technocratic Administration and Strategic Adaptation

The technocratic administration of territory through the use of LWGs, as well as adaptive management networks friendly to extractive industry is bolstered by LWG membership as well as their consensus governance decision-making structure. SWLWG membership, for example includes Julie Lutz, representing mining, but also two local ranchers, two of the sporting community, one representing the public at large, one from Rock Springs county government, two from BLM, one from WGFD, and one from natural gas industry.<sup>114</sup> Of the land managed by the SWLWG, 75 percent is federal public land with the remaining 25 percent under either private or state ownership.<sup>115</sup> This means that BLM will automatically prioritize land leasing in most of the territory to a minority within group stakeholders. The allocation of priority, and land is reactive against the needs of the sage-grouse populations inhabiting the territory, but because of budgetary cuts discussed above, the ability of the workgroup to meet is effectively hindered “The SWLWG will continue to meet at least annually to evaluate population and habitat monitoring results, research results, plan implementation status, and potential for new

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<sup>114</sup> The Southwest Wyoming Local Sage-grouse Working Group. *Southwest Wyoming Sage-grouse Conservation Plan*. V. 2.0. The Southwest Wyoming Local Sage-grouse Working Group, November, 2013. 4.

<sup>115</sup> *Ibid.* 5.

conservation projects as long as project funding remains available via Wyoming General Fund budget as provided by the Governor and Legislator.”<sup>116</sup>

The SWLWG was formed from the initial discretionary fund of \$7 million for GRSG conservation. Since then, the working group allocated \$450,000 to GRSG conservation in their management area. An examination of their project reports shows who has been funding what project, and the results yielded by managerial experiments administered over the course of the group’s implementation. It shows that the SWLWG was instrumentalized by the oil and gas industry to produce geographic and ecological knowledge about local sage-grouse populations, and a deeper reading of their SWLWG’s management objectives and recommendations shows that oil, gas, and mining benefited from managerial recommendations that attempted to control grazing as conservation action. Local information gained about GRGS habitat, and range within Southwestern Wyoming was then fed to industry partners thus informing their future territorialization strategies. The instrument was made dormant after it served its purpose.

This feeds into EDF’s WCE, because the abstracted nature of a habitat offset credit allows for technocratic management to continue maintaining a system of environmental domination through an economy that does not rely on local knowledge once that knowledge has been fed into its circuitry. EDF’s ability to provide mobility for capital through the enrollment of landowners into their offset credit economy does the double duty of managing adaptive management triggers through enabling the creation of territories for GRSG without including population counts, as well as pushing the burden of effectiveness monitoring and adaptive management downward to credit developers rather than government or industry. Private landowner enrollment, therefore, is critical to the offset economy the SWLWG recommends and

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<sup>116</sup> Ibid. 6.

the organizational connections between Lutz, and Burget already incline landowner enrollment in the WCE, thus increasing stability of the offset economy.

Private land ownership under SWLWG jurisdiction accounts for 21.7% of total leks in an area with populations above statewide averages recorded since 2013.<sup>117</sup> The SWLWG both recognizes that fossil fuel development within their territory will increase in the future, as well as mapping GRSG as sitting on top of potential fossil fuel plays.<sup>118</sup> Thus, SWLWG's mandated partnerships with fossil fuel developers and recommended offsite mitigation as a development strategy favoring extractive industry and the WCE as an instrument for them because environmental conservation is adjusted to the production of territory while ignoring population numbers that could be declining.<sup>119</sup> The instrumental network formed by Lutz, and Burget connect back to the WCE and show how the WCE is an instrument that favors the status quo because it lives and dies by the necessity of habitat offsetting relative to industrial development as a primitive accumulation tactic. The mobilization of landed workforces will only be effective if it is supported by intensivities of capital that spur the organization of that economy. This depends on the needs of debtors, and not the abilities of suppliers within the commodity circuit from the outset.

Offsite mitigation carries costs for project debtors however local initiative can lessen, or mitigate those costs when translated through an epistemic conservation instrument such as a LWG. Fossil fuel development within the SWLWG's administrative zone is not as intensive compared to others such as the Upper Green River Basin, or the Powder River Basin. However, the management plan shows both a concern for continued extraction of trona, as discussed above,

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<sup>117</sup> Ibid. 9, 19.

<sup>118</sup> Ibid. 26, 27, 33.

<sup>119</sup> Ibid. 26, 33.

and for future energy developments. Most notably, unlike other LWG management plans, the SWLWG splits mineral extraction into “Energy Development,” which encompasses possible siting for wind and solar installations, and “Mineral Development” focusing on trona, energy sources such as coal and uranium, precious stones, and a host of other materials like sand, gravel, and lithium.

The division between energy and mineral development is tactically important because it shows the SWLWG’s authority in making recommendations to the larger GRSG management structure based on local industrial needs through the local application of technocratic models.<sup>120</sup> It allowed for a difference in the prioritization of threats related to GRSG within the SWLWG management zone, as energy development is ranked as a high priority of concern while minerals and mining are ranked as a medium priority.<sup>121</sup> In other words, mining attracts less scrutiny in development and management of GRSG in Southwestern Wyoming, than does energy development including development of renewables such as solar and wind. The priority rankings are significant because the SWLWG developed recommended management practices from their initial local threat assessments, and mining despite having similar impacts to energy development (oil, gas, and coalbed methane), is more likely to be developed within the SWLWG management zone.<sup>122</sup> This shows localized tactical power as translated through the instrument of the SWLWG in the production of force through an attempted fixation of the discourse related to the conduct of conduct within local management zones.

All active mining sites operate within sage-grouse habitats according to the SWLWG.<sup>123</sup> This is significant because any mining operation must then be concerned with maintaining

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<sup>120</sup> Ibid. 21.

<sup>121</sup> Ibid. 22.

<sup>122</sup> Ibid. 26-29.

<sup>123</sup> Ibid. 60.

habitat and populations during planned expansion of activities. The effects of mining, though not properly “quantified” according to the SWLWG conservation plan, are plainly evident within the language of the plan stating “all of the mine sites are within sage-grouse habitats and some historical leks in and near heavily impacted areas have been destroyed or become unoccupied.”<sup>124</sup> The major mining sites listed in the report are: the defunct Westmoreland Kemmerer mine, Black Butte coal mine, the Jim Bridger Coal Complex, the Haystack coal mine - built by Kiewit and acquired by Westmoreland in 2017 before the company filed bankruptcy and was acquired by its creditors.<sup>125</sup> Perhaps more critical to the paleotechnic complex in Southwest Wyoming are the trona mines operated by ANSAC, and Solvay, and some industrial gravel operations.<sup>126</sup> Of the sites listed, the Jim Bridger Complex, and the trona mines are likely to expand further into sage-grouse habitat.

Ciner has announced plans to leave ANSAC by 2021, to provide solutions to its own logistical problems of distribution.<sup>127</sup> This will entail an expansion of infrastructure at the mining site itself, however Ciner has not announced how it plans to handle the shift away from ANSAC. Perhaps more interestingly, a press release by Ciner dated June 1, 2018 in their site archives claims that Ciner is the central distribution arm for the rest of ANSAC, though ANSAC itself makes no reference to this role.<sup>128</sup> ANSAC will not allow Ciner to use any of its load port capabilities, infrastructure or marketing resources but this may not hinder Ciner as ANSAC is facing distributional difficulties at the Port of Longview - a major port in Washington used by

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<sup>124</sup> Ibid.

<sup>125</sup> Proctor, Darrell. "Westmoreland Coal Emerges from Chapter 11 Bankruptcy." *POWER Magazine*. March 17, 2019. Accessed August 20, 2019. <https://www.powermag.com/westmoreland-coal-emerges-from-chapter-11-bankruptcy/>.

<sup>126</sup> The Southwest Wyoming Local Sage-grouse Working Group, 2013. 60.

<sup>127</sup> ANSAC. "Ciner Resources to Exit ANSAC." ANSAC. November 12, 2018. Accessed August 06, 2019. <http://www.ansac.com/news/2018/11/12/>.

<sup>128</sup> Ciner "An Alliance for Superior Soda Ash." Ciner. June 01, 2018. Accessed August 06, 2019. <https://www.ciner.us.com/an-alliance-for-superior-soda-ash/>.

ANSAC.<sup>129</sup> The possibility that ANSAC could lose one of its major distributional hubs could be reason for Ciner to leave ANSAC but Genesis, and Tata have not indicated a desire to leave at the time of writing. Ciner, however is in talks with the Port of Longview, exclusively, and this prompted ANSAC to threaten legal action against the port and Ciner as both were competing for Berth 4.<sup>130</sup>

Both Ciner and the port have denied any legal wrongdoing, but the competition for the port belies a more interesting story as ANSAC's proposal for Berth 4 would have built a terminal capable of shipping 6.6 million tons of soda ash annually, while Ciner has proposed an 8.8-million-ton expansion. That number, however, would require Ciner to triple its Green River production from their numbers in 2017 according to ANSAC. Ciner already accounts for 40 percent of ANSAC's exports, and with soda ash consumption expected to grow at two percent per year, these numbers, and the subsequent expansions associated with them, do indicate a desire for mine expansion in Southwest Wyoming. Accordingly, the expansion proposed by Ciner would require two to three 1.5-mile-long train units and one marine vessel per day to accommodate ramped up production and global distribution of soda ash. The competition over infrastructure, and supply-chain networks between Ciner and ANSAC could increase site visits to the mines thus increasing noise and surface disturbance as secondary effects for sage-grouse populations in a critical and core habitat area.

### Kicking up the Dust: A Conclusion

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<sup>129</sup> Hale, Zack. "Port of Longview Negotiating with Prospective Tenant for Berth 4." *Longview Daily News*. February 15, 2018. Accessed August 06, 2019. [https://tdn.com/news/local/port-of-longview-negotiating-with-prospective-tenant-for-berth/article\\_bef9626e-ab0c-5c7c-bbd1-50c95c3e6cca.html](https://tdn.com/news/local/port-of-longview-negotiating-with-prospective-tenant-for-berth/article_bef9626e-ab0c-5c7c-bbd1-50c95c3e6cca.html).

<sup>130</sup> Hale, Zack. "Port of Longview Faces Legal Threat over Soda Ash Terminal." *Longview Daily News*. May 07, 2018. Accessed August 06, 2019. [https://tdn.com/news/local/port-of-longview-faces-legal-threat-over-soda-ash-terminal/article\\_47febf78-2096-5397-a4f4-1815117f0e7e.html](https://tdn.com/news/local/port-of-longview-faces-legal-threat-over-soda-ash-terminal/article_47febf78-2096-5397-a4f4-1815117f0e7e.html).

Lutz's membership within the SWLWG and her industry connections point to a decreased cost of land acquisition by trona mining as it attempts to offset necessary expansion for a race to the top over the largest reserve of trona in the world. Prioritizing ecological impacts of mining lower than that of energy not only attracts less scrutiny for similar ecological damage, but also sets the bar lower for landowner enrollment to offset that development. In short, land can be accumulated by the trona industry faster and easier because their ecological impact is coded as less than that of energy developments including wind infrastructure. Thus competitive development may support the offset credit economy in Southwestern Wyoming through attracting capital intensivities while displacing and killing the reproductive capacities of GRSG as part of neoliberal environmentality.

The above displays how the SWLWG is a tactical instrument for the paleotechnic complex because coal, and coalbed methane are situated within mineral development and not the more expensive energy development category. It also displays how a local conservation instrument was tacticalized to maintain territory for megamachinic development because renewable energy is considered costlier in the aggregate due to its ability to provide raptor perches, and increased rights-of-way. This says nothing of how coal is dying across the US as a power source as energy transitions to cheaper hydrocarbons, nuclear, and renewables; nothing except how GRSG conservation is granting ANSAC and fossil fuels an advantage in Wyoming as all LWGs, and the WCE claim that solar and wind installations are more damaging to GRSG population health than hydrocarbon extraction.

The Jim Bridger Coal Mine Complex is a "mine-to-mouth" operation in SWLWG management area and is slated for a few small expansions as their operation continues. The mine feeds the coal power plant that provides energy to the surrounding area, and some transmission



corridor expansion is expected as Wyoming exports its energy across state lines.<sup>131</sup> Energy transmission affects GRSG populations by providing raptor perches as well as rights of way that disturb the landscape. The Jim Bridger Coal Complex plans to expand onto land that is both GRGS habitat, and owned by their partners, Anadarko Petroleum.<sup>132</sup> Anadarko Petroleum is also part owner of the Blacks Butte coal mine with Kiewit Mining Group and serviced by Union Pacific Rail Road loading coal for heating and smelting at their Point of Rocks distribution facility for export. Both operations highlight the importance of continued coal production along with future extractive potential of Southwestern Wyoming for the paleotechnic complex and the SWLWG shows how local technocratic power complexes can be mobilized to protect it as part of a larger environmentality.

The WCE, therefore, is connected to machinic assemblages in Southwestern Wyoming through Wanda Burget, and her associate Julie Lutz - to say nothing of her other associations to the trona-coal complex through the Wyoming Mining Natural Resources Foundation - and thus to the Megamachine as both Burget and Lutz act as instruments on its behalf. Their associations show how the WCE is embedded within a logistical commodity network of soda ash production that is critical to increasing urbanization and thus megamachinic expansion across the globe as well as American geopolitics through the reproduction of materiality within synthetic environs. Lutz's connections to the SWLWG show how LWGs are technocratically managed sites of

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<sup>131</sup> U.S. Department of the Interior: Bureau of Land Management. *TransWest Express Transmission Line Project Final Environmental Impact Statement (FEIS): Directors Protest Resolution Report*. December 16, 2016; U.S. Department of the Interior. Bureau of Surface Mining Reclamation and Enforcement. *Environmental Assessment for Jim Bridger Coal Mine Complex Mining Plan Modification for Federal Coal Lease WYW02727*. 2018.

<sup>132</sup> Anadarko has recently been acquired by Occidental Petroleum for \$38B as of August, 2019. This is a global merger of fossil fuel developers that, while interesting, cannot be explored here. For the sake of readability, I will continue to refer to Anadarko Petroleum separately, however it is important to note this change in the history of fossil capital. See: Hiller, Jennifer "Anadarko shareholders go for the cash in \$38 billion Occidental buyout." *Reuters*. August 8, 2019. Accessed October, 15, 2019. <https://www.reuters.com/article/us-anadarko-petrol-m-a-vote/anadarko-shareholders-go-for-the-cash-in-38-billion-occidental-buyout-idUSKCN1UY22M>

information gathering, as well as tactical planning that can be instrumentalized by extractive industry through the insertion of technocrats acting on its behalf. The LWGs also connect and articulate federal and state biopower on the ground and form part of an informational feedback loop that can be used to prevent paleotechnic deterritorialization through tactical defunding via other instruments within the conservation assemblage such as the DoI. The above developments and functions are cast against a neoliberal environmentality that fixes the centrality of market mechanisms to the production of technonature through the aviobiopower<sup>133</sup> of the GRSG conservation assemblage translated into geopolitics for the production of technonatural milieux.<sup>134</sup>

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<sup>133</sup> Luke, Timothy W. "Beyond birds: Biopower and Birdwatching in the World of Audubon." *Capitalism Nature Socialism*, vol. 11. (3), September, 2000. pp. 7-37. 21.

<sup>134</sup> Luke, 1999. 118, 123.

**Chapter Five:**  
**The Greater Sage-grouse in the Global Environment: An Evaluation of the Wyoming Conservation Exchange**

Whose environment is the Environmental Defense Fund defending? The work above has attempted to provide an answer by examining the activities of the Environmental Defense Fund (EDF) in Wyoming as part of a larger Greater Sage-grouse conservation assemblage through the instrument of the Wyoming Conservation Exchange (WCE). I have contextualized the WCE through an assemblage theoretic methodology that treated it as connected to other instruments within conservation machinery stretching from local conservation instruments, such as the Southwest Wyoming Local Sage-grouse Working Group (SWLWG), to the global stage through natural soda ash commodity networks. Chapters Two and Three displayed connections between sage-grouse conservation, and the continued extraction of hydrocarbons within sage-grouse core habitat areas by examining the production of commodities through the WCE. Most importantly, this work has shown how the sage-grouse was instrumentalized by State and Federal sage-grouse conservation initiatives to construct a policy environment in Wyoming that benefits the industries historically responsible for sage-grouse habitat loss, and thus the loss of the sage-grouse herself. I conclude that the Environmental Defense Fund is defending an environment for the growth of capital in the form of natural soda ash, hydrocarbon energy, and perhaps most interestingly, tradable representations of the sage-grouse and her needs.

The following concludes my dissertation by compiling and analyzing the findings presented throughout this work. I revisit the problematique of Greater Sage-grouse conservation and the importance of Wyoming in the context of Federal environmental regulations. Then I connect the Wyoming Core Area Protection (CAP) strategy to the Wyoming Conservation Exchange, and how its political economy displays how the landscape, flora and fauna of

Wyoming are instrumentalized within the production of commodities propelling the self-referential expansion of capital within and through the sage-grouse conservation assemblage. Lastly, I discuss how capital's expansion within Wyoming is connected to the technocratic management of the environment such that it remains habitable for trona and hydrocarbon exporters. However, first it is necessary to remind the reader of the theoretical and methodological frameworks used in the above work to better seat the findings of this dissertation within the construction of environment.

### From Geotechnics to Technonature: The Greater Sage-Grouse Instrument

Chapter One advanced a post-natural reading of environmental conditions termed *technonature*.<sup>1</sup> The technonatural view treats “the environment” as the result of human-technology interactions structured through regimes of technics mediated by machines. As will be recalled from the Introduction, the focus of the above work has been, following Benton MacKaye,<sup>2</sup> Lewis Mumford,<sup>3</sup> and Timothy W. Luke,<sup>4</sup> the production of environment through geo-engineering - related to the deployment of individual instruments - and geotechnics - the totality of relations mediated by and through geo-engineering. Geo-engineering was defined as a practice that produces habitability relative to some form of flow (commodities, populations, and

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<sup>1</sup> White, Damian F., and Chris Wilbert, eds. *Technonatures: Environments, Technologies, Spaces, and Places in the Twenty-first Century*. Waterloo, Ont.: Wilfrid Laurier University Press, 2009.

<sup>2</sup> MacKaye, Benton. *From Geography to Geotechnics*. Urbana: University of Illinois Press, 1969.

<sup>3</sup> Mumford, Lewis. *The Myth of the Machine: Technics and Human Development*. New York: Harcourt Brace Jovanovich, 1966; Mumford, Lewis. *Technics and Civilization*. New York: Harcourt Brace Jovanovich, 1934; Mumford, Lewis. *The Myth of the Machine: The Pentagon of Power*. New York: Harcourt Brace Jovanovich, 1970.

<sup>4</sup> Luke, Timothy W. *Capitalism, Democracy and Ecology: Departing from Marx*. Chicago: University of Illinois Press, 1999; Luke, Timothy W. *Ecocritique: Contesting the Politics of Nature, Economy, and Culture*. Minneapolis: University of Minnesota Press, 1997; Luke, Timothy W. “At the end of Nature: Cyborgs, ‘Humachines’, and Environments in Postmodernity.” *Environment and Planning A*, vol. 29, 1997b, pp.1375-1377; Luke, Timothy W. “Cyborg Enchantments: Commodity Fetishism and Human/Machine Interactions.” *Strategies*: Vol. 13, No. 1, 2000. pp. 39-62. <https://doi.org/10.1080/10402130050007511>; Luke, Timothy W. “Liberal Society and Cyborg Subjectivity: The Politics of Environments, Bodies and Nature.” *Alternatives: Global, Local, Political*: Vol. 21, No. 1, Jan-Mar, 1996. pp.1-30. <https://doi.org/10.1177/030437549602100101>.

resources) grounded in technological interventions of Earth's physical systems relative to the demands of civilization.<sup>5</sup> Within the study above, technological interventions are accomplished through the extension of instruments that draw materials and energy into synthetic assemblages. Chapter Three, for example examined EDF's attempts to geo-engineer the topography of Wyoming's Core Habitat Areas through the instrument of the Wyoming Conservation Exchange. This analysis showed that the WCE is engaged in producing territory relative to the perceived needs of the Greater Sage-grouse in terms of habitat while enrolling landowners as a workforce for offsetting ecological damage caused by the expansion of industrial capital across the sagebrush steppe. The production of habitat mitigation credits, I argued, displays the power of capital to change and expand within a landscape through economic incentives by linking industrial capital to the production of territory and representations of habitat grounded in technoscientific construction, and management of milieux.

The production, adjustment and management of milieux, it will be recalled, is guided by strategies of governance - governmentality - that includes the management of populations as its primary concern.<sup>6</sup> I argued that the management of populations within technonature is accomplished through the production of scientific knowledge that renders both human and non-human populations legible for security apparatuses.<sup>7</sup> In this way, the production of knowledge about the Greater Sage-grouse is grounded in the discipline of ecology, and, as Chapters Two, Three and Four argued is used as a justificatory framework for adjusting the relationships held

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<sup>5</sup> MacKaye, 1969. 49, 110.

<sup>6</sup> Foucault, Michel. *Security, Territory, Population Lectures at the College De France, 1977-78*. François Ewald, Alessandro Fontana, and Michel Senellart, eds. Basingstoke: Palgrave Macmillan, 2007. 20-21, 278; Löwbrand, Eva and Johannes Stripple. "Governmentality." In *Critical Environmental Politics*. Death, Carl, ed., 2013. 112.

<sup>7</sup> Agrawal, Arun. *Environmentality: Technologies of Government and the Making of Subjects*. Durham, NC: Duke University Press, 2005. 34-5; Foucault, 2007. 20-21, 100-101, 104, 278; Foucault, 2007. 8-11; Foucault, Michel. *The Foucault Reader*. Edited by Paul Rabinow. New York: Pantheon Books, 1984. 16-18.

between human and non-human populations and their environment.<sup>8</sup> Milieu, therefore, contains rules for how humans and non-humans should relate to one another.<sup>9</sup> In the work above, relations are dictated by how populations relate to the geography and geology of Wyoming, and this is enforced through instruments grounded in the veracity of technoscientific knowledge about the sage-grouse, and its habitat. Milieux, therefore, are composed of both the physical stuff that make up the material conditions in which populations and individuals find themselves, as well as normative, disciplinary structures reinforcing relations between things as a function of governance.<sup>10</sup>

The production of physical space through geo-engineering, as well as the normative conditioning of milieux is the result of technical environmental governance strategies as they unfold across existing assemblages.<sup>11</sup> Environmental governance strategies - environmentalities - unfold through the extension of instruments that translate information across, and through assemblages.<sup>12</sup> Chapter Two highlighted how environmental administrative authorities changed as the geography of Wyoming was reterritorialized through the creation of sage-grouse management zones within and through the Core Area Protection Strategy as an instrument.

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<sup>8</sup> Foucault, Michel. *The Order of Things: An Archaeology of the Human Sciences*. London: Routledge, 2005. 319-321, 338, 340, 383-386; Foucault, Michel. *"Society Must Be Defended": Lectures at the Collège De France, 1975-76*. Edited by Mauro Bertani, Alessandro Fontana, and François Ewald. Translated by David Macey. New York: Picador, 2003. 9, 28; Ihde, Don. *Postphenomenology: Essays in the Postmodern Context*. Evanston, Ill: Northwestern University Press, 1993. 43; Rutherford, Paul. "The Entry of Life into History." In *Discourses of the Environment*. Edited by Darier, Éric. Oxford: Blackwell, 1999. 53-4.

<sup>9</sup> Foucault, 2003. 30-31; Ihde, Don. *Instrumental Realism: The Interface between Philosophy of Science and Philosophy of Technology*. Bloomington: Indiana University Press, 1991. 19.

<sup>10</sup> Foucault, Michel. *The Birth of Biopolitics Lectures at the Collège De France, 1978-1979*. Edited by Michel Senellart. Translated by Graham Burchell, Picador, 2008. 30; Foucault, 2007. 12-13, 19-22; Foucault, 2005. 389, 394; Lukács, György. *History and Class Consciousness: Studies in Marxist Dialectics*. Translated by Rodney Livingstone. London: The Merlin Press, 1971. 38.

<sup>11</sup> Luke, Timothy W. "Technology." In *Death*, 2013. 268, 272.

<sup>12</sup> Fletcher, Robert. "Environmental Unbound: Multiple Governmentalities in Environmental Politics." *Geoforum*, vol. 85, 19 June 2017, pp. 311–315., doi: 10.1016/j.geoforum.2017.06.009; Ihde, Don. *Postphenomenology and Technoscience: The Peking University Lectures*. Albany: State University of New York Press, 2009. 41, 45; Luke, Timothy W. "Environmental as Green Governmentality." In Darier, 1999. 145; Mumford, 1970. 55, 108-110.

Chapter Three examined the production of space relative to the needs of the conservation assemblage within the manufacture of commodities that reproduce the landscape according to standards imposed by the WCE and the disciplinary power of “the market.” Chapter Four displayed how local conservation instruments form part of a larger assemblage allowing for the tactical adjustment of space relative to technocratic economic demands written into the Southwest Local Sage-grouse Working Group. All of these chapters highlight how power was transformed and translated through instruments to produce milieux according to a neoliberal environmentality.<sup>13</sup>

As such, this dissertation has examined how conservation infrastructure can be instrumentalized for the production of commodities, space, subjectivities, and in a more indirect way, species.<sup>14</sup> This research exemplifies the production of ecosystems relative to the needs of capital through neoliberal strategies of environmental governance. The Greater Sage-grouse in Wyoming is a subject-object of environmental neoliberalization through its instrumentalization within and through the local-state-federal conservation assemblage as “the market” is fixed to the production of habitat within the state.<sup>15</sup> The species history and its survival include the history of technological intervention within its habitat, and the habitat mitigation credit economy that has been the focus of political-economic analysis throughout this work. The habitat mitigation

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<sup>13</sup> Allenby, Braden R. *Reconstructing Earth: Technology and Environment in the Age of Humans*. Washington, D.C.: Island Press, 2005. 46-7; Fletcher, 2017. 312; Harvey, David. *A Brief History of Neoliberalism*. Oxford: Oxford University Press, 2005. 76; Higgs, Eric. *Nature by Design: People, Natural Process, and Ecological Restoration*. Cambridge, MA: MIT Press, 2003. 49-51; Ihde, Don. *Technology and the Lifeworld: From Garden to Earth*. Bloomington, IN: Indiana University Press, 1990. 33-4, 167, 171, 186; Ihde, 1993. 54-55; Lukács, 1971. 87; Luke, 1999. 71; Paterson, Matthew. “Commodification.” In *Death*, 2013. 56; Mumford, 1970. 58; Rutherford, Paul. “Ecological Modernization and Environmental Risk.” In *Darier*, 1999. 100; Rutherford, Stephanie. *Governing the Wild: Ecotours of Power*. Minneapolis: University of Minnesota Press, 2011. xvii-xix, 78, 187-88; White, Damian F., Alan P. Rudy, and Brian J. Gareau. *Environments, Natures and Social Theory: Towards a Critical Hybridity*. New York: Palgrave, 2016.

<sup>14</sup> DeLanda, Manuel. *War in the Age of Intelligent Machines*. New York: Zone. 1991. 6-7; Luke, 1996. 10-11; Luke, 1997b. 1376; Luke, 2000. 57.

<sup>15</sup> Foucault, 2008. 30-32.

economy at the heart of EDF's WCE is inscribing "the market" within the species history of Greater Sage-grouse by instrumentalizing it, and commodifying its habitat. As the above work has shown, the geo-engineering of Wyoming can be understood through recognizing the emergence of the grouse as a political, economic, and historical instrument justifying a geotechnic regime that favors the reproduction of commodities while commodifying the grouse herself.

As the reader will recall from the Introduction and Chapter Two, GRSG is well distributed across Wyoming as 37.5 percent of the remaining Rocky Mountain population occupies nearly a quarter of Wyoming's surface.<sup>16</sup> The species displays high habitat fidelity making the translocation of grouse populations difficult at best.<sup>17</sup> Anthropogenic disturbance has been the biggest threat to its survival as the grouse loses its home to urbanization, pollution, grazing, wildfire, mining, and most importantly coal, oil and gas extraction.<sup>18</sup> GRGS population declines have triggered Federal wildlife management regulations and the government of

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<sup>16</sup> Stoellinger, Temple, and David "Tex" Taylor. "A Report on the Economic Impact to Wyoming's Economy from a Potential Listing of the Sage Grouse." *Wyoming Law Review*: Vol. 17. No. 1. University of Wyoming, 2016; U.S. Department of the Interior. *Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to List Greater Sage-Grouse (Centrocercus urophasianus) as an Endangered or Threatened Species; Proposed Rule*. U.S. Fish and Wildlife Service. Washington; National Archives and Record Administration, October 2015. (Federal Register, Vol. 80, No. 191). (50 CFR Part 17). 59865.

<sup>17</sup> Baxter, Rick J. "Survival, Movements, and Reproduction of Translocated Greater Sage-Grouse in Strawberry Valley, Utah." *Journal of Wildlife Management* 72(1), 2008. pp. 179-186. Doi: 10.2193/2006-402; Baxter, Rick J. "Survival of Resident and Translocated Greater Sage-Grouse in Strawberry Valley, Utah: A 13-Year Study." *The Journal of Wildlife Management* 77(4), 2013. pp. 802-811. Doi: 10.1002/jwmg.520; Reese, Kerry P. and John W. Connelly "Translocations of sage grouse *Centrocercus urophasianus* in North America," *Wildlife Biology* 3 (3/4), December, 1997. pp. 235-241. <https://doi.org/10.2981/wlb.1997.029>.

<sup>18</sup> Gamo, Scott, Jason D. Carlisle, Jeffrey L. Beck, Juliette A. C. Bernard, and Mollie E. Herget. "Greater Sage-Grouse in Wyoming: An Umbrella Species for Sagebrush-Dependent Wildlife." *The Wildlife Professional*, Spring 2013. pp.56-59; Hanser, Steven E. and Steven T. Knick. "Greater Sage-grouse as an Umbrella Species for Shrubland Passerine Birds: A Multiscale Assessment." In Knick, Steven T. and John W. Connelly (eds.) *Greater Sage-grouse: Ecology and Conservation of a Landscape Species and its Habitats*. University of California Press and the Cooper Ornithological Society, 2011. 475; Stiver, San J. "The Legal Status of Greater Sage-Grouse: Organizational Structure of Planning Efforts: Appendix 2.1 Memorandums of Understanding, 1999 and 2000." In Knick and Connelly, 2011. 42-3; Wisdom, Michael J., Cara W. Meinke, Steven T. Knick, and Michael A. Schroeder. "Factors Associated with Extirpation of Sage-grouse." In Knick and Connelly, 2011. 467; U.S. Department of the Interior, 2015. 59860.



Wyoming is on tenterhooks fearing reductions in its ability to continue capital intensive activities should the grouse be listed under the Endangered Species Act. In response, the Environmental Defense Fund and its partners have taken Wyoming as an opportunity to test a habitat exchange as a market-based conservation instrument. The functioning of the WCE is tied to: (1) the regulatory frameworks embodied by the Wyoming CAP, as Chapters Two and Three displayed; (2) the manufacture of workforces through the engineering of subjectivities as Chapter Three argued; (3) and the technocratic management of information relative to State and Federal administrative assemblages as well as the localized tactical adjustment of conservation plans as Chapter Four showed. Chapters Two, Three and Four demonstrate how geo-engineering is used in attempts to draw in and incorporate the autarkic and organic life rhythms of the grouse into the machinic synthetic networks of capital conceived as an ecosystem.

This dissertation has shown that the geo-engineering instrument of the WCE is connected to the production of commodities emanating from the trona industry, as well as the hydrocarbon industry in Wyoming. This has been demonstrated in Chapter Two through recognizing the problem that GRSG population declines will cause both industries if they trigger an Endangered Species Act listing, as well as the economic worries expressed by the State of Wyoming within the CAP instrument as Wyoming depends on mining, and hydrocarbon extraction for nearly 20 percent of its GDP.<sup>19</sup> As Chapter Four showed, the WCE is connected to actors working for the American Natural Soda Ash Corporation - the largest exporter of natural soda ash in the world - through the SWLWG, and the Wyoming Mining Natural Resources Foundation through the

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<sup>19</sup> Office of the Governor. "Greater Sage-Grouse Core Area Protection." *Executive Order 2008-2*, State of Wyoming. August 1, 2008. 1; US Department of Commerce, and Bureau of Economic Analysis. "Bureau of Economic Analysis: Wyoming." BEA: Data Tools: Wyoming. September 25, 2018. Accessed January 27, 2019. <https://apps.bea.gov/regional/bearfacts/action.cfm>; U.S. Department of the Interior, 2015. 59865.

WCE's Vice President, Wanda Burget.<sup>20</sup> The extension of the habitat mitigation credit economy through the instrument of the WCE shows how synthetic ecosystems of capital are unfolding and expanding within Wyoming through the neoliberal instrumentalization of the sage-grouse.<sup>21</sup>

Chapter Two showed how the basis of programmatic enrollment within the mitigation credit economy is critical to the continued extraction of trona and hydrocarbons because of Federal demand for landowner enrollment in GRSG conservation.<sup>22</sup> Landowner enrollment within the conservation assemblage was incentivized through the extension of Candidate Conservation Agreements with Assurances that translated Federal biopower into geopower allowing for a recoding of the landscape according to the demands of the local-state-federal GRGS conservation initiative.<sup>23</sup> Chapter Three built from this analysis to show how the mitigation credit economy rests upon the Wyoming CAP as a regulatory framework providing the need for mitigation credits. The manufacture of demand through the CAP incentivizes the need for landowner enrollment as suppliers of mitigation credits for concentrations of capital to offset ecological damage to sage-grouse habitat. This dynamic displays the expansion of capital's synthetic ecosystems through the rearticulation of landowner relationships to their

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<sup>20</sup> "Current Members." Wyoming Mining Natural Resource Foundation. Accessed May 08, 2019. <http://www.wmnr.org/current-members.html>; "Member Companies." ANSAC. Accessed May 20, 2019. <http://www.ansac.com/about-ansac/member-companies/>; "Mission and Strategy." Wyoming Mining Natural Resource Foundation. Accessed May 27, 2019. <http://www.wmnr.org/mission-and-strategy.html>; Southwest Wyoming Local Sage-grouse Working Group. *Southwest Wyoming Sage-grouse Conservation Plan. V. 2.0*. The Southwest Wyoming Local Sage-grouse Working Group, November, 2013. 4; "Wanda Burget." *Linked In*. No Date. Accessed May 08, 2019. <https://www.linkedin.com/in/wanda-burget-84a5857/>; "Wyoming Mining Natural Resource Foundation." Wyoming Mining Natural Resource Foundation. Accessed May 20, 2019. <http://www.wmnr.org/>.

<sup>21</sup> Castree, Noel. "Neoliberalising Nature: Processes, Effects, and Evaluations." *Environment and Planning A*: Vol. 40, 2008.158. Doi: 10.1068/a39100.

<sup>22</sup> U.S. Department of the Interior, 2015. 59931-59940.

<sup>23</sup> Pidot, Justin R. "Public-Private Conservation Agreements and the Greater Sage-Grouse." *Public Land & Resources Law Review* 39, 2018. 184; U.S. Department of the Interior, 2015. 59874, 59886; Wyoming Bureau of Land Management, Natural Resource and Conservation Service, Wyoming Game and Fish Department, Wyoming Department of Agriculture, Wyoming Association of Conservation Districts, U.S. Forest Service, and U.S. Fish and Wildlife Service. *Greater Sage-Grouse Umbrella CCAA for Wyoming Ranch Management: A Candidate Conservation Agreement with Assurances for Greater Sage-Grouse (Centrocercus urophasianus)*. U.S. Fish and Wildlife Service, 2013. 11.

property included in the mitigation credit as a commodity. Chapter Four connected the production of rules for relating to territory, and GRSG to the demands of industries targeted specifically by the credit mitigation economy, and thus charts the power of ANSAC, and fossil fuel extraction to the production of landscape at the local level. This power is accomplished and amplified through the tactical insertion of technocrats in key decision-making positions within local conservation infrastructure, and as this work has shown, the WCE is no different.<sup>24</sup>

Wes Sibert and James Hellyer - the WCE's Director and President respectively - link the local agricultural, and ranching communities to the habitat mitigation credit economy by representing those stakeholders on the WCE's Executive Board.<sup>25</sup> As I have explored in Chapters Two, Three and Four, agriculture and ranching have been affected by GRGS conservation within the state, and is a target of environmental governance.<sup>26</sup> Additionally, ranchers and farmers have been targeted through the habitat mitigation credit economy as potential credit producers.<sup>27</sup>

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<sup>24</sup> Christiansen, Thomas J., and Lorien R. Belton. "Wyoming Sage-grouse Working Groups: Lessons Learned." *Human-Wildlife Interactions* 11, no. 3, Winter, 2017. 277.

<sup>25</sup> "WCE's Board of Directors." Wyoming Conservation Exchange. April 04, 2017. Accessed April 08, 2019. <http://www.wyomingconservationexchange.org/about/wces-board-of-directors/>.

<sup>26</sup> "For Landowners." Sage Grouse Initiative. Accessed April 08, 2019.

<https://www.sagegrouseinitiative.com/about/for-landowners/> "Frequently Asked Questions." Wyoming Conservation Exchange. January 05, 2015. Accessed April 08, 2019.

<http://www.wyomingconservationexchange.org/about/frequently-asked-questions/>; Lockman, Dave, Art Reese, Miles Moretti, Fred Palmer, Aimee Davidson, Gary and Jo Ann Zakotnik, and John Andrikopoulos. *The Farson Landowners' "Healthy Lands Initiative" A Unique Conservation Initiative on a Working Wyoming Landscape Sponsored by Shell Oil Company and the Mule Deer Foundation*. The Mule Deer Foundation, 2017; Mealor, Brian A., Rachel D. Mealor, Windy K. Kelly, Dylan A. Bergman, Shayla A. Burnett, Travis W. Decker, Beth Fowers, Mollie E. Hergert, Cara E. Noseworthy, Jennifer L. Richards, Cynthia S. Brown, K. George Beck, and Maria Fernandez-Himenez. *Cheatgrass Management Handbook: Managing an Invasive Annual Grass in the Rocky Mountain Region*. Laramie, WY: University of Wyoming, 2013. 7; Sublette County Conservation District. *Sublette County Conservation District: Annual Report 2018 and Plan of Work 2019*. Sublette County Conservation District. Pinedale, WY: Sublette County Conservation District, 2018. XIV; United States Department of Agriculture. Natural Resources Conservation Service. *Greater Sage-Grouse 2018 Progress Report*. Working Lands for Wildlife, 2018. 2.

<sup>27</sup> Duke, Esther A., Amy Pocewicz, and Steve Jester. "Upper Green River Basin Ecosystem Services Feasibility Analysis Project Report." The Nature Conservancy. December, 2011; Hansen, Kristiana, Esther Duke, Craig Bond, Melanie Purcell, and Ginger Paige. "Rancher Preferences for a Payment for Ecosystem Services Program in Southwestern Wyoming." *Ecological Economics* 146, 2018. 240-49. doi: 10.1016/j.ecolecon.2017.10.013; Kreuter, Urs P., David W. Wolfe, Kenneth B. Hays, and James R. Conner. "Conservation Credits—Evolution of a Market-Oriented Approach to Recovery of Species of Concern on Private Land." *Rangeland Ecology & Management* 70, no. 3, 2017. pp. 264-72. doi: 10.1016/j.rama.2016.10.012; Wolfe, David. "Operation Warbler: How Fort Hood and Local Ranchers Teamed up to save a Bird." Environmental Defense Fund. July 15, 2015. Accessed April 08, 2019.

While the networks held by Sibert and Hellyer are less dense than that of Peterson or Burget, their involvement concerning local conservation and its effect on the ranching and agricultural communities should not be overlooked considering the work that EDF and their partners have done to gauge landowner receptivity to programmatic enrollment in the WCE. As the reader will recall, EDF's standard of success has been less concerned with direct benefits to the species they claim to be helping, and more so about the amount of land that they can enroll in their habitat offset economy.<sup>28</sup> The instrument of the WCE should not be seen as apart from these considerations, and the data generated in part by Melanie Purcell and The Nature Conservancy shows that EDF is again defining 'success' by whether a ready supply of GRGS habitat capital can be generated through landowners *qua* workforce.

Recall that Eric Peterson - the WCE's administrator - is chiefly concerned with credit production, accounting and distribution.<sup>29</sup> His job within the WCE is to maintain the balance sheet of creditors and debtors while securing a reserve fund from credit production to offset unforeseen habitat losses.<sup>30</sup> Peterson's role is, thus, that of an internal monitor to maintain the continued fungibility of the habitat credit economy by finding buyers and connecting them to potential creditors. Thus, Peterson is concerned with translating industrial capital into operational permissibility within the CAP through extending capital's reach by synthesizing assemblages within the production of mitigation credits as commodities. Additionally, he connects Federal, State and local environmental power to the WCE as the manager for the Sublette County Conservation District that has enrolled in the Sage Grouse Initiative under the USDA's National

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<sup>28</sup> Ibid.

<sup>29</sup> Wyoming Conservation Exchange. *Wyoming Conservation Exchange Manual. V. 2.0*. Environmental Defense Fund, 2016. 49.

<sup>30</sup> Ibid. 9, 23-24.

Resource Conservation Service.<sup>31</sup> His network includes Melanie Purcell as his right-hand at SCCD, and Purcell is also part of the WCE's technical advisory team that is tasked with producing information concerning the success of the WCE and its mitigation credit economy.<sup>32</sup> Peterson, thus is instrumental in linking the WCE with Federal initiatives as well as translating power and capital to ensure the functioning of conservation infrastructure relative to the demands and needs of industrial capital targeted by the State and the WCE.

Chapter Four selected Wanda Burget as an instrumental nexus into the SWLWG through her associations with Julie Lutz - her Chairman of the Board at the Wyoming Mining Natural Resources Foundation.<sup>33</sup> The Foundation, it will be recalled, is a conservation instrument created by the companies operating in Southwestern Wyoming in trona and coal mining.<sup>34</sup> The material connections displayed by Burget connect her to the largest trona mine in the world, as well as Kiewit Coal, Westmoreland Coal, the Union Pacific Railroad and to the operations of Wyoming's largest private landholder, Anadarko petroleum now operating under Occidental Petroleum after an acquisition in August of 2019.<sup>35</sup> This is only one side of Burget's industrial

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<sup>31</sup> "New Paradigm." Sage Grouse Initiative. Accessed April 08, 2019.

<https://www.sagegrouseinitiative.com/about/new-paradigm/>.

<sup>32</sup> The Wyoming Conservation Exchange, 2016. 9, 12; "Partners." Sage Grouse Initiative. Accessed April 08, 2019.

<https://www.sagegrouseinitiative.com/about/partners/>.

<sup>33</sup> "Current Members." Wyoming Mining Natural Resource Foundation. Accessed August 08, 2019.

<http://www.wmnr.org/current-members.html>.

<sup>34</sup> "Wyoming Mining Natural Resource Foundation." Wyoming Mining Natural Resource Foundation. Accessed May 20, 2019. <http://www.wmnr.org/>.

<sup>35</sup> Associated Press. "Coal Company in Bankruptcy Court Asks to Sell Wyoming Mine." *AP NEWS*. January 24, 2019. Accessed June 27, 2019. <https://www.apnews.com/24b759d3354349c99dea1b568d00f8a5>; Hiller, Jennifer "Anadarko shareholders go for the cash in \$38 billion Occidental buyout." *Reuters*. August 8, 2019. Accessed October, 15, 2019. <https://www.reuters.com/article/us-anadarko-petrol-m-a-vote/anadarko-shareholders-go-for-the-cash-in-38-billion-occidental-buyout-idUSKCN1UY22M>; "Member Companies." ANSAC. Accessed May 20, 2019. <http://www.ansac.com/about-ansac/member-companies/>; Proctor, Darrell. "Westmoreland Coal Emerges from Chapter 11 Bankruptcy." *POWER Magazine*. March 17, 2019. Accessed August 20, 2019.

<https://www.powermag.com/westmoreland-coal-emerges-from-chapter-11-bankruptcy/>; Reynolds, Nick. "Federal Judge Approves Sale of Kemmerer Coal Mine." *Casper Star-Tribune Online*. June 11, 2019. Accessed June 27, 2019. [https://trib.com/business/energy/federal-judge-approves-sale-of-kemmerer-coal-mine/artiCle\\_2880f318-6091-5ccb-9c50-3d43932e3510.html](https://trib.com/business/energy/federal-judge-approves-sale-of-kemmerer-coal-mine/artiCle_2880f318-6091-5ccb-9c50-3d43932e3510.html); Rogers, Alan. "Photos: Westmoreland Coal's Bankruptcy Leaves a Southwest Wyoming Community on the Brink." *Casper Star-Tribune Online*. May 29, 2019. Accessed June 27, 2019; The Southwest Wyoming Local Sage-grouse Working Group, 2013. 60.

connections as she represents ‘industry’ within the WCE, and Julie Lutz connects Burget and her networks to the production of landscape in Southwestern Wyoming. Lutz represents mining on the SWLWG and I explored the formation and local administration of GRSG territory through the policy and funding networks that support local sage-grouse working groups.<sup>36</sup>

The local working groups are tasked with articulating the state conservation plan with a local accent and are reactive to the needs of industries under their jurisdiction.<sup>37</sup> They are populated by technocrats selected by their respective industries to represent their interests within the local administration of territory.<sup>38</sup> Analyzing the SWLWG showed that trona and coal mining were classified as less impactful within the SWLWG’s recommended management plans than other land uses including wind energy development and that this classification is unique to the SWLWG.<sup>39</sup> This consideration is highlighted against the backdrop of Trump administration prioritization for all energy development within GRSG zones through a recoding of the BLM, which handles the bulk of land management in Southwestern Wyoming, and, indeed across most of the state.<sup>40</sup> Given the above, I concluded in Chapter Four that habitat offsetting within Southwestern Wyoming is geared toward the continued extraction of trona, coal, and coalbed methane through a simultaneous de-prioritization of developmental impacts through the SWLWG instrument, and permitting prioritization for extractive industry through the BLM.

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<sup>36</sup> Wyoming Game and Fish Department. *2016 Comprehensive Management System Annual Report for the U.S. Fish and Wildlife Service*. 41; Wyoming Game and Fish Department. *2017 Comprehensive Management System Annual Report for the U.S. Fish and Wildlife Service*. 40.; Wyoming Game and Fish Department. *2018 Comprehensive Management System Annual Report for the U.S. Fish and Wildlife Service*. B-19.

<sup>37</sup> The State of Wyoming. *Greater Sage-grouse Conservation Plan*. The State of Wyoming, June 24, 2003. 6.

<sup>38</sup> Belton, Lorien R., and Douglas Jackson-Smith. "Factors Influencing Success among Collaborative Sage-grouse Management Groups in the Western United States." *Environmental Conservation* 37, no. 3, September, 2010. 253.

<sup>39</sup> The Southwest Wyoming Local Sage-grouse Working Group. *Southwest Wyoming Sage-grouse Conservation Plan*. V. 2.0. The Southwest Wyoming Local Sage-grouse Working Group, November, 2013. 22, 26, 27, 33.

<sup>40</sup> "Instruction Memorandum No. 2018-26". Department of the Interior. Bureau of Land Management, December 27, 2017. 2; "Revised Greater Sage-Grouse - Compensatory Mitigation Framework." The State of Wyoming, July 10, 2017. 1.

It is, therefore, reasonable to conclude that ANSAC, Kiewit, Anadarko, Westmoreland, and the Union Pacific all benefit from the operations of the SWLWG as well as the WCE as an instrument in the offset credit economy.

It appears that EDF is finding the ways that work for hydrocarbon industry to continue its operations in Wyoming through helping to defend the environment created for them through the CAP and Federal management initiatives. The Environmental Defense Fund is defending the hydrocarbon environment by linking together the synthetic machinic assemblages of capital with the Greater Sage-grouse through commodification. The geotechnic regime operating in Wyoming under the aegis of Greater Sage-grouse conservation, therefore, is concerned with creating an environment habitable for the machines, and flows that have historically destroyed the Greater Sage-grouse's populations through habitat loss. It remains to be seen whether the simulated surrogate habitats will mitigate sage-grouse population declines. However, as this dissertation has shown the sage-grouse's habitat has been incorporated into the commodity networks of capital's synthetic ecosystems. Therefore, the Greater Sage-grouse is undergoing technonaturalization through adjustments within its habitat committed in the name of its conservation tied to securing the conditions necessary for the reproduction of machines concerned with extracting iron and hydrocarbons that reproduce the materiality of capital's machinic ecosystems at the global scale. The Environmental Defense Fund in Wyoming through the WCE as an instrument is attempting to protect the global flow of commodities that populate, and form the material conditions of the global environment of the Megamachine.

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