From non-native “weed” to butterfly “host”: knowledge, place, and belonging in ecological restoration

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Abstract

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Increasing recognition that what we call "natural" landscapes and ecosystems are often co-produced through human activities has prompted a proliferation of conversation, across the natural and social sciences, about the meaning and role of ecological restoration in the 21st century. Emergent concepts such as the Anthropocene and "post-Natural" conservation work to destabilize conventional categories, such as "native" species, that have been used by restorationists to answer the question of what plants and animals *belong* in particular places. Such categories matter because the forms of life that are understood to belong are actively made to live through the practices of restoration, while others are killed or allowed to die. I apply the Foucauldian lens of conservation biopolitics to an ethnographic case study of a restoration

project aimed to foster the life of a species of endangered butterfly on San Juan Island, WA. This case provides evidence of multiple environmentalist discourses of restoration, exemplified by competing norms regarding a plant, once considered a non-native "weed," that is now carefully propagated as an important "host" plant for butterfly reproduction. Tensions between the different approaches to this restoration project provide insight into the human values underlying the scientific knowledges that constitute the discourses of restoration and conservation. The processes of life-making and place-making inherent to restoration, I argue, shape human understandings of ourselves in relation to "nature," through processes of normalization and discipline that create environmentalist subjectivities. Through critical discourse analysis of the effort to foster butterfly and host plant lives, I examine how particular kinds of places and human subjects are made through the biopolitical endeavor of ecological restoration. In contrast with critiques of restoration as a nostalgic practice aimed at re-creating the past, I argue that contemporary restoration discourses have promise to provide a foundation for a (bio)political understanding of human intervention in "nature" that is explicitly conceived through relationships between human and nonhuman life.

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> "The sun finally came out and stayed a spell last week. I shut down my computer and headed for the shore. Soon I was settled on a piece of driftwood by the inland sea, binoculars in hand, scanning the sublime scene. It wasn't long before I spotted a beautiful creamy-white butterfly fluttering among a healthy gathering of tumble mustard plants on a sandy slope. It was an island marble – a rare member of the family of white butterflies called the Pieridae. Every so often the butterfly would land on one of the plants, extend its long black proboscis into the faint yellow blooms and feed on the sugary nectar of life. The yellowish-green mottling on its hind wings made the marble nearly imperceptible on the plant – Nature's perfect camouflage on a delightful spring day. There is something special about watching a beautiful little creature going about its business and knowing there is no place on earth, except the San Juan Islands, where it exists. Add to the mystique, the saga of a subspecies of butterfly that was declared extinct over a century ago on southern Vancouver Island and then rediscovered here in 1998. It is a tale worth repeating."
>
> - Susan Vernon, in the San Juan Islander newspaper, April 20, 2010 (Vernon, 2010)

Chapter 1. Introductions

In early 2015, construction began on a new segment of Cattle Point Road, a county highway running through American Camp, the southern portion of San Juan Island National Historical Park on San Juan Island, Washington. The existing road, which cut across the hillside above the sandy bluffs overlooking the south beach, had become threatened by erosion of the bluffs caused by the waves below. Over a mile of the highway was slated for removal and replacement with a new road about 300 feet farther uphill. Once the old road was removed, the disturbed swath of the hillside was recontoured, covered with topsoil, hydro-seeded with native grass and prairie plant species, and covered with a coir (coconut-fiber) blanket designed for temporary erosion control. The revegetation plan for the old road bed was seen as a "unique opportunity to create an extensive native plant community that currently exists only in small, isolated remnants

throughout the prairie/grassland habitat of the American Camp unit" (U.S. Department of Transportation, 2012, p. 298). In this way, the road project was aligned with a broader effort described as "an ambitious project to restore the prairie to a pristine state" (National Park Service, n.d.). This ecological restoration project, aimed at reestablishing the historic conditions and biotic assemblages of a rare and rapidly shrinking ecosystem type, the Puget Sound coastal prairie, prioritized the removal of introduced plant species and revegetation of the prairie with desirable natives.

Not long after the project was completed, restoration ecologists monitoring the revegetation effort were surprised to find an extremely rare local insect species moving in to the area. The Island Marble butterfly (*Euchloe ausonides insulanus)*, a candidate for endangered species listing by the U.S. Fish and Wildlife Service, was known to live nearby in the sandy dunes near the beach, where another restoration effort was already underway to protect its habitat. While it was hoped that the "extensive native plant community" of the revegetated road bed would eventually become a habitat area for the butterfly, the designers of the revegetation project had certainly not thought it would happen on its own, nor so quickly. No one anticipated that the butterflies would migrate unassisted from the beach, taking advantage of the unintended spread of one of their preferred host plants – a weedy species called tumble-mustard (*Sisymbrium altissimum*) – into the old road corridor. In the spring of 2016, butterflies began to lay eggs on the flowers of these host plants, and the caterpillars that emerged used the tumble-mustard flowers and leaves as their exclusive food source during the larval stage of their growth.

Figure 1: Island marble butterfly (Euchloe ausonides insulanus), on flowers of field mustard (Brassica rapa) host plant. Photo by author.

The discovery of a brand-new population of an endangered animal, which would seem to demonstrate the species' resilience, might appear to be cause for hope regarding the potential rebound of the population. However, such excitement quickly turned to grave concern on the part of the restoration ecologists involved. A main source of this concern was the use of an erosion-control blanket held together by a matrix of plastic monofilament, a thin, photo-degradable fishing-line-like fiber designed to hold together the coir. Scientists wondered, would host plants growing through this material develop normally, and provide effective habitat and oviposition sites for butterflies? Would caterpillars be able to move through the material without injury or damage? And how could crews of restoration laborers, working on the road corridor over the course of the summer and fall to remove invasive weeds and plant additional native prairie species, avoid crushing the delicate animals under their boots? The new site began to look like an

ecological sink – a place that draws butterflies away from other, more productive habitats, only to see their reproduction cut off – rather than an opportunity for population growth.

The scientists fell into what Jenny Shrum, a National Park Service biologist, later described as a "cycle of total panic" (personal communication, 2016). They set up time-lapse cameras at a few sites to observe the development of host plants and movements of caterpillars. Elsewhere, they rushed to find and collect caterpillars, bringing as many as possible into a laboratory where they could be kept in captivity to adulthood, before being released back onto the landscape. As the larval stage of development came to a close a month later, the caterpillars began to move off their host plants in search of appropriate sites to form their chrysalides for their months-long pupal stage. To the further worry of the scientists, caterpillars in the lab were found to be attaching to the plastic monofilament of the erosion control blanket itself, rather than to the wooden skewers they typically used as pupal sites. New concerns arose: would the pupae develop normally? Would the emergent butterflies break their delicate wings on the plastic fiber as they emerged, or be trapped under the erosion-control material and unable to fly away?

Such questions, while unique to the unusual circumstances of the island marble case, reflect an increasingly common conundrum for restoration ecologists, conservation biologists, and others involved with the protection of wild animals and places: in many cases, those animals and places are not quite so wild, or "natural," as they might seem at first glance. Environmentalist narratives often decry human disturbance as a contributor to environmental degradation, and a likely cause of endangerment and extinction. In this case, though, the heavily disturbed area of the old road bed, complete with plastic monofilament fibers for chrysalides, appeared (at least to the animals

themselves) to provide better habitat conditions than the nearby sand dunes where the butterflies were already living. Yet those sand dunes, too, are far from a pristine, natural system. The coastal storms that beat on the southern shores of San Juan Island, causing the erosion that produces the sand dune ecosystem, are becoming more and more common in the era of anthropogenic climate change. The tumble-mustard host plants on which the butterfly eggs and larvae live and feed are an introduced, non-native species, commonly described as a weed. In such a context, the use of plastic monofilament as a pupal site appears only marginally less "natural" than the previous behavior exhibited by the species.[1]

Furthermore, it is not known with any certainty whether the butterflies themselves "belong," in a sense, on southern San Juan Island. It is the only place in the world they are found today, but they were actually never observed there until fewer than twenty years ago. The species had last been recorded in 1908, on a few Canadian islands farther north in the Salish Sea, and had been thought to be extinct ever since. In 1998, a lepidopterist conducting a survey of insects on San Juan Island was astonished to find island marble butterflies living on the prairie at American Camp (Pyle, 2006). Following this "shocking rediscovery" (Berg, 2013), the desire to protect and care for this rare species sparked substantial, still-ongoing efforts to better understand its biology and ecology, and to take measures to ensure the reproduction of the population. Local organizations began lobbying for its listing as an endangered species. Meanwhile, restoration ecologists put to use newly acquired biological and ecological knowledges, planning and

[1] It is a bit too early to draw firm conclusions about whether this was a successful strategy for the animals, which will emerge from their chrysalides in June or July of 2017. Early evidence, though, suggests that the pupae are developing normally, as I will discuss further in Chapter 6.

implementing on-the-ground efforts to restore the species by creating the habitat that allowed for its continuing survival on the American Camp prairie.

As the story of the Cattle Point road realignment project and unexpected butterfly migration aptly demonstrates, the circumstances of the island marble case raise important questions about how this project might be done, and indeed what "restoration" even means. To what conditions should the ecosystem be restored? What kinds of human interventions are appropriate to facilitate butterfly survival, if indeed that is the appropriate goal? Should the local plant species that butterflies use for reproduction be considered non-native weeds, which should be removed, or important host plants, to be cultivated? Finally, where does the butterfly *belong*, and what kind of place (or places) must be made in order to facilitate its survival into the future?

The purpose of this thesis

In this thesis, I examine the island marble conservation and restoration project on San Juan Island as a case study through which to explore the array of discourses and practices that collectively go by the name of ecological restoration. By *discourses*, I mean what Gillian Rose (2001) has described as "groups of statements which structure the way a thing is thought, and the way we act on the basis of that thinking. In other words, discourse is a particular knowledge about the world which shapes how the world is understood and how things are done in it" (p. 136). I seek to better understand the relationships between the "particular knowledges" at work in restoration, on the one hand, and the physical-material landscapes that are being restored, on the other – in short, what does it mean to say that one will "restore" an ecosystem, a species, or a

place, and how does such an effort manifest itself in the material world? This question has tremendous relevance in the age now commonly known as the Anthropocene, with the recognition that what we call "natural" landscapes and ecosystems are often, perhaps always, co-produced through human activities. In the context of increasing awareness of anthropogenic declines in global biodiversity, the capacity to actively repair degraded ecosystems and habitats – a typical conceptualization, though hardly the only one, of the practice of restoration – appears, to many, to be critical to the sustainability of both ecological systems and human societies around the world. Yet the Anthropocene also poses theoretical challenges for restoration practitioners, who have often sought to re-establish pristine historical ecosystems, or at least maintain historic levels of biodiversity, in a permanently changed and ever-changing landscape.

The competing priorities of rare species preservation, on the one hand, and restoration to historic conditions, on the other, make the case of the island marble butterfly a prime example of what William Adams (2016) has called "an important fracture zone in conservation" (p. 7). While critiques of nature as a "pristine state" are hardly new (e.g. Cronon, 1996), debates over the role of human intervention into "natural" landscapes and ecosystems rage on across the natural and social sciences, as well as among conservation and restoration practitioners working in the field. I argue that the case of the island marble butterfly poses a unique opportunity for thinking through the political, cultural, and (importantly) spatial implications of restoration, in both discourse and practice, in the Anthropocene. The apparent extinction of the butterfly (and resultant lack of human knowledge about its past ecology), combined with its contemporary reliance on introduced host plants, pose an explicit challenge to conventional ideas about

restoring ecological conditions to an undisturbed past state of Nature. In this way, the specific challenges of the island marble case align with broader academic critiques of the theory and practice of ecological restoration, which I discuss in Chapter 2. Meanwhile, the discursive emphasis on protecting this "rediscovered" species – precisely because it is endangered, and despite arguably having relatively little economic, cultural or ecological value – raises questions about the relationships between species, habitats, and ecosystems, the ways we assign value to nonhuman forms of life, and the role of human intervention into the natural world.

As an entry point for discussing these broader issues, I focus my attention on a particular discursive shift that has gradually (and incompletely) taken place in the context of the island marble project. As noted above, ecological research is currently ongoing at American Camp to determine best management practices for facilitating the reproduction of the island marble butterfly population, primarily through management of plant and animal communities to create optimal habitat conditions. Specifically, as I will discuss in detail in Chapter 4, ecologists are currently experimenting with how to modify the assemblage of species on the prairie to include the necessary plants for island marble reproduction – *including* non-native host plants. Such a practice stands in contrast with the received wisdom of ecological restoration, in which non-native plants and animals are generally removed and replaced with natives. In the profoundly human-altered socio-ecological system that is the American Camp prairie, these land managers have thus largely turned away from one of the usual tenets of restoration practice, because the endangered butterfly's reproduction has become so dependent on its relationships with these non-natives. The current restoration practices include disturbing the existing ecosystem and

intentionally planting and cultivating the plants – previously designated as "weeds," now considered important "host" plants – that are essential for butterfly reproduction. This shift in thinking, spurred by the effort to foster the lives of butterflies, makes restoration a kind of field-based experimental practice aimed at learning how to effectively construct habitat conditions, thereby making a particular kind of place in which butterflies can live.

This shift in how scientists think about a particular plant, I argue, offers insight into how the discourses of ecological restoration work to normalize human values as scientific truths. Indeed, as I will argue in Chapter 5, the shift that I describe above emphasizes one set of scientific discourses (endangerment and biodiversity) at the expense of another (restoration to historical conditions). In both cases, however, these apparently objective scientific discourses serve to hide the role of human values in restoration. This case study provides a lens through which to examine the important political (and ethical) decisions that must be made to determine which plants and animals are considered to *belong*, and should thus be protected or actively restored. I argue that the shift is indicative of a broader destabilization of conventional categories, such as "native" species, that have been used to answer the question of "what plants and animals belong in particular places?" (cf. Lorimer, 2012, p. 598). Such categories matter because the forms of life that are understood to belong are actively made to live through the practices of restoration, while others are killed or allowed to die. In this way, ecological restoration amounts to the biopolitical administration of nonhuman life, in which land managers make decisions that "foster life or disallow it to the point of death" (Foucault, 1990, p. 138).

The biopolitical implications of restoration, I argue, also reach far beyond the single host plant. The people who practice restoration come to understand themselves, and their relationships with plants, animals, and the natural world, through the material work that they do to foster nonhuman life. In this way, the discourses of restoration work to form the subjectivities of the people who practice restoration, who in turn reproduce those discourses – that is, discourse and subjectivity are mutually constitutive. As Rose puts it, discourse "disciplines subjects into certain ways of thinking and acting, but this is not simply repressive; it does not impose rules for thought and behavior on a preexisting human agent. Instead, human agents are produced through discourses. Our sense of our self is made through the operation of discourse. So too are objects, relations, place, scenes: discourse produces the world as it understands it" (Rose, 2001, p. 136). As I have suggested already, therefore, the discourses of restoration also have important effects on the material world, "making live and letting die" particular plants and animals, and thereby shaping the biotic assemblages and even the physical terrain of the places where restoration happens. In this way, I argue, the act of "making live" is also one of "making place," as the places where restoration happens – while very much still located in the material world – are socially constructed, and materially reshaped, through the discourses of restoration. My examination of the biopolitics of restoration, then, seeks to pay attention to the relational ties through which environmental discourses, material practices and real places, human subjectivities and values, and the lives of plants and animals are all collectively made and remade.

Attention to these complex ties, as well as the multiplicity of strands of restoration discourse at work even within a single project, opens for analysis the nuanced, sometimes contradictory, and

continually evolving world of ecological restoration. The case study of the island marble butterfly, I argue, reveals complexities of discourse and practice in ecological restoration that have created tensions both between and within restoration practitioners. These tensions lead to important political debates and decision-making processes over nonhuman belonging (a question of being in or out of *place*, in which life and death are at stake) that I seek to examine in this thesis. The relational ties between discourses, values, places, and lives are not fixed or immobile, but continually reforming themselves through such processes, and in response to both human and more-than-human agencies. This complexity contravenes the too-easy critique of restoration as a nostalgic, "Edenic Science" (Robbins and Moore 2013, p. 4) that envisions an impossible return to a pristine past state of Nature. Indeed, even as the discourse of restoration often works to reproduce categories that define nature in opposition to the human, the practice of ecological restoration also embraces, in many ways, the anthropogenic production of "natural" ecosystems, places, and forms of life. In my concluding chapter, I aim to suggest how the heterogeneity and complexity of restoration, despite its challenges and contradictions, has promise for new ways of thinking about the role of human intervention in the natural world. I argue that contemporary shifts in thinking about restoration, as exemplified by the case of the island marble butterfly, may provide a foundation for a biopolitics of nature that is explicitly conceived through mutual relations between human and more-than-human life.

An overview of key conceptual resources

My project can be understood as an examination of the practice of ecological restoration as the construction of a particular social and cultural discourse. The definition of *discourse* that I cite

above (Rose, 2001), drawn from the work of Michel Foucault, emphasizes that discourse is reliant on, indeed constituted by, the production of knowledge. Knowledge, for Foucault, is itself a construction of power: "there is no power relation without the correlative constitution of a field of knowledge, nor any knowledge that does not presuppose and constitute at the same time power relations" (1977, p. 27). Drawing on this Foucauldian conception of knowledge-power, I explore the field of ecological restoration as a discursive production that both creates and is created by relations of power, shaping and stabilizing the politics of nature. I seek to examine how human values work to make different kinds of socioecological places in the name of "restoration," understood as a set of cultural and political discourses rather than an objectively scientific undertaking.

The framing of scientific knowledges as forms of discourse, rather than objective truths, that have important material effects on landscapes situates my analysis and approach at the intersection of the related fields of science and technology studies (STS) and political ecology. The tradition of STS seeks to examine how "scientific knowledge and technologies… participate in the social world, being shaped by it, and simultaneously shaping it" (Law, 2004, p. 12), while political ecology aims to "address the condition and change of social/environmental systems with explicit consideration of relations of power" (Robbins, 2011, p. 20). Political ecology has thus tended to focus on the effects of power (including, to a certain extent, the Foucauldian conception of knowledge-power) in changing material landscapes, while STS addresses more directly the process of the production of scientific knowledges, but the two fields have been increasingly in conversation in recent years (see Goldman et al., 2011). Contemporary work at

the intersection of these field aims to "critique the truth claims made in the name of environmental science and… to understand how these truth claims come about and to what effect" (Turner, 2016, p. 415).

A prominent strand of such scholarship utilizes the additional Foucauldian concepts of *biopower* and *biopolitics* to examine the kinds of truth claims that are made to justify life and death. The emergence of biopower, according to Foucault, is marked by the shift from a sovereign right to *kill* to the capacity to "foster life or disallow it to the point of death" (1990, p. 138). Biopower is thus "power over life" itself, and "brought life and its mechanisms into the realm of explicit calculations and made knowledge-power an agent in the transformation of human life" (1990, p. 143). While Foucault himself had little to say about *nonhuman* life, many contemporary scholars have extended biopolitical thinking to consider the administration of the lives of more-than-human animals (e.g. Holloway et al, 2009; Rutherford, 2007; Youatt, 2008), and in particular to examine the field of conservation as a particular form of biopolitics (e.g. Biermann, 2016; Hennessy, 2013; Lorimer & Driessen, 2013). Conservation, in this analysis, amounts to the administration of nonhuman life by making certain forms live while others are allowed to die. The emphasis here is on the management of life at the level of the population, a fundamental characteristic of Foucauldian biopolitics: "today's conservationists by and large aim to foster and protect the diversity of nonhuman life, taking as their object not individuals (e.g., trees, charismatic animals, or geological formations) but populations, communities, and species" (Biermann & Mansfield, 2014, p. 259).

Biopolitical control over populations is accomplished through the application of "technologies of power" (Foucault, 2003, p. 249) that regulate the reproduction and circulation of life. On the human level, these include regulatory mechanisms such as public health systems and the measurement and management of birth and death rates; for nonhumans they include endangered species lists and conservation breeding practices, among many others. Much work on conservation biopolitics has emphasized the proliferation of scientific technologies that allow for the calculation and administration of animal lives on the level of the population or species (e.g. Braverman, 2015; Youatt, 2008). Biopolitics also, importantly, operates through the proliferation of norms that govern behavior, mobilizing human subjectivity itself to create self-regulating populations. As Foucault puts it, "a normalizing society is the historical outcome of a technology of power centered on life" (1990, p. 144). A biopolitical approach therefore places emphasis on the power of discourse, and the production of knowledge and truth as technologies for the management of life. As Stephanie Rutherford writes, "Governing becomes the construction of certain truths and their circulation via normalizing and disciplining techniques, methods, discourses and practices that extend beyond the state and stretch across the social body" (2007, p. 293).

Following this approach, I frame ongoing efforts to "restore" habitat for the Island marble butterfly as a biopolitical project, which administers nonhuman life and death precisely by simultaneously regulating and disciplining human restorationist subjects. Through this theoretical lens, the practice of ecological restoration can be understood as the management of nonhuman life across a range of scales and relationships, including individual plants and

animals, distinct kinds of life understood as separate "species," or interwoven assemblages of species (as well as non-living material) understood as "ecosystems." The discourses of restoration shape the understanding of what should live and die, and what belongs – that is, they assign different (and sometimes competing) human values to different kinds of life. The particular form that biopolitics takes in the case of island marble, I will argue, amounts to the management of a "novel" socio-ecological system that lacks an historical analogue, posing a theoretical challenge to popular and scientific discourses of ecological restoration.

As I have suggested above, the act of "making live" of certain plants and animals, and the correlated biopolitical making of human subjectivities, is also an act of "making place." *Place* matters a great deal in ecological restoration, as I will discuss in greater detail in Chapter 2. The identification of an ecosystem or landscape to be "restored" requires the inscription of both spatial and temporal boundaries – where does the restoration site begin and end, and to what conditions (often, though not necessarily, historical) should it be restored? It therefore amounts to the reification of a bounded, nameable unit with shared, unifying characteristics or meanings – a "place" – out of the unbounded fabrics of landscapes and ecological relations. By "making place," I refer to this act of inscription of meaning onto space: "place is the location where the social and the natural meet" (Prazniak & Dirlik, 2001, p. 18). The social meanings of places, of course, are not conjured out of thin air, but discursively constructed and (re)interpreted. Much geographic scholarship works to understand how the existing cultural and historical meanings of places influence and shape social structures. As Steve Herbert describes it, such scholarship seeks to reveal "the historical legacies of places, how the echoes of the past reverberate in the

contemporary construction and use of particular landscapes. Such places have meaning associated with a perhaps imagined past, yet these meanings shape the experience of the present. These spaces speak to those who inhabit and visit them, and reinforce particular sets of cultural meanings" (2010, p. 70).

In this way, the layers of meaning inscribed in a place such as the San Juan Island prairie are socially constructed, but also reproduced in the materiality of the landscape. The San Juan Island prairie itself "speaks" to people such as restorationists. They, in turn rearticulate the discourses through which they understand (and simultaneously construct) both the place's meaning and their own role as human agents in it (Rose, 2001). Restorationists' understandings of *place* and their own *subjectivity* are thereby co-constituted in relation to one another. The practices of ecological restoration that I examine, therefore, do not simply unfold on a pre-existing or predetermined landscape, but are themselves the active process of creating the places known, variously, as San Juan Island, American Camp, the prairie, butterfly habitat, or the island marble restoration site. Such places do not share universal meaning to all who know them, as evidenced by the variety of names that can be layered onto a single landscape. In this way, the discursive act of place-making is a profoundly political process. Stephen Fisher and Barbara Smith, writing about the formation of a political subjectivity for the place of Appalachia, argue that "the "place" that people seek to defend, restore, revitalize, or transform is rarely self-evident in its boundaries or meanings, in that the visions of its past and desires for its future are not identical among those who would claim it as home." While a restoration site is not typically "home," in a literal sense, to people, the politics of place-making are central to the discourses of environmentalism that

underlie the project of ecological restoration. Indeed, environmentalisms are deeply place-based forms of biopolitical subjectivity, rooted in the various "desires for the future" of the landscapes on which they seek to work.

Moreover, a restoration site *is* a literal home to the plants and animals that live there (and are "made to live" there). Human social and cultural meanings may be opaque to most nonhuman life forms, yet there is little question that plants and animals, too, both make and are made by the places where they live. In this way, ecosystems are relationally co-constructed through their interactions with both human and nonhuman lives. The more-than-human turn in geography lends the insight that the understanding of landscapes as socially and culturally produced, as I have described above, risks lacking sufficient attention to the materiality of these landscapes and the agency of nonhuman lives (Wolch & Emel, 1998). The biopolitical process of "making live" does not amount to complete human control over a passive landscape, nor is the making of *place* limited to the construction of human meanings or the enactment of human practices. Recent work bringing an explicitly more-than-human perspective to Foucauldian biopolitics has sought to address these concern (e.g. Hodgetts, 2017; Srinivasan, 2014), examining the role of nonhumans in shaping the places they live as well as the discourses about them. Following this approach, I seek to pay close attention to the practices of plants and animals that work to make both life and place in this complex and contested socioecological setting. As Jamie Lorimer and Clemens Driessen put it, the "biopolitical turn . . . has expanded from a Foucauldian interest in the ways in which life is spaced, to a vital materialist concern for the lively potentials of

nonhuman forms and processes to *make places* and unsettle such orders" (2013, p. 250, emphasis mine).

This understanding of place-making as a biopolitical, relational, multi-species process offers a lens through which to examine how scientific discourses and practices – such as those of ecological restoration projects – both create and are created by particular kinds of places. In recent years, the field of STS has become more explicitly spatial, examining how the *places* where science is done matter with regard to the production of scientific knowledges (Powell, 2007). Science studies has long emphasized how certain types of places, such as the laboratory, work to produce scientific knowledges as objective truths (e.g. Latour, 1987). More recently, geographers of science have turned to "the field" as a place for scientific practice, examining the boundary between "lab" and "field" in applied science, and its implications for knowledge production (Kohler, 2002). In keeping with the tradition of science studies, though, this approach still focuses primarily on the production of scientific knowledges, emphasizing how particular places work to shape and justify scientific discourses. Less attention has been paid to how those discourses, in turn, work to re-make the *places* where science is practiced and put into practice. As Jake Fleming puts it,

> "despite two decades of calls to situate science (Haraway 1991; Forsyth 2011), we still have few accounts in political ecology of how science done in a place *both reflects its materiality and transforms it*… Even as political ecology has embraced [the complexities and consequences of science done outside the lab], it has depicted science with "generalized discussions of knowledge systems" rather than "detailed contextualization of specific knowledge claims from different actors" (Goldman 2007, 308) …the geography of science reveals science as multiple, concrete, and happening in place, with consequences for the place, the science, and the political ecologist who represents them both." (2014, p. 1187, emphasis mine)

Following this approach, I seek to examine how the scientific discourses and practices of ecological restoration both reflect and transform the material places – and the lives of plants and animals – on the prairies of American Camp on San Juan Island. In this way, my work is situated at the intersection of the literatures of political ecology and science studies as overarching approaches. More specifically, it seeks to draw on, connect, and elaborate recent work addressing conservation as *Foucauldian biopolitics*, as *relational place-making*, and in terms of *geographies of science*. Elements of each of these theoretical frameworks will be brought to bear specifically on the discourses and practices of ecological restoration through the empirical study of the island marble case.

The structure and organization of this thesis

Before turning to the study itself, I will provide here a brief outline of the structure and organization of this thesis. In this introductory chapter, I have introduced the case study and goals of my research and outlined the conceptual framework I will use to examine the case. In Chapter 2, I examine the discourse of ecological restoration, undertaking a literature review that explores the history and philosophy of restoration, as expressed both by practitioners in the field and through the scientific discipline of restoration ecology. This review seeks to map out contemporary shifts in the cultural and political terrain of restoration, as well as of nature-society relations more broadly. As noted above, many critics of restoration have described restoration as a nostalgic practice, and/or pointed to the contemporary moment of the Anthropocene as something of a crisis for the idea of "restoring" nature. At the same time, as I show in this chapter, the idea of restoration has always been framed around mutual relations between humans

and ecological systems. Ultimately, my review of this literature points to the need for more empirical attention to the discourses and practices of practitioners of ecological restoration to inform theoretical debates about the significance of the practice, an objective that has guided the design of my research throughout this thesis project.

In Chapter 3, I begin by discussing the key research questions that shaped my research design, drawing on that literature review. These research questions shape and guide both the empirical data, and my analysis and interpretations of that data, which follows in Chapters 4-6. (For that reason, I will resume and further elaborate this outline, in the context of the design of the research project, in the beginning of Chapter 3). My discussion of methodology explains my qualitative approach, an ethnography based in participant observation (modified by drawing on techniques from qualitative interviewing) as well as critical discourse analysis. The objective of my research design, which I will explain further in Chapter 3, was therefore to develop an in-depth, qualitative account of both the material and discursive practices at work in the project to protect and restore the island marble butterfly. By this, I mean both the tangible, physical actions that are taken to promote the lives of butterflies, and the discourses that work to justify and explain those practices. Ethnographic methods allow a researcher to show "what people *do* as well as what they *say*" (Herbert, 2000, p. 552), thereby providing valuable insight into both the practice and the discourse of ecological restoration.

Drawing on these methods, Chapter 4 focuses first on the material practices of the island marble restoration project – that is, examining precisely "what they do," where "they" refers not only to restoration ecologists and practitioners, but also to the plants and animals themselves that inhabit

the American Camp prairie. I begin with the life cycle of the butterfly itself, its history on the landscape, and its relationships with its host plants, as well as a brief history of the *place* of the American Camp prairie itself. I then turn to an empirical account of the practices of restoration, focusing on several key elements of the project: the construction of experimental habitat plots for growing host plants on the prairie, the raising of butterflies from egg to adulthood in captivity, and the long-term plan to establish a modified suite of plant species and ecological conditions "in the wild" that will facilitate the survival of an island marble butterfly population. My objective here is to show how the material practices of restoration are biopolitical, in the sense of administering nonhuman life and death, and that the practices of "making life" also amount to the making of the *places-for-life*. These places are made in the image of particular spatial and temporal imaginaries that dictate what kinds of life belong, and should be the object of restorationists' interventions.

In Chapter 5, I examine the discursive practices of the project, focusing on not only "what they say," but also what it reveals about what "they" (meaning, here, scientists and restoration practitioners) *think* about the work being done. As I have already suggested, there are multiple scientific (and simultaneously biopolitical) discourses that inform the practices of island marble restoration. I elaborate on two important, distinct threads of discourse. The first, which I call the "discourse of endangerment," emphasizes the butterfly as a highly at-risk species and the potential for its extinction, thus highlighting the urgency of working to protect its survival. The second, a "discourse of restoration," draws on ideas of historical ecological fidelity that I will discuss in Chapter 2, taking "restoration" literally in the sense of putting back past conditions.

Expanding on the implications of restoration as a biopolitical endeavor, I aim to show how these discourses discipline and shape human understandings of nature, each normalizing particular spatial and temporal imaginaries and relationships between forms of life.

Finally, in Chapter 6, I turn to the relationships between discourse and practice, examining how these discourses work to justify particular collections of practices – including, importantly, practices that amount to the "making live" and "allowing to die" of certain forms of life, and simultaneously the making of particular kinds of socio-ecological places. I argue that attention to the multiplicity of discourses at work in a single restoration project offers insight into environmentalist subjectivities that are constructed in relation to both particular places and nonhuman lives. Tensions between competing biopolitical discourses can lead to the rethinking of received wisdom and values, such as what kinds of plants and animals are understood to belong in a particular place. At the same time, I seek to pay attention to the way that the lively, material world that is (supposedly) to be "restored" challenges these frameworks of human ideas, resisting both discursive categorizations and material interventions. By examining the competing, sometimes contradictory environmentalist discourses and practices at work in the island marble project, I seek to explore how the practice of ecological restoration works to discipline and shape the subjectivities of restorationists, thereby creating values of particular kinds of nonhuman lives and places.

In conclusion, I suggest that this heterogeneity of restoration discourse and practice, despite its challenges and contradictions, has promise for new ways of thinking about the role of human intervention in the natural world. The island marble case, I argue offers evidence of

contemporary shifts in thinking about restoration, as a practice *for* the Anthropocene, rather than in tension with it as suggested by many critics. These shifts do undermine many conventional categories and assumptions, and require a rethinking of common restoration discourses and practices. At the same time, I argue that they also have the potential to provide a foundation for a biopolitics of nature that is explicitly conceived through relations of "becoming-with" (Haraway, 2008) nonhuman life, in places that are mutually and intentionally made by and for human and more-than-human beings.

Chapter 2. The shifting terrain of ecological restoration: a literature review

In this chapter, I seek to map out the discursive context in which the project to restore the island marble butterfly takes place, introducing key concepts from the literature of restoration that inform and shape the project. As I have suggested in the previous chapter, this thesis examines important ongoing shifts in discourse and practice that work to destabilize conventional categories and assumptions of restoration, from relatively mundane concepts like non-native species to deep-seated ideas about how human beings relate to nature. Such shifts, exemplified by the case study of the island marble butterfly, must be understood in the context of a broader discursive field that encompasses both those who practice restoration in the field and those who theorize and critique it. That field, however, is fractured by multiple divides that tend to impede conversation. These include both the gap between field practitioners and academics, and disciplinary divisions within academic knowledge production.[2] As I will argue further below, the traffic of knowledge and ideas across these divides is uneven. This can lead to the formation of multiple threads of discursive production (e.g., within restoration ecology, among restoration practitioners working in the field, or among critical geographers who write about restoration) that do not always connect with one another or operate with the same assumptions. Nonetheless, they

[2] The first of these divides is reflected in the terminology generally used to describe two very closely related pursuits, "restoration ecology" and "ecological restoration": the former being a scientific discipline, studied at universities and in carefully controlled experiments, while the latter is a field practice implemented at real-world project sites. In this sense, restoration ecology seeks to produce knowledge while ecological restoration seeks to reshape the material world. While I aim, throughout this thesis, to use this terminology as consistently as possible, I also suggest that such a black-or-white distinction, like many others I will discuss in this chapter, is at times ill-suited to describe real world practices. Certainly, the island marble restoration project includes elements of both fields.

do collectively form something that might be described as a *discourse of restoration*, which this chapter seeks to examine.

The goal of this chapter is to weave together the various discursive threads that make up such a field, thereby providing context for the shifts evidenced in the island marble case, while simultaneously bringing the critical conceptual tools of STS and political ecology that I have described in the previous chapter to bear on each of these threads. Such an approach necessitates tacking back and forth between literatures from multiple disciplines, including especially restoration ecology and critical geography. The interpretation of scientific knowledge production as the construction of particular truth claims, rather than truth itself, is an approach applicable to both the knowledges produced by natural scientists such as restoration ecologists *and* social scientists such as critical geographers. In my review, then, I aim to be unsparingly critical across those disciplinary boundaries – and yet my goal is not merely to critique, but also to draw forward elements of each discursive thread that appear to go unseen, or misunderstood, by other parties. In this way, I hope my work can serve to help bridge these divides, facilitating conversation between restorationists, ecologists and geographers, among others. I recognize, too, that my work also contributes to the discourse of restoration, and makes certain knowledge claims of its own, necessitating a reflexivity about the politics of my own intervention in that field that I will discuss further in Chapter 3.

In the following sections, I selectively review elements of the history and philosophy of the field of ecological restoration, with the goal of bringing it more deeply into conversation with responses and critiques made by geographers and other social scientists. In contrast with

critiques that suggest that restoration necessarily serves to reify a dualistic framework in which human activities are in opposition to pristine Nature, I focus in particular on elements of restoration discourse that emphasize "humans-in-nature." This discourse, I suggest, has much in common with fashionable contemporary ideas in the critical social sciences, such as the concept of the Anthropocene, yet has been little addressed in the geographic literature. As social scientists have been quick to point out, however, many of the fundamental categories of thought used in restoration do serve to reproduce a binary view in tension with the idea of "humans-in-nature." Such concepts include "native" species, human "impacts," historical baselines, and ideas about "wild" animals or places, among others. After briefly reviewing these central concepts of restoration discourse, I aim to explore how they have come under stress on multiple fronts in the contemporary moment. This is evidenced in the case of the island marble butterfly, where both critical academic perspectives and the material reality of the socio-ecological system in question pose challenges to conventional ways of thinking about ecological restoration.

Restoration and the human/nature dualism

A key point of critique for many social scientists engaging with restoration ecology has been how the latter inscribes a particular set of relations between "nature" and human society – relations that are deeply informed by, as well as reinforcing of, a problematic and uniquely Western vision of the natural world. A rich tradition of scholarship in critical human geography deconstructs the human/nature dualism, pointing to the social construction of nature itself, and particularly to understandings of the natural world as a pristine space of wilderness, devoid of human activities (e.g. Latour, 1993; Smith, 2010; Cronon, 1996; Castree & Braun, 2001;

Haraway, 2003). Political ecologists have critiqued ecological restoration for its implicit return to an idealized and anachronistic past state of Nature: for example, Paul Robbins and Sarah Moore describe restoration, along with conservation biology, as an "Edenic Science," which seeks to return landscapes and ecosystems to "a condition before the Columbian encounter, or a time or place before human contact, or a place of expulsion or return – one Before the Fall" (2013, p. 4). Critics have described restoration's emphasis on historical "baseline" conditions – whether pre-Columbian, pre-human, or antediluvian – as a form of ecological nostalgia, often lacking sufficient critical engagement with the material histories of human land use in the places to be restored (Hall, 2010). The frequently-used language of repairing or undoing human "impacts" on otherwise natural landscapes thus reproduces the idea of a pristine Nature separate from human activities (Head, 2008).

While critiques of the "redemptive aspirations" (Cooke & Lane, 2015, p. 238) of restoration are valid, it is worth noting that the paradox of returning an ecosystem to a pristine past condition through practices of ongoing human intervention have also been extensively discussed by restoration ecologists and practitioners, in conversations dating back to the early days of the discipline in the 1980s. In a classic volume on restoration, *Nature by Design,* the former Society for Ecological Restoration (SER) chairperson Eric Higgs called attention to the problem of imagining a pristine past: "ecosystems are dynamic. There is no *original* condition for an ecosystem in any meaningful sense; one cannot fix a specific point in time" (2003, p. 38). More than a decade earlier, the restoration activist Alexander Wilson had made a similar point, writing: "What is an authentic landscape? What is native, or original, or natural?" (1991, p. 115). This

awareness of the problematic nature of the "natural" ecosystem led restorationists to turn away from the ideal of strictly re-creating past conditions, instead focusing on restoring the "historic trajectory" of an (ever-changing) ecosystem (SER 2004), with particular attention to the processes and functions of ecosystems, rather than their static components (Hobbs et al., 2009). This evolution in understanding of restoration as a concept followed changing ideas in the science of ecology in the late 20th century, which shifted emphasis away from static, equilibrium conditions toward dynamic ecosystem processes (Adams & Mulligan, 2003). Whereas early restorationists might have imagined that it would be possible to step in and "fix" a damaged ecosystem, which could then be left to its own devices, many contemporary practitioners instead understand their role as "stewards" engaged in ongoing, permanent intervention in profoundly socio-ecological systems.

The resulting philosophy, which Hobbs et al. (2011) suggested calling "intervention ecology" as a means of escaping the perpetual debates over the term "restoration," joins in a longstanding tradition emphasizing "humans-in-nature" in restoration thinking (e.g., Higgs, 2003; Wilson, 1991, Jordan 1990). For example, Wilson went on to anticipate elements of William Cronon's (1996) famous critique of wilderness, writing: "restoration proposes a new environmental ethic. Its projects demonstrate that humans must intervene in nature, must garden it, participate in it. Restoration thus nurtures a new appreciation of working landscape, those places that actively figure a harmonious dwelling-in-the-world." (1991, p. 115) Such work need not take place in a wilderness setting, but can be done, as Cronon also suggests, in backyards, urban streets, farms, and other settings that are both human and natural. As I will explore further in Chapter 4, the

landscape of the American Camp prairie is just such a place, where appeals to ideas of restoring pristine, wild nature are tempered by a history of significant human interventions (or "impacts"), creating the human-modified historical landscape that is itself memorialized in the form of a National Historical Park. As Emma Marris (2011) has suggested, ecological restoration in such places might take the form of tending a "rambunctious garden," in which the sharp distinctions between wild and managed landscapes, and between the natural and the human, dissolve.

The dissolution of such boundaries is also a central theme of a great deal of contemporary work in the critical social sciences, much of which (including this thesis) is framed through the conceptual lens of "the Anthropocene." This name, proposed in 2000, refers to the contemporary epoch in which human activities have arguably become the dominant geological force on Earth. The concept of the Anthropocene has sparked a tremendous proliferation of conversation across disciplinary boundaries, with many scholars debating the utility and implications of such a designation (see Castree, 2014a, 2014b, for a review of the geographic literature in this area). The concept of the Anthropocene also has deeper roots in environmentalist discourse, echoing Bill McKibben's (1990) famous argument for the "end of nature," which alternately mourns and rails against environmental disasters caused by humans. Rather than grant the premise that human impacts on the planet are inherently negative, some suggest that the Anthropocene could be a new opportunity for conservation (e.g. Cooke and Lane, 2015, p. 233), even arguing for an eco-modernist "good Anthropocene" with high-tech solutions to environmental challenges (Asafu-Adjaye et al., 2015). Some see the figure of the universalized human in the prefix "Anthropo-" as distracting from the central role of neoliberal capitalism in ecological destruction

(Moore, 2015), while others have sought to use the Anthropocene concept to further deconstruct the human/nature dualism, celebrating the potential of "humans-in-nature" (Buck, 2015).

In this thesis, I take up the concept of the Anthropocene, despite some ambivalence about its potential implications, as a conceptual reference point for the thorough interweaving of human activities and ways of life with the places (and nonhuman lives) that we think of as "natural" or "wild." While the concept of (and debates over) the Anthopocene are fairly recent, then, many of the interventions that it signifies here are not. In the case of the American Camp prairie, for instance, significant human "impacts" such as introduced species date back to at least the 1850s, and indigenous land management practices such as burning affected the ecosystem for centuries, perhaps thousands of years, before that. My goal, in using the term "Anthropocene," is not to become embroiled in ongoing debates over precisely when such a geological epoch should begin,[3] nor even to suggest that a universal definition is a necessity. Instead, the Anthropocene concept points, for me, to the fact that anthropogenic histories are common, even standard, in supposedly "natural" places. This is not a celebration or even a justification of human impacts to such landscapes (cf. Wilson, 2017), but a recognition that such human effects, while longstanding and in some cases irreversible, are also the result of human decision-making processes which are political, and therefore can be changed. In the context of ecological restoration, then, the idea of "restoration for the Anthropocene" joins calls to decenter pre-human historical baselines and idealized visions of nature as the objective of conservation and

[3] That said, I agree with Ellis et al. (2016), who argue for the involvement of social scientists in making such a determination, if one is to be made.

restoration projects, while carefully examining the politics and ethics of the ecological interventions that such projects make.

(Re)examining central concepts in restoration discourse

Such a reevaluation encompasses an ongoing debate about the distinction made by ecologists between valued "native" plant or animal species, on the one hand, and "non-natives" introduced by people (also called "introduced," "exotic," or "alien" species, or simply "weeds") typically targeted for removal on the other. The idea of native-ness is a fundamentally geographical idea, in which belonging is a result of being in or out of place in the world (Warren, 2007), yet its application in ecological science (typically at a regional scale, as in the common formulation of "Pacific Northwest native species") tends to treat it as in inherent trait of a particular species. Warren calls for eliminating geographic distinctions such as native/non-native for valuing plants and animals and instead focusing on the functional value provided by the species – an argument echoed by a prominent group of ecologists writing for a broader public audience (Davis et al., 2011). Responding to the latter, though, other ecologists have maintained that the distinction is still critically important and thus should not be abandoned. Daniel Simberloff (2011), for instance, has argued that non-native plants and animals have significant ecological – and importantly, economic – effects on ecosystems, and that denying the distinction falsely minimizes anthropogenic environmental change. A closely related debate centers on the proposed concept of "novel ecosystems," emergent assemblages of species and processes that have no historical analogue, but increasingly play important ecological roles around the world (Hobbs et al., 2006, 2009). Such ecosystems often include or may even primarily consist of non-

native species. The closely related idea of "anthromes", or anthropogenic biomes (Ellis, 2009) calls attention to the fact that these "new natures," too, are hardly new with the emergence of awareness of the Anthropocene, but have long been important and widespread (but little-examined) phenomena.

In practice, many restoration practitioners have focused their attention primarily on "invasive" plants that pose known ecological risks, ignoring or deprioritizing other non-natives. As seen in the case of the island marble butterfly, though, the popular discourse of environmental restoration commonly equates "non-native" with "invasive," despite appeals by ecologists to use these categories more precisely. Of course, the category of "invasive," too, is a construction of human values rather than an objective concept. The "demonization of invasives" (Castree, 2014a, p. 459) as aggressive foreigners may also lead to a too-quick judgment of the role of a particular species in a particular place, as seen in terminology such as "alien" species (see also Kull & Rangan, 2015, Davis et al., 2011).

These categories thus risk conflating ideas about foreignness and difference as they relate to human beings, on the one hand, and animals or plants, on the other. This a longstanding concern of critics who worry about "restoration ecology's potentials for deepening nativism and xenophobia in what is still a white supremacist country" (Haraway, 1995). Scholars have long called attention to troubling ideas of "purity" in environmentalist discourse, as when pure forms of nature require the removal of indigenous people from conservation areas (e.g. Kosek, 2006). Categories such as "non-native" or "invasive" arguably amount to the policing of the purity of ecosystems, with "uncomfortable and oftentimes xenophobic discursive echoes" (Hodgetts,

2017, p. 22), undermining the supposedly objective scientific nature of these categories for determining plant and animal belonging. Indeed, the connections between nationalist and racist discourses of human difference and environmentalist values are more than mere echoes. For example, Christine Biermann (2016) shows how values of American exceptionalism, natural purity, and both fear of the foreign and desire for the exotic come together in the construction of the American chestnut tree as the object of a major restoration effort, while the blight that threatens it becomes an enemy of the nation.

At the same time, Mastnak et al. (2014) offer an alternative narrative, complicating the links of native plant advocacy to human nativism. They suggest instead that removal of non-native plants might be seen as a form of "botanical decolonization," a response to a history of colonialist introductions of foreign species. This formulation, too, draws on connections between discourses of human and nonhuman difference, but in a different way. Interpreting biodiversity as akin to human cultural diversity, the introduction of foreigners in this context is metaphorically linked not to immigration but to imperialism and even colonialist genocide – or, alternatively, to a melting-pot assimilationism that leads to the loss of unique, local ecological conditions.

Ideas about "purity" in nature are increasingly important in light of the use of genetic and genomic technologies in conservation practice. Much recent work on the politics of conservation is characterized by close attention to genetics, and the problems that contemporary genetic scientific knowledges and technologies pose to conservation. Genomic information allows for individual plants and animals to be recognized as "pure" members of a particular type, such as an endangered or highly-valued species (or subspecies), and therefore valued or devalued in

accordance. Again, environmentalist ideas about the purity of species demonstrate troubling close ties to racist, eugenicist discourses (Biermann, 2016; Biermann & Mansfield, 2014; Fredriksen, 2016). At the same time, the designation of the "species" itself as an object of conservation is called into question: "what a species is is not fixed, but something that evolves along with the scientific and cultural frameworks through which we engage it." (Hennessy, 2013, p. 73, see also Crifasi, 2007; Hennessy, 2015). Under the current biopolitical order that creates the possibility for protection of species deemed "endangered," the scientific process of taxonomy itself becomes fundamentally political, with similar subspecies either grouped together or split apart depending on which will lend itself better to the politics of conservation (Crifasi, 2007; Fredriksen, 2016). In this context, the species is not always a meaningful material category, but can be a "strategic essentialism" to be employed by conservationists (Lorimer, 2012).

These debates provide essential context for the case study of the island marble restoration project. As I have suggested in chapter 1, the shift away from emphasizing island marble host plants as a nonbelonging, "non-native" or even "invasive" species, to embracing their role in butterfly reproduction, provides a key stepping-off point for examining the discursive implications of the island marble project. Importantly, though, the shifts seen in the island marble case ultimately appear to be informed less by contemporary theoretical developments, such as the debates I have framed above, than by the unique challenges of material conditions on the ground. As I will examine in the later chapters of this thesis, the valuing of the butterfly (essentialized, perhaps strategically, as a species at risk of extinction) is a significant driver of this shift. In this way, the competing discourses at work in the island marble project (which I will

examine closely in Chapter 4) are each framed by conceptual categories that are themselves destabilized by the critical perspectives I have discussed here.

What belongs, and who decides?

In light of the destabilization of these categories, prominent scholars in restoration ecology have recently suggested reworking their approaches to develop a "Restoration v2.0" (Higgs et al., 2014). Influenced by the earlier formulation of "intervention ecology" (Hobbs et al., 2011), this model reevaluates the role of historical knowledge and past conditions in guiding restoration practices. Rather than focusing on historical baselines or predefined categories, this approach "accepts multiple potential trajectories for ecosystems, emphasizes process over structure, and embraces pragmatic goals for human well-being" (Higgs et al., 2014, p. 499). At the same time, the newly fashionable concept of "rewilding" offers a related approach: as Holly Jean Buck (2015) perhaps overly optimistically puts it, rewilding "alludes to both past and future: in an enchanted Anthropocene, humans are not reduced to simply removing species but reintroducing them" (p. 373). From an early emphasis on establishing "cores, corridors and carnivores" (Soulé and Noss, 1998), rewilding discourse has branched out to include processes to reestablish (or substitute for) forms of life and ecological processes that are extinct or missing (see Jørgensen, 2015 for a summary of such techniques). For some advocates, rewilding offers an approach to conservation that emphasizes experimentation with emergent ecological systems, and a recognition of the lack of complete human control, rather than appealing to recreate pristine past conditions. Jamie Lorimer (2015) argues that rewilding thus resolves many of the critiques of restoration as a mode of historical romanticism: "There is no single, universal baseline to which

conservation can appeal or toward which restoration can aim… divergent future ecologies emerge when conservationists shift from composition to rewilding" (p. 7).

Ecologists and social scientists have thus both joined in calls to complicate oversimplified notions, such as native species belonging to pristine, historically intact ecosystems, that have often been used as the means for judging the value of plants and animals. A growing group of scholars argues for new modes of post-Natural conservation, often using the critical perspective of more-than-human geography (e.g. Adams, 2016; Collard et al., 2015; Lorimer, 2012). Two recent books, which I draw on extensively in this thesis, independently suggest the emergence of new modes of wildlife conservation that defy conventional approaches, each arriving at ideas of conservation without, or after, Nature (Braverman, 2015; Lorimer, 2015). In the absence of conventional distinctions, though, important questions still remain: how can we determine which plants and animals belong in a particular place? (cf. Lorimer, 2013, p. 598). Which "divergent future ecologies" should be cultivated, or avoided, to the extent that human interventions can shape them? These questions point to what William Adams has called "an important fracture zone in conservation" (2016, p. 7), echoing Robbins and Moore's diagnosis of "ecological anxiety" (2013) over the role that humans play in making such determinations. Neither the capability to "rewild" ecosystems, or to practice "Restoration v2.0," after all, eliminates the political and ethical dilemmas of conservation as a biopolitical practice.

Many scholars have expressed concern that the opening of the field of "postnatural conservation" might therefore be understood as ecological relativism, opening the door for further environmental degradation and/or encouraging a neoliberal "green development" environmental

politics (Lorimer, 2015, p. 117; Cooke & Lane, 2015, p. 241; Hennessy, 2013; Castree, 2014c). On the contrary, as Noel Castree argues, recognition of human values in the supposedly objective science of ecology is explicitly "not a charter for 'relativism'" (2014a), but a recentering of human politics. Benjamin Cooke and Ruth Lane call for "progressing carefully": "wild experiments in the Anthropocene are not an invitation to abdicate management to plants in the face of uncertainty," instead, they "direct a form of reflexive human agency that works actively with the trajectories of ecological assemblages… to shape an Anthropocene that is habitable for humans and nonhumans in the face of environmental change" (2015, p. 241). The question of what plants and animals belong in particular places, and who decides cannot be eliminated by a post-natural perspective, but is instead made explicitly political. As Biermann writes, "the Anthropocene's socioecologies… emerge from somewhere, and it is neither possible nor perhaps desirable to sanitize our landscapes, sciences, and companion species of the vestiges of these power-laden histories" (2016, p. 217). Postnatural theorists of conservation, then, should be more attentive than ever to the politics of environmentalist discourse, such as that expressed by ecological restoration. New modes of conservation do not mean ignoring past conditions altogether, but instead a politics of "reckoning with the past" to understand how contemporary ecosystems arrived at their current conditions (Collard et al. 2015, p. 327).

Such an approach, of course, requires insight from both natural and social sciences. Unfortunately, as I have suggested above, the disciplinary distance between natural scientists doing restoration ecology and social scientists who theorize human-environment relations may contribute to such oversimplifications and misunderstanding (see Castree, 2014a, p. 460).

Moreover, the theory and practice of restoration is by no means created in the academy alone. On the contrary, field practitioners of ecological restoration often engage in informal experimentation with both scientific and technological practices and ideological approaches, often well before these practices and approaches have been discussed in the academic literature. They may pass on their results, ideas and best practices through word-of-mouth networks of communication, rather than published academic journals (Gross, 2010). Their on-the-ground practices, too, may reflect complexities and nuances that are not well explained by the abstractions of theory, as Irus Braverman noted in her qualitative study of conservation practitioners, observing "a deep discrepancy between the fidelity of many of my interviewees toward the ideals of nature and wilderness, and the ways in which their actual management practices reflect the messiness and pluralities of these constructs" (2015, p. 11).

As a result, the discourse of restoration is fragmented across a variety of fields, including "pure" natural and social sciences, applied sciences, nonprofit and government organizations, and volunteers and members of the public. Intellectual traffic across these fields is uneven. Certain key contributions from the social sciences have certainly made significant waves in the world of conservation practice (e.g., the influence of Cronon's "trouble with wilderness" argument on the "new conservation" movement; Kareiva et al., 2011). At the same time, critics within the social sciences may be unaware of the extent to which field practitioners have responded to both internal and external critiques and adapted their own practices. As a result, social scientists writing about conservation and restoration may themselves be reinforcing outdated or

stereotypical ideas of these fields, with too little attention to ongoing conversations within these fields, and new ideas being put into practice on the ground (Breslow, 2014, p. 748).

A biopolitics for conservation in the Anthropocene

In contrast to Robbins and Moore's (2013) labeling of ecological restoration as an "Edenic Science," I suggest that restoration might be alternatively interpreted as the epitome of post-Natural or Anthropocene environmentalisms. Restoration simultaneously responds to *and* engages in human manipulation of the environment to shape the form that nature takes. Restorationists are thus well-practiced in literally *constructing* and *producing* nature, putting into action the debates over these processes that have long troubled scholars of nature and society. Far from being an enlightened form of simply "putting back" the right nature, though, restoration is also a social and political process of experimenting with, and debating the value of, differently constituted socio-natures. Through these practices, restorationists are "learning to be affected" (Latour 2004, see also Lorimer 2015) by the natural world, developing and interpreting relationships with the plants, animals, fungi, soil, water, and so on that they work with.

As I have suggested above, critical perspectives that focus only on the naïve romanticism of restoring past conditions, or turn quickly to celebrate rewilding as an emergent mode, thus tend to miss the actual complexity and diversity of *restoration* discourses, and ignore (or cite merely as a contradiction) the central role of human agency and action in restoration. Indeed, a conceptualization of rewilding framed around shifting human relationships with natural processes (as celebrated by Buck, Lorimer and others) has much in common with the restoration

philosophy of "humans-in-nature" that I have described in this chapter. Robbins and Moore describe rewilding as "experimental conservation theater," through which various actors can perform a kind of radically transparent literal production of nature, calling attention to the issues and debates of the Anthropocene (2013, p. 14). This celebration of a nascent ecological approach, emphasizing its pedagogical rather than just its material effects, is reminiscent of the writing of William Jordan (1990), a pioneer of restoration credited with coining the term "restoration ecology," who wrote:

> "ecological restoration is much more than a technical and scientific challenge. It is also a model for a healthy relationship between ourselves and nature… I now see the greatest value of restoration – not in its ability to transform the landscape directly (or at least not only in that), but *in its ability to transform it indirectly through the education and transformation of the human beings who inhabit and shape it*" (p. 5, emphasis mine).

In this way, the practice of ecological restoration, just as much as rewilding, offers resources for thinking about humans and nature not as a categorical dichotomy, but as forms of life relationally co-constituted by one another, and always in the process of "becoming-with" each other (Haraway, 2008). This conceptualization of restoration emphasizes its effect on human subjectivity, as the process of "restoring" an ecosystem also amounts to becoming a (certain kind of) "human-in-nature".

Restoration can thus be a practice through which people carefully and thoughtfully engage in "living with" plants and animals, seeking a "harmonious dwelling-in-the-world" (Wilson 1991). This is not to say that restoration discourses are not still deeply romanticized, or have moved past old notions such as pure, natural systems, human "impacts," or the duality of native/alien

species. On the contrary, as Hodgetts notes, "logics of nativity and invasion remain strongly influential in contemporary conservation practice" (2017, p. 22), rooted in the dualistic idea of pristine Nature degraded by human activities. At the same time, though, restoration discourse has long placed an emphasis on human agency and action to intentionally create particular forms of nature. Rather than view this as an inherent contradiction, or source of "ecological anxiety," we might consider it a productive tension in Anthropocene restoration, paying attention to the ways in which restoration practitioners are actively complexifying the discourse of restoration as they adapt their practices to the changing world.

In spite of the "proliferation of discourse" about conservation that I have outlined above, relatively little empirical attention has been paid to restoration projects on the ground that are actively engaged in such critical practices. Social scientists tend to paint restoration with a broad brush (as when lumping it, along with conservation biology, under the rubric of the "Edenic sciences"), or to repeat older critiques that may not apply to what contemporary restorationists are doing in the field. Some notable exceptions include the work of Lesley Head, who shows that land managers who work with invasive plants are far from naïve about the prospect of eradicating these species or returning their landscapes to a pristine state – instead, they are engaged in the hard work of "living with" invasive plants:

> "They have already moved beyond the argument about whether we can or should maintain a "pure" state of nature untrammeled by non-native and invasive species. Yet none of these managers have given up… we argue that scientists need to recognize what on-ground managers are doing with invasive plants, and that their adaptive strategies to establish the boundaries of cohabitating with these plants reflect a sensible approach to living in the Anthropocene." (Head et al., 2015, p. 316).

On the other hand, Sara Kuebbing and Daniel Simberloff (2015), in a quantitative assessment of the attitudes that land managers hold about native/nonnative species, suggest that most land managers are not shifting away from treating invasive species as a major problem. They call for more qualitative empirical work on the discourse of native species in order to better understand what they claim to be *lack* of a philosophical shift, in light of the extensive critiques that have been made of this discourse. Mastnak et al. (2014), too, call for more empirical attention to the discourse of "native" and "invasive" plants, in offering the narrative of "botanical decolonization" as an alternative to common critiques of restoration practices.

In response to such calls, this research project seeks to pay greater attention to the material and discursive realities of practitioners engaged in ecological restoration. Critiques of restoration have tended to create a somewhat reductionist portrayal, in the social science literature, of the wide variety of practices and theoretical perspectives offered by folks who actually *do* ecological restoration. To date, most critical social scientists have not paid enough attention to cases where restorationists are already engaging in new practices, responding to critical perspectives (both internal and external), and adapting their discourses and practices to the changing world. While there is little doubt that outdated concepts certainly live on in restoration discourse, newer concepts are also emergent, but presently lack sufficient empirical attention in order to develop a more robust theory of what "restoration" might mean for the 21st century.

The case study of the island marble butterfly provides an opportunity to examine those discourses and practices and begin to develop such theoretical groundwork. The restoration effort currently underway on San Juan Island is an unconventional project, aimed at "restoring"

an endangered species living in a rare and valued ecosystem, which has also been profoundly human-altered through the course of its history. This example provides an opportunity to shed new light on the questions of what plants and animals belong in a particular place – in this case, the place of the prairie at American Camp – as well who makes the decisions about which live to foster and which to allow to die**.** Through this research, I explore how contemporary modes of ecological restoration may pose both challenges and new opportunities for thinking about nature and environmental conservation.

Chapter 3. Methodology

This research project is a study of the social, cultural and political implications of the process of ecological restoration, exploring the shifting cultural and political terrain of restoration through an ethnographic case study of the ongoing project to restore the "rediscovered" island marble butterfly. Thought to have been extinct since the early 20th century, this species was rediscovered only in 1998 in a small population in San Juan Island National Historic Park on San Juan Island, Washington, where my field research site is located. The butterfly is currently found only on San Juan Island, primarily within the American Camp unit of the Park, with potential habitat areas stretching onto neighboring private lands. In 2016, the subspecies was determined to be "warranted" for listing by the U.S. Fish and Wildlife Service, with full listing as an endangered species likely to follow later this year. Urgent, short-term efforts to protect the species are being undertaken simultaneously with a broader scientific research effort with the goal of determining best management practices for restoring habitat and protecting the species in the long run. My ethnographic study of this effort thus responds to calls, as described in the previous chapter, for greater empirical attention to the practice(s) of ecological restoration on the ground.

One objective of my study is to provide an in-depth, detailed account of the material and discursive practices at work in these restoration efforts. By "material practices," I mean the tangible, physical actions that are taken to protect and promote the lives of butterflies. These efforts are focused on establishing effective habitat, which involves manipulating the existing ecological communities to create optimal conditions for butterfly reproduction. In this way,

restoration practitioners are literally, and quite intentionally, *making the place* that is the island marble restoration site. The first research question I seek to address focuses on these physical-material efforts: what kinds of practices are taking place, and making place, in the project to restore the island marble butterfly on San Juan Island? I explore this question in detail in Chapter 4, investigating the material conditions of the restoration site: what does the physical space look like? What management practices are being used to alter the ecosystem? What plants and animals are present? What plants and animals are being included or excluded, or defying human efforts to manage their presence?

In the following chapter, I turn to the project's discursive practices, by which I mean the *construction of a discourse* about the butterfly, the ecology of the San Juan Island prairie where it lives, and the role of humans in protecting, conserving or restoring its habitat. Following the Foucauldian understanding of knowledge as an effect of power, I frame the scientific knowledge of restoration ecology, and the practices of island marble restoration specifically, as a discursive production that both creates and is created by relations of power, shaping and stabilizing the politics of nature. I seek to examine how human values work to make different kinds of socioecological places in the name of "restoration," understood as a set of cultural and political discourses rather than an objectively scientific (or primarily material) undertaking. Following Gillian Rose's definition of discourse as "a particular knowledge about the world which shapes how the world is understood and how things are done in it" (2001, p. 136), I ask, what are the particular knowledges – the discourses of restoration – that are put forward in the island marble project? What kinds of imaginaries of the "natural" world, and the act of restoring it, are

inscribed in this discursive construction? What are the relationships articulated between people and the natural components (including plants, animals, soils, and so on) of the ecosystem?

As I discuss in detail in Chapter 5, the discourses of restoration and conservation shape the understanding of what plants and animals belong in a particular place, and even which should be allowed and encouraged to live, or killed or permitted to die. Following Foucault, I frame efforts to restore habitat for the island marble butterfly as a biopolitics of non-human life. Through this theoretical lens, restoration can be understood as the administration of life and death across a range of scales, including individual plants and animals, distinct kinds of life understood as separate "species," or interwoven assemblages of species (as well as non-living material) understood as "ecosystems."

While this Foucauldian perspective emphasizes the social construction of human ideas about nature and restoration, the material world that the butterflies inhabit (not to mention the butterflies themselves) are by no means merely a social construction. In Chapter 6, I attempt to bring together these material and discursive perspectives on restoration, examining how the two sets of practices that I have described inform one another. What are the relationships between the discursive and material elements of the restoration project? How do particular ecological or restorationist imaginaries make possible certain kinds of spaces? On the other hand, how do material conditions on the ground inform and change the discourse of restoration?

Ethnographic and textual methods for exploring discourse and place

To answer these questions, I seek an in-depth, idiographic understanding of the complexities of island marble restoration as it is understood and conceptualized by the scientists, restoration practitioners, and volunteers who do the daily work on the ground. The methodology of ethnography is well suited to gain that kind of insider perspective. Ethnographic methods can reveal key insight into both the making of places, or "how everyday social interactions create public and private spaces at multiple scales" (Watson & Till, 2010, p. 122) and also the production and elaboration of discourses: "ethnographers unearth what the group takes for granted, and thereby reveal the knowledge and meaning structures that provide the blueprint for social action" (Herbert 2000, p. 551).

My ethnographic approach is rooted in participant observation, conducted over the course of a full season of island marble reproduction (and coincident restoration efforts) between April and November 2016. I joined crews working in the field to plant island marble host and nectar plants, followed the lead biologist managing the project through her daily routine, spoke extensively with the restoration ecologist who designed the experimental island marble restoration plan, and joined the annual partner's meeting attended by twenty-eight different stakeholders in the process, including representatives from local, state and federal agencies, among other experiences. Throughout these events, I took extensive field notes, noting both the details of material practices – how plants are installed, how fences are constructed, how butterfly larvae are counted – and also the layers of meaning that these various actors ascribed to their actions. My objective was to "make sense of the actions and intentions of people as knowledgeable

agents…[ethnography] attempts to *make sense of their making sense* of the events and opportunities confronting them in everyday life" (Ley, 1988, p. 121, emphasis mine).

I also watched butterflies flutter across the prairie landscape to find the bright yellow bursts of flowers that marked host plants. I observed and counted the tiny, bright orange eggs, standing out against the background of those yellow flowers, and tracked the movement of the larvae that hatched from those eggs as they grew, moving up and down the stems of their host plants and later, down to the ground and to neighboring plants to find a suitable location to make their chrysalis. I watched deer browse their way gradually across the prairie landscape, changing their paths at the edge of the habitat patches where tall fences excluded them from some of most inviting-looking patches of vegetation. I cannot claim that these kinds of observation allow me to completely make sense, or claim understanding, of how animals perceive or understand their landscapes and lives. Nonetheless, I hope that they at least ground my ethnography, in a small but meaningful way, in the lived experience of animals rather than relying exclusively on the representations of human actors. In this way, I hope that this work also makes some contribution to the conversation about the nascent methodologies of multi-species ethnography (Hodgetts & Lorimer, 2015; Kirksey, 2015).

Figure 2: Flowers of Brassica rapa host plant, with island marble egg (orange sphere just below center of flower cluster). Photo by author.

My ethnographic approach is supplemented by the use of a second method, that of critical discourse analysis of textual documents. I collected a series of written documents produced between 1998 and the present day that discuss the island marble conservation and restoration project. These texts mainly fall into three categories: management and planning documents developed by conservation partner agencies, press releases and news media coverage of the project (which typically are themselves sourced from interviews with biologists and scientists working on the project), and websites, mainly produced by stakeholder agencies such as the U.S. Fish and Wildlife Service, the National Park Service, and so on. Most of these documents are publicly available via the internet. They are written primarily for a public audience, and draw heavily on the statements of (or in some cases, are directly authored by) members of the scientific community working on the island marble project.

I read these documents for not only their manifest content, such as background information on the project or details of restoration practices, but also for their unstated assumptions and use of language and metaphor – in short, for their contribution to the discourse of island marble restoration. Discourse analysis has been described as the examination of "how people use language to construct their accounts of the social world" (Tonkiss 1998, cited in Rose 2001, p. 140). The discourse of island marble restoration is constructed through both written and spoken accounts, as well as actions, and thus can be explored and analyzed both in textual documents and through ethnographic methods. Both the written documents and my notes from field work were coded by the same process, using a combination of etic codes developed through my review of important themes in the theoretical literature, and emic codes that emerged directly from the data itself. As a final step, I triangulated these methods by conducting a single, semi-structured qualitative interview with a key informant, where I asked probing questions for the purpose of clarifying, confirming and deepening my interpretations of the project.

As Rose puts it, describing the work of Foucault, this type of critical analysis of discourse allows for the development of "empirical accounts… focusing on their details, their casual assumptions, their everyday mundane routines, their taken-for-granted architecture, their banalities" that lead to "startling accounts of how subjects and objects were and are discursively produced" (2001, p. 139). Following in these methodological footsteps, I attempt to place these written accounts of the world of island marble restoration alongside the accounts created by the collaborative process of participant observation described above to understand how the discursive production of the restoration project takes place and makes place.

Reflexivity in discourse

As both participant and observer in island marble restoration, I aimed to balance obtaining the "insider" perspective that allows a deep understanding of the project on its own terms with a critical perspective that allows me to interpret it as a case study exemplifying broader social and cultural phenomena, such as environmentalist discourses. As an experienced practitioner of ecological restoration, with over 10 years of professional experience in this field, I have been able to readily slide into the mindset of the practitioners I have been working with, to ask questions about their practices using the same kind of language, and underlying assumptions, as the community I am studying. This insider status has helped me to develop rapport with scientists and land managers, and move quickly through the rudimentary steps of how the project is *done* in order to more effectively focus on important details of how it is *understood*.

While this has had tremendous benefits for my research, it also points to the ways in which I, too, am a part of the discursive production that I interrogate in this thesis. As Rose says, "the social sciences are just as discursive as any other form of knowledge production, and in producing a piece of research you are participating in their discursive formation" (2001, p. 180). While I hope that this research breaks from the conventional wisdom of ecological restoration in ways that are quite apparent, I nonetheless make no claim for complete objectivity – as Donna Haraway famously puts it, "seeing everything from nowhere" (1988, p. 581) – but instead hope to offer an interpretation that is quite grounded in my particular experience. In this way, I draw on the techniques of what Leon Anderson has called "analytic autoethnography," which requires "awareness of reciprocal influence between ethnographers and their settings and informants. It

entails self-conscious introspection guided by a desire to better understand both self and others through examining one's actions and perceptions in reference to and dialogue with those of others" (2006, p. 382). While I do not claim to be a "complete member researcher" in quite the full manner that Anderson's definition of this methodology would seem to require, I nonetheless understand myself, and my own academic production, as being very much a part of the production of (and also, hopefully, contributing to shifts in) ecological restoration discourses.

The discourses I seek to examine also encompass, are reproduced in, and are themselves modified by, the very act of talking with subjects that entails this research. In the course of participant observation, I had long, sometimes erratic and winding conversations on the topics of butterflies, habitats and ecosystems, the meaning of ecological restoration, and the role of humans in nature, among other topics. While I have described my methodology as primarily rooted in participant observation, my interactions with research subjects moved far beyond passive observation of their activities. I borrowed techniques from qualitative interview methods, asking probing questions to gain important details about their work, and looking for their interpretation and explanations of important themes. They, in turn, made essential contributions to my theoretical understanding of the project, as our ideas regarding the significance of the project developed in collaborative conversation.

In this approach, the traditional separation between the objective researcher, on the one hand, and research subjects as sources of "data" to be analyzed, is blurred, as subjects and researcher work together to advance theory and produce knowledge. Peter Jackson and Polly Russell, writing about interviews focused on life histories, argue that "the material generated is not "pure"

or "objective" data but is the result of a collaboration and agreed interpretative conversation" (in DeLyser, 2010, p. 176). This approach to research, I argue, can be applied far beyond that specific type of interview setting to encompass a broad range of collaborative qualitative methods. Particularly in the realm of science studies, I would suggest, an approach that considers scientists as collaborators in the co-production of theory (rather than research subjects whose ideas would seem to exist primarily to be critiqued as social constructions) could do much to reduce the potential for antagonistic relationships between social and natural scientists.[4]

Storytelling and the production of environmental knowledges

This blurring of boundaries between researcher and subject, and between data and interpretation, necessitates a rethinking of the relationship of theory and empirics in qualitative research, or more specifically, the role that a single empirical case study can play in the production of theory and knowledge more generally. As Herbert argues, attempts to describe most qualitative research through the formal dichotomy of deductive and inductive approaches tend to be oversimplifying: "a better depiction of common practice is that researchers are constantly tacking back and forth [between theory and data], always mobilizing some theoretical framework yet perpetually

[4] I would like to thank two people, in particular, for the extended conversations that we have had and for the various, and important, contributions that they have made to my own thinking and the arguments advanced in this thesis. Jenny Shrum is the biologist for the National Park Service who manages the project at American Camp, and spent an entire work day giving me an extended tour of the project and generously sharing her own thoughts on the human values embodied by the restoration effort. Dr. Amy Lambert, Ph.D., is the restoration ecologist whose research is largely responsible for much of the current body of scientific knowledge about the island marble butterfly, and who designed the restoration plan for the ongoing effort to restore its habitat. She generously introduced me to the project and has shared her ideas with me over the course of many fruitful conversations. I am tremendously grateful to both Jenny and Amy for their contributions to this project. Needless to say, any errors, or misrepresentations of their ideas, contained in this thesis are entirely my own responsibility.

troubling that framework with the data at hand" (2010, p. 73). I have attempted to take this approach, simultaneously framing the island marble case study within the broader theoretical context of the discourses of ecological restoration (as outlined in Chapter 2), while also remaining open to the ways in which the case defies these expectations.

As I have suggested above, island marble restoration can be read as what Herbert calls an "anomalous case": an example that "belies expectations; it does not bear out what either theory or common sense would expect" (2010, p. 78). The island marble case is anomalous to the extent that it is understood within the discursive framework of the conventional, normalized practices of ecological restoration, with the obvious contradiction of "restoring" a weedy, introduced plant species being just one of many exemplary anomalies. Yet that conventional approach is by no means the only discursive framework through which the project can be understood, as I have discussed in Chapter 2. In the context of ongoing debates about post-natural, Anthropocene conservation, the island marble case can be used as a critical tool with which to explore the competing, sometimes contradictory discourses that are at work in contemporary environmentalism. Through a qualitative, in-depth ethnographic examination of how restoration is understood by the people who do it, I hope to offer some theoretical insight into the emergent discourses of environmentalism in the Anthropocene – to tell, perhaps, an alternative to the conventional story of what ecological restoration is and should be.

Framing this project as an act of story-telling, too, emphasizes how the act of collection, analysis and interpretation of qualitative data is a profoundly personal and subjective one. No doubt another researcher, confronted with the same collection of textual documents that I have

examined, and/or undertaking a similar ethnographic research effort, would nonetheless have woven together a substantially different kind of story about island marble restoration. I believe that this subjective, situated understanding of knowledge production is not a weakness but a strength of this kind of qualitative methodology. Understanding ethnography, and qualitative research more broadly, as a type of story-telling opens up the political possibilities of this form of knowledge production: as Emilie Cameron argues, it is "not so much about representing a stable, outside reality or developing an argument in a conventional sense, but rather a form of play with possibilities and a practice of moving geographic thought in new directions" (2012, p. 585).

In keeping with this approach, I have attempted not to hide the interpretive act of story-telling – that is, the art of crafting a compelling narrative – from my account. Some of the stories told in this thesis are not mine to tell, in many ways: for example, the account of the surprise appearance of butterflies on the disturbed Cattle Point road bed, with which I opened Chapter 1, describes events which occurred well before I began my ethnography. That story, and others like it, were reproduced as conveyed to me by my collaborators. Many such stories that appear here were pieced together from multiple accounts. Others are my own stories of my field work experience, and I have intentionally used a first-person narrative style where that is the case, centering my own presence as a researcher in the hope of effectively situating the knowledges that these stories might contribute to. I have, of course, offered my own analysis and interpretation of the meaning and significance of the events and activities I observed, hoping that the stories told in this thesis do contribute, in a meaningful and substantive way, to ongoing intellectual

conversations, but there is no question that alternative interpretations of the events I describe might be every bit as valid as the conclusions I have drawn.

My approach to qualitative research and the interpretation of discourse and culture assumes that there is, in the end, no fundamental epistemological difference between the process of "knowledge production," as it is framed in academic work, and the processes of meaning-making undertaken by people going about their daily lives, or scientists doing their work. The arguments and understandings advanced in this thesis, while they admittedly use a certain amount of disciplinary academic language, cannot be privileged over the ways that the people examined understand themselves. On the contrary, as I have argued in Chapter 2, the meanings and significances attributed to the act of "restoration" by its practitioners are sometimes (perhaps often) more nuanced and complex than those described by the critical social scientists who have written about them. My ethnography seeks to examine the stories told by those practitioners, in search of a deeper understanding of those meanings and significances. At the same time, in retelling the stories, it simultaneously makes new meaning. In this way, academic knowledge production is also discursive, normative, and biopolitical, inscribing particular collections of human values in the truth claims it makes. My hope is that the discursive work done by this thesis may play some part in normalizing and facilitating conversation about conservation across academic disciplines and discursive fields, drawing in contributions from natural scientists, conservation and restoration practitioners, critical social scientists, and environmentalists of all types. What entails in the following chapters are my interpretations of the discourses and

practices of ecological restoration. I hope the reader will also feel empowered and encouraged to draw their own.

Chapter 4. Material practices of island marble restoration

> "A beautiful white and green butterfly with a marbled hind wing, the island marble once fluttered about in the open grasslands and Garry oak woodlands of Washington's San Juan Islands and Canada's Gabriola and Vancouver Islands. Last seen in 1908, it was believed extinct until a small population was found 90 years later in the San Juan Island National Historical Park. Scientists believe this is the only viable population of island marble butterflies in the world — one catastrophic event could wipe out the whole population."
>
> – Center for Biological Diversity website (n.d.)

The island marble butterfly was first "discovered" and named by western scientists in the 19th century on Vancouver Island, British Columbia, where at least 14 specimens were collected between 1860 and 1908 (Shepard, 2000). The organism was identified as a subspecies of the Large Marble (*Euchloe ausonides),* a widespread but locally rare species across much of western North America, though not otherwise found on the west side of the Cascade Mountains in Washington or British Columbia. After the last specimen was taken in 1908, the island marble butterfly was not seen again, and was considered extinct until the "shocking rediscovery" (Berg, 2013) made in 1998, when a lepidopterist conducting surveys on San Juan Island in Washington found island marble butterflies in the prairies of American Camp, the southern unit of San Juan Island National Historic Park (Pyle, 2006). After these specimens were identified and the subspecies was formally named, a significant effort ensued to learn more about the biology, lifecycle, and habitat of the "rediscovered" island marble butterfly, as well as to determine the size and geographic range of the population.

Despite ongoing study over the past two decades, discussed in greater detail below, much remains unknown about island marble. For one thing, neither its apparent absence for 90 years

nor the shift in location from Vancouver Island to San Juan Island have been explained. As Jenny Shrum, biologist for the National Park Service, tells me, it is "not exactly clear if it was here all along," and simply went unnoticed at American Camp through the 20th century, or whether migration from Vancouver Island – a distance much greater than the butterflies are believed to be able to fly – may somehow have occurred more recently (personal communication, 2016). For another, no one can say exactly how large or how stable the population is. Scientists involved in the conservation project have offered estimates between 100 and 1,000 individual organisms over the years, and they know that the population took a significant dive around 2009-2010. Shrum estimated that between 200 and 500 island marble butterflies are alive today, noting what appears to be a slight increase in the population in 2016 compared to the past few years (personal communication, 2016).

More precisely, the butterflies *were* alive last spring, since the organism exists in the form of an adult butterfly for only about nine days out of the year. The eggs laid during that time progress through the larval (caterpillar) stage over the course of just over a month – typically sometime between May and July – passing through five stages of growth (instars) before entering diapause (dormancy) in the form of a pupa, or chrysalis. For the majority of its life cycle, sometimes more than eleven months out of the year, island marble takes the form of the chrysalis, filled with what one biologist described as "bug goop," from which the newly formed adult butterfly emerges the following spring (observation, 2016).

In addition to the estimated 200-500 chrysalides that might be found "in the wild," though, about 140 more are kept in a heated room, located in the back of a former storage shed, tucked into the

woods near the American Camp prairie. Carefully tied with thread to the shish-ka-bob skewers that substitute for the plant stems where caterpillars prefer to form their chrysalides, these pupae are meticulously attended by a field biologist from the National Park Service until the butterflies emerge in May or June. After their emergence, the butterflies are released back into the field to supplement the existing population, and eggs are collected to start the process again. This captive rearing program, started by a local volunteer in her living room, is understood as an urgent, short-term effort to ensure the viability of the population from year to year, while the long-term recovery of the species is dependent on the restoration of habitat conditions in the prairies of American Camp and the surrounding areas of southern San Juan Island.

Figure 3: Island marble chrysalides, with adult butterfly, in captive rearing lab. Photo source: San Juan Island National Historical Park, 2016.

In this chapter, I seek to provide a detailed, in-depth account of the material practices – including both human and nonhuman practices – that take place (and make places) at the island marble restoration site(s) at American Camp. This ethnographic account, drawing on participant observation in the field, conversations with scientists and field staff, and a range of written documents about the project, frames efforts to protect the island marble butterfly as a form of conservation biopolitics: the "making live" of butterflies on the American Camp landscape. This approach draws on the conceptual tools of science and technology studies, as discussed in chapter 1, examining how the scientific practices of butterfly restoration shape both the social and material worlds. I begin with an overview of the life cycle of the island marble butterfly, reviewing the scientific knowledge, produced since the 1998 rediscovery, that explains how island marble reproduction works. This body of science, though largely aimed at guiding restoration efforts, addresses these reproductive processes in the absence of *intentional* human intervention – that is, it essentially seeks to explain how the butterfly lived prior to rediscovery. Nonetheless, the butterfly's reproductive processes demonstrate its profound dependence on the other species, *including* humans, that are present in the ecological assemblage that is the American Camp landscape. In this way, I seek to show how the existence and reproduction of the island marble butterfly is a ''relational achievement spun between people and animals, plants and soils, documents and devices in heterogeneous social networks'' (Whatmore, 2002, p. 14). In the first section of this chapter, I review these networks of relations. Taking explicit human efforts to make butterflies live out of the equation for a moment, I focus in particular on the relationship between the island marble butterflies and their host plants, whose presence, prevalence and morphology is essential to the lives of the butterflies.

At the same time, the practices I describe do not simply unfold on a pre-existing or predetermined landscape, but inform another "relational achievement": the making of a *place.* Island marble reproduction occurs on a landscape known by many names, which include "San Juan National Historical Park," "American Camp," the "prairie," butterfly "habitat," or the "restoration site," among others. Each of these layers has "meaning associated with a perhaps imagined past, yet these meanings shape the experience of the present" (Herbert, 2010, p. 70). As I have argued in chapter 1, the act of identifying and naming places, using any of these terms, is a political act that calls that place into being through relations that work to simultaneously construct the subject(s) naming it. Potential definitions of place range in scale from the place of a single host plant, where an individual island marble larva (caterpillar) develops, to the place of the coastal prairie, a wide-ranging landscape (crossing human boundaries including public/private land divisions) on which the island marble population "flutters about." These places are not discrete categories, but overlap and blend into one another, leading to potential tensions between understandings of what (and who) a particular place is for. In the second section of this chapter, I examine the layers of meaning that are inscribed on the space of southern San Juan Island through a brief environmental history of the place(s) of the American Camp landscape, seeking to understand how different kinds of socioecological places can coexist, both materially and discursively, on the same landscape.

In the later parts of the chapter, I turn to how contemporary scientific management practices, explicitly intended to foster the lives of butterflies, reshape both the places and the lives of plants and animals on that landscape. Drawing on the approach of science and technologies studies,

with an explicitly spatial lens, I aim to account for "how science done in a place both reflects its materiality and transforms it" (Fleming, 2014, p. 1187). I focus on three distinct, though interrelated, efforts to protect the butterfly population: the establishment of experimental habitat restoration plots, the construction of a facility for captive rearing, and the development of a long-term vision for a restored prairie ecosystem. In each of these sections, I seek to explore the techniques and practices that are used to modify the landscape, altering ecological conditions, making (particular kinds of) places, and allowing or fostering the lives of some plants and animals while disallowing or even killing others. Even as I focus on human activities, I also hope to show how plants and animals defy human attempts at management, escaping from control and exerting their own forms of biopower to shape the places in which they live. In this way, conservation biopolitics is not a process of complete human control over a passive landscape, nor is "making place" merely a cultural or political process of assigning human values to spaces. Instead, I seek to pay close attention to nonhuman agency, including the practices of plants and animals that work to make both life and place in this complex and contested socioecological setting.

"The saga of a subspecies": island marble reproduction and ecology

Island marble reproduction is dependent on the presence of appropriate "host plants." These are the species on which eggs are laid and develop into larvae, and which provide food, in the form of flower petals and leaves, for the growing caterpillars.[5] Nearly the entirety of the egg and larval

[5] I use the term "host plant" as defined by Lambert (2011), who writes "Host plants are defined as those plants that support development of larvae through the final instar under field conditions" (p. 2). Following the common

stages are spent on a single plant, with the caterpillar leaving its host only after reaching the fifth instar, at which point it is nearly ready to form a chrysalis. Island marble has been found to use three distinct species as host plants on San Juan Island. These are commonly known as field mustard (*Brassica rapa)*, tumble mustard (*Sisymbrium altissimum),* and pepperweed (*Lepidium virginicum)*. Despite the word "weed" in its name, only *Lepidium* is considered to be a native species, while *Brassica* and *Sisymbrium* are both introduced (Lambert, 2011).

These species occupy distinct ecological niches in the landscape of American Camp: *Lepidium* occurs in tidal lagoons on the (more protected) northeastern shore; *Sisymbrium* is found in highly disturbed sand dunes overlooking the south beach; and *Brassica* pops up in the upland prairies in the western part of the park. The last of these is the location of the most concerted efforts to restore habitat, for reasons I will discuss in detail later in this chapter, and is therefore the primary focus of much of my discussion throughout this thesis. For the most part, the three habitats are geographically separated: "generally, host plant species do not overlap in distribution and therefore limit the development of immature stages of *E. ausonides insulanus* to one host plant species" (Lambert, 2011, p. 3). It is less well understood to what extent this limitation applies to the mature stage: while adult butterflies do not typically migrate very long distances, they have been occasionally observed to fly upward of one kilometer, putting these different host plant habitats within range for migration. Female adults have never been observed to oviposit on more than a single species of host plant, but researchers caution against concluding that this lack

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colloquial practice of restorationists working on the project, I refer to these species by their genus names (*Brassica, Lepidium, Sisymbrium),* by which I intend only the particular species found in these ecosystems and not any other members of that genus.

of evidence means that the animals have any fidelity to the species of host plant where they were born. Amy Lambert, the restoration ecologist who designed the habitat restoration plan, speculates that cross-migration does occur occasionally, when large butterfly populations and well-timed "dispersal events" such as high winds happen to coincide, but that this most likely does not happen on an annual basis (personal communication, 2016). No research has been done at this time to determine whether the distinct populations vary genetically.

The butterfly is profoundly dependent on its host plant, which provides the entirety of its habitat and food source for the egg and larval stages. The larva grows in synchrony with the plant, feeding first on the soft petals of mustard flowers, then moving on to more fibrous stems and fruit as both plant and caterpillar develop through the spring. A caterpillar born too early or too late in the life cycle of the plant will starve, finding nothing appropriate to eat and unable to move to another plant. For this reason, timing is critical to reproduction, as the hatching of island marble eggs must coincide with the emergence of host plant flowers. "If you wanted to convince a crowd of skeptics that a benevolent god exists," writes journalist Rich Smith (2016), "you might begin by describing the close relationship between the island marble and the mustard plant." Of course, the close ties of this relationship might just as easily be interpreted as evidence for coevolutionary processes as for theism. In any case, for the butterfly population to reproduce to its full potential (and thereby to sustain the size of the existing population) requires continuous flowering of host plants during the six- to seven-week period while butterflies are mating and laying eggs (Shrum, personal communication).

Despite this apparently exclusive relationship between animal and host, however, the island marble is actually notable within its family (*Pieridae)* for being oligophagous rather than monophagous, enabling it to adapt to multiple host plants – as it apparently did at least twice, sometime after the introductions of *Sisymbrium* and *Brassica* into the ecosystem. Again, very little is known about these transitions, which occurred while the island marble butterfly was believed to be extinct, or perhaps even before it had been identified. Jon Shepard writes that hairy rockcress, *Arabis hirsuta,* "is the presumed larval foodplant" that was used by island marble in the 19th century on Vancouver Island, apparently basing this presumption on the known presence of this species there and the evidence that the Large Marble butterfly uses *Arabis* species as hosts elsewhere (2000, p. 6). He notes also that other available host plants could include "various introduced, weedy species, none of which could have been the original larval foodplant. It is not known if these introduced larval host plants were present prior to the extirpation [from British Columbia] of the Island marble" (p.6). Lambert (2011) elaborates, carefully distinguishing presumptions from known facts:

> "It is presumed that alterations to and reductions in native prairie drastically reduced ancestral host plant populations (e.g., *A. eschscholtziana* [synonymous with *Arabis hirsuta*]) in grasslands on San Juan and Vancouver Islands. Heavy sheep grazing at the turn of the 19th century likely caused a decline in native host plants populations that resulted in the extirpation of *E. ausonides insulanus* from Vancouver Island (Shepard 2000, Pyle 2004). Similarly, agriculture conversion and introduction of domestic livestock resulted in the decline and degradation of native plants in grasslands on San Juan Island (Rolph & Agee 1993, Griffin 1852 as cited in Avery 2002). However, unlike Vancouver Island, *E. ausonides insulanus* presumably persisted on San Juan Island in grasslands by switching to non-native introduced host plants (i.e., *B. rapa* and *S. altissimum*) as native host plants became increasingly rare." (p. 120-121)

Elaborating on this presumption, one scientist speculates in conversation that the island marble butterfly may actually have been "rescued" from complete extinction by the inadvertent introduction of *Brassica* (personal communication, 2016). Complicating the typical narrative of anthropogenic extinction due to habitat loss, this perspective frames the human "impacts" of European settlement on the landscape as simultaneously destructive and creative. The "novel" components of the American Camp ecosystem – the introduced host plants – may have provided the critical habitat conditions that allowed for island marble survival through the 20th century. All of this is speculation, of course, and should not be interpreted as evidence for claims that "novel ecosystems" necessarily promote biodiversity. Importantly, though, this history demonstrates that the process of island marble reproduction can't be understood in the absence of human influence or "impacts." Such a purely "natural" reproductive process has possibly not taken place since before the organism was discovered by western science. In this way, both the island marble itself and the places where it lives defy framing in terms of a human/nature dualism. Instead, as Elizabeth Hennessy writes, "wildlife is produced through the relational imbrications of social and biological histories" (2013, p. 73). As I will discuss further in Chapter 6, such an understanding of butterfly lives challenges conventional environmentalist discourses aimed at conserving or restoring the species, or the places where it lives.

In light of the switch to non-native host plants, those plant species have become central to the project of restoring habitat for the reproduction of island marble. *Brassica rapa,* in particular, has been the primary focus of restoration efforts, for reasons I will discuss in detail later in this chapter. *Brassica* is a common species on the prairies of American Camp, as well as in farm

fields and other disturbed areas around San Juan Island. A common agricultural weed, *Brassica* tend to spring up readily where there is disturbed soil. The Washington Department of Fish and Wildlife describes it as a "early successional species that densely colonize[s] disturbed soil, and die[s] out over time" (WDFW, 2012). It was widespread across the American Camp prairies, from when the island marble was "rediscovered" there in 1998, through the early 2000s. By 2012, however, the plants were nearly absent. Perhaps this was because it had indeed "died out over time," though another factor was probably the rapidly-increasing blacktail deer (*Odocoileus hemionus)* population in the area over the same time period (Lambert, 2016, p. 3).

Deer browse heavily on *Brassica* during the spring months when it begins to flower, a fact that has significant implications for island marble conservation. "One of the biggest threats for the island marble butterfly is that deer will come in and they want to eat the same plants the butterflies need to lay their eggs on," said Ted Thomas of the U.S. Fish and Wildlife Service (quoted in Cauvel, 2016). More than mere competition over food sources, deer browse that occurs after oviposition on the host plants is also a direct cause of mortality for island marble eggs and larvae. Deer are repeatedly cited as a threat to island marble conservation: as Schultz et al. (2011) write, "the high density of black-tailed deer in the San Juan Islands is likely a significant limiting factor for the butterflies" (p. 366).

Yet the relationship of deer to host plants and butterflies is more complex than these statements indicate. Left to its own devices, *Brassica* on the American Camp prairies generally tends to flower and go to seed early in the spring, leaving island marble larvae without food when they emerge. Plants that are browsed by deer, however, develop a second flush of flowers later in the

spring, often at the ideal time for growing larvae. The apparently perfect coincidence of synchronous development between host and butterfly, in this case, appears to be at least partially dependent on the role of deer – otherwise seen as a butterfly conservationist's "nemesis" – in the ecosystem (Shrum, personal communication). In this way, as I will discuss further below, the actions of deer are directly responsible for making the ecological conditions required for island marble reproduction, thereby producing the place that is island marble habitat.

The reproduction of island marble butterflies "in the wild," then, is a complex process that is directly affected not only by the biology of its host plants, but also by the populations of predators (including not only deer but also wasps, spiders and others), environmental factors such as winds and annual precipitation patterns, and a host of other factors. Deer and *Brassica* are just two of many more lively inhabitants of the multi-species assemblage that shape the prairie ecosystem, making possible butterfly life. I have focused here on the roles that these two specific organisms play in island marble reproduction for two reasons. First, these species are among the most directly linked to mortality in the egg and larval stages, which appears to be a major limiting factor on reproduction leading the endangerment of the species. Secondly, populations of both deer and *Brassica* (not to mention island marble itself) are carefully managed by people, destabilizing the idea that island marble reproduction is really happening "in the wild" at all. The boundary between the human-built environment and the supposedly "natural" field setting becomes unclear in the context of a socio-ecological system where significant elements of the biota are human-introduced and/or intensively managed. In this way, the island marble project evidences the collapsing distinction between *in situ* and *ex situ* conservation (Braverman,

2015). In fact, the species in question has never quite been *in place* on the anthropogenic landscape of the American Camp prairie. I will return to this argument in chapter 5, but I turn now to a closer examination of the *places* in which the processes of island marble (re)production occur, and the different layers of human meaning and value that are inscribed in those places.

"The only known place in the world where this tiny creature lives": the place(s) of the American Camp prairie

The name "American Camp" signifies an understanding of place that draws from the political significance of San Juan Island in the late 19th century. When the 1846 Treaty of Oregon set an ambiguous boundary between the United States and Great Britain, both countries laid competing claims to the San Juan Islands. The Hudson's Bay Company staked out the British claim by establishing the first colonial agricultural endeavor on San Juan Island, called Belle Vue Sheep Farm, on the prairies at the southern end of the island – the same place where today's island marble butterflies are found. Both British and American farmers began to settle on the prairies of southern San Juan Island in the 1850s, bringing with them a variety of agricultural plants, very likely including *Brassica*, in addition to farmed animals. The famous "Pig War," a twelve-year standoff without any actual shots fired, began in 1859 when an American settler killed a British pig that had come into his garden. A local crisis arose when the settler was threatened with arrest, in response to which both countries sent military detachments to the island. A tentative peace was quickly negotiated, averting a clash that might have sparked war between the two countries, and the island was divided by a joint occupation. To protect the local settlers, what is today known as "American Camp" was constructed as a military encampment not far from the

site of Belle Vue Sheep Farm, while the British built "English Camp" on the north end of the island. British troops eventually withdrew after the boundary was resolved in 1871, yielding the entire island to the United States (Avery, 2004).

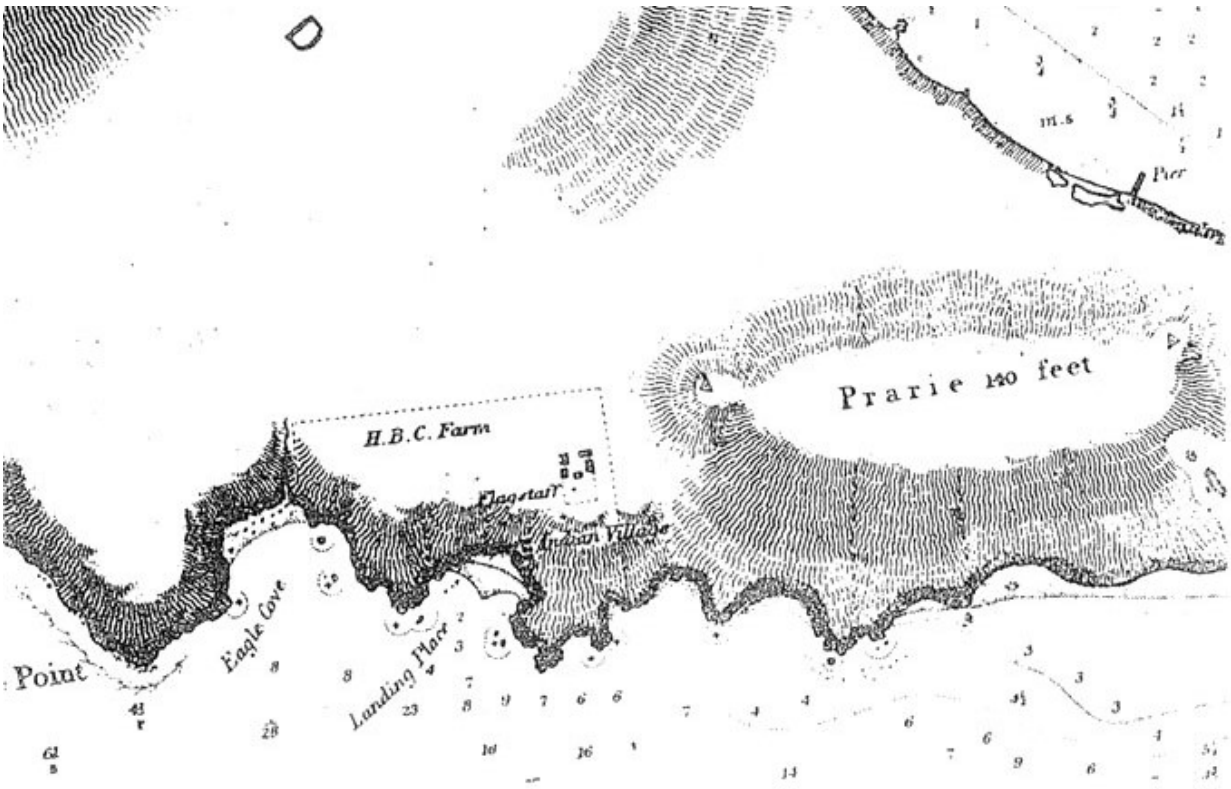

Figure 4: Historic location of Hudson's Bay Company (H.B.C.) farm location. Photo source: San Juan National Historical Park (Richards, c. 1856).

The site was listed as a National Historic Landmark in 1961, and is today a National Historical Park that includes both American Camp and English Camp. National Historical Parks are one of many special categories managed by the National Park Service, whose mandate to "conserve the scenery and the natural and historic objects and the wild life therein" has been noted for its potential for multiple contradictory interpretations (Winks, 1997). National Historical Parks, in particular, are "customarily preserved or restored to reflect their appearance during the period of

their greatest historical significance" (National Park Service, 2003). The landscape of American Camp is therefore managed, to the extent possible, to recreate what it looked like during the Pig War era of the 1860s. Jenny Shrum tells me that the understanding of the place as an historical landscape has a significant impact on the ecological assemblages that are valued there: "we're literally looking at old paintings and historical photos [of the American Camp landscape] and going, 'what kind of tree is that?'" (personal communication, 2016). This historical approach has significant overlap with the conventional ideas of ecological restoration, in terms of putting environmental conditions back to a historical state, but the baseline is shifted, significantly, to after the arrival of European settlers and their associated "portmanteau biota" (Crosby, 1986).

Figure 5: Painting by Richard Schlecht; artist's rendering of historic conditions of American Camp. Photo source: San Juan National Historical Park (Schlecht, n.d.).

These differing baselines for restoration can lead to conflicting ideas about what plants and animals belong, revealing the possibility of a contradiction between conserving "historic objects" and "wild life." On the American Camp prairies, for example, the process of forest succession leads to the encroachment of trees such as Douglas fir (*Pseudotsuga menziesii)* on the edges of the prairies. These are common, native evergreen trees, typically quite desirable to restorationists elsewhere in the Pacific Northwest. Moving in from surrounding forested areas, though, they eventually shade out native grassland species, converting prairie into forest over time. Douglas fir were likely absent from the historical landscape of southern San Juan Island largely due to the indigenous practice of burning the prairie to maintain the open landscape. From this perspective, they do not belong on the landscape if the baseline in consideration is either the historical era of the Pig War, or the years prior to European settlement. Yet their absence in that place is a direct result of human "impacts" on the landscape, they are still classified as "native" to the region, and they certainly would seem to qualify as "wild life." For all these reasons, cutting down trees, as Parks managers would like to do, tends to provoke backlash from local residents and neighbors, for whom protecting trees (especially native ones) is often central to the definition of environmentalism (Shrum, personal communication).

On the prairies of American Camp, the encroachment of Douglas fir is generally seen by ecologists not as a natural process to be protected, but as a threat to the prairie itself, as a distinct type of place from the forests that surround it. This points to an ecological understanding of the place – as an *ecosystem* type– that can complement, but also may compete with, its multiple layers of historical significance. The prairie, to its advocates, is an ecosystem much less common

that the ubiquitous evergreen forest of the region, and worthy of special protection. Coastal prairies were once widespread, but are now found in less than 3% of their historic range in the Puget Sound region (Chappell et al., 2001). The reference point for that "historic range," of course, is prior to European settlement of the Pacific Northwest. The open prairies of American Camp, then, are not only "scenery," or a historical and cultural resource, but also a critically important and at-risk ecosystem. As the Douglas fir example demonstrates (and as I will explore further in Chapter 5 with regard to the island marble butterfly) these varying historical, cultural, and ecological understandings of the place have important implications for what plants and animals are seen to belong, and permitted or even cultivated to live there.

The rediscovery of the island marble butterfly on San Juan Island in 1998 adds an additional set of layers to this complex network of cultural and ecological relations that make the place of the American Camp prairie. To butterflies, and to the ecologists and biologists who seek to protect them, the prairie is also the place signified by the word "habitat": the collection of plant stems, flowers, and leaves, as well as soil, water, and air, that make up the life-world of a butterfly. Just a few of the critical features of this place are the splashes of yellow flowers (developed at just the right time of year) that invite butterflies to land and deposit eggs, the flower petals and leaves where those eggs hatch and grow into larvae, and the sites of attachment that larvae select for themselves for the long chrysalis phase. These, of course, are conceptions of place that would have little meaning to the typical visitor to the park, though they are well known to the restorationists who work carefully to produce these habitat conditions. As I will discuss further in the following sections, the restoration site, a fenced-off and carefully managed subsection of

the prairie landscape, and the captive rearing facility, a laboratory setting where caterpillars are grown into butterflies, are constitutive elements of island marble habitat (conceived broadly as the spaces where butterflies live, as opposed to a more limited idea of "natural" habitat), while at the same time they are important socioecological places to understand in their own right.

Finally, it is worth taking a bug's-eye view to note that the caterpillar and chrysalis stages of the island marble, which make up the vast majority of the organism's life cycle, each take place on a single host plant. The entire world of an individual member of the species, with the exception of its nine-day adult phase, is lived on the side of a plant: its habitat, in short, is another living being. While such an observation may seem obvious and routine to an entomologist or ecologist, I hope that the application of the geographic concept of "place" to describe such a small-scale worldview, scarcely visible to most observers, may offer a useful alternative to the anthropocentric lens through which the analysis of place is often made. As I have suggested above, this place too is made by a multi-species assemblage that includes the humans who plant and foster host plant lives, and the deer whose browsing stimulates flower growth at the right time of year.

"Growing weeds:" fostering the lives of *Brassica* host plants

The dramatic reduction in *Brassica* observed on the American Camp prairies in 2012, coupled with concerns about the very small size of the butterfly population, set in motion a significant effort to restore the prairie habitat conditions where the butterfly had been "rediscovered." The Island Marble Habitat Restoration Project (IMHRP), begun in the autumn of 2014, is a five-year

experimental plan, designed to encourage the establishment of *Brassica* in the American Camp prairie while simultaneously testing out multiple management techniques (Lambert 2016). Because *Brassica* is understood to be an opportunistic, "colonizing" species, the restoration plan is based on the principle of plant succession, designed to create a patchwork of disturbance across the prairie landscape in which *Brassica* will take hold. The patches to be disturbed are square plots, ten by ten meters, laid out on a matrix across the prairie. Ten new plots are treated each year, in rotation, including both treatment and control plots. The plan is based on an adaptive management model, meaning that the timing and sequencing of management practices, as well as the specific practices themselves, are subject to change from year to year based on previous results and observations.

When I visited the site in the late spring of 2016, the "year two" plots had just undergone the first steps of their initial treatment. All vegetation within the plot had been cut to the ground by crews using gas-powered brushcutters (known as "weed-whackers"). Soon afterward, the plots would be sprayed with systemic herbicides to kill the roots of the old vegetation, preventing regrowth. Fostering the lives of the desired host plants thus requires killing other forms of life, using biopolitical technologies that include the commonplace tools of ecological restoration such as brushcutters and backpack sprayers for herbicide. On the patch of bare earth created by these practices, soil would be disturbed manually, using another tool called a "dibble bar" to create indentations in the soil for plants to take hold, and seeds or seedlings of desirable vegetation would be planted. The list of species designated for planting included *Brassica* itself as well as native prairie species such as chickweed (*Cerastium arvense),* an important nectar source for

island marble butterflies. The *Brassica* would be planted deliberately late, in comparison with the plant's normal cycle of seed production, in an attempt to encourage flowering in sync with the life cycle of next year's island marble population (observation, 2016).

Meanwhile, a "year one" plot nearby, which had undergone similar treatment the previous year, was in full bloom, a ten-meter square thick with yellow *Brassica* flowers on the otherwise brownish-tan prairie landscape. I joined project staff conducting monitoring for island marble in this plot, scrutinizing individual plant stems in search of eggs or tiny caterpillars. When one was found, a biologist would identify the larval instar stage, tag the plant with bright flagging tape at its base, and note the animal in the day's record. We began with the plants that were already flagged, looking to find the same animal again to track how much and quickly it had grown, or on the other hand, if it had disappeared (presumably lost to a predator, as the caterpillars do not move off their single host plant at this stage in their life cycle). Multiple rounds of such monitoring over the course of the larval stage (May-June) allow for estimates of the total number of island marble using these plots, as well as their survival rates to each successive stage of development (observation, 2016).

Figure 6: Restoration ecologists monitoring larva survival rates, 2016. Photo by author.

The *Brassica* plots established by the IMHRP are a prime example of conservation as a biopolitics of nonhuman life – that is, the governance of life through techniques that not only discipline individual bodies, but also manage the processes of life and death at the level of the population, or in this case, the entire species. What ecologists typically describe as "habitat restoration" amounts to the fostering of particular kinds of plant and animal lives, such as the *Brassica* host plants that facilitate the reproduction of island marble. To "make live" island marble butterflies requires promoting the lives of *Brassica* plants, while disallowing or even killing (using herbicide or by manual removal) undesirable weedy species that would undermine the habitat restoration effort. Careful monitoring of the butterfly and host plant populations allows for statistical measurement of their reproduction and mortality, as I will discuss further

below, and for the management of those processes by techniques such as the deliberately late sowing of seeds.

Within the confines of the ten-square-meter plot, the process of restoration represents a radical remaking of the biotic assemblage, and thereby the very place, of the prairie. The use of herbicides effectively eradicates living things from the bounded space of the restoration site, defining it as a clearly distinguishable place from the surrounding prairie ecosystem (see figure 7 below). On this blank canvas, so to speak, restorationists select the palette[6] of species to be used for revegetation – that is, the plants that will be explicitly "made to live" there. Within the typical spectrum of ecological restoration activities, this is a fairly extreme form, as many restoration sites aim to supplement, rather than start anew, the community of flora. Nonetheless, it exemplifies how ecological restoration, in general, represents a significant re-formation of the biotic community within the spaces designated to be restored, remaking both nonhuman populations and the places they inhabit. The common practices of ecological restoration thus amount to the making of both lives and places, using biopolitical technologies to foster the life of a particular assemblage of desirable species within a designated territory. The eradication of life from the restoration site is not absolute, of course, since plants spring back from seeds that blow in across the site boundaries. Some of these are left to grow, while others are weeded out. The places of the restoration site and the larger American Camp prairie are thus closely related

[6] This terminology, borrowed from landscape design, is widely used in the discourse of ecological restoration, typically without comment on the implications of the artistic metaphor. As I will discuss further in Chapter 5, the restoration palette is generally limited to native species, so the inclusion of *Brassica* here marks a shift from the normal practices of restoration.

through the circulations of butterflies and plant seeds (but not certain other animals, as I will discuss below) across the boundaries that define them.

Figure 7: Habitat plots on American Camp prairie and Puget Sound shoreline. Photo source: Google Earth.

Amy Lambert, the restoration ecologist who designed the IMHRP, describes the project as an experiment to answer three questions about island marble habitat: “Can we build it? If we build

it, will they use it? If they use it, will they survive?" (observation, 2016). Based on the results of two years of monitoring data, the answer to all three questions appears to be yes: the project has constructed habitat, butterflies are using it, and they appear to be surviving. 2016 results showed 17% survivorship to the fifth instar in the prairie plots, compared to just 6% in comparable data from 2005-2008 (Lambert, 2016a). The "life table" in which these survival rates are documented, showing the percentage of mortality at each progressive stage of development, epitomizes the biopolitical technologies through which the sorting and administration of life takes place: it is, as Foucault puts it, the *table* that "enables thought to operate upon the entities of our world, to put them in order, to divide them into classes, to group them according to names that designate their similarities and their difference" (Foucault 1994, p. xvii). The life table enables the fostering of butterfly life, at the level of the species, through the quantification and statistical measurement of mortality rates at the subsequent stages of larval development. Based on this information, it becomes possible to develop appropriate interventions into the ecological processes that cause that mortality.

Table 3. Life tables for island marble using *B. rapa* in upland grassland at American Camp. Data from Old Town Lagoon and Lower Redoubt sites were combined for 2005-2008 (n=544). Experimental Study Plots 11-20 located south of the redoubt were combined for 2016. Individuals that were not tracked through full development were excluded.

2005 - 2008			2016		
lx	*N*	*qx*	l_x	*N*	q_x
1.00	544	0.52	1.00	271	0.31
0.48	263	0.73	**0.69**	187	0.40
0.13	72	0.28	0.42	113	0.31
0.10	52	0.35	0.29	78	0.42
0.06	34	0.62	**0.17**	45	0.22*
0.02	13	0.31	0.03	8	

*Based on the number of deaths (n=10); does not include those individuals that disappeared.

Figure 8: Life table, reproduced from Lambert 2016. Rows indicate stages of larval development, from egg to fifth instar. l_x is ratio of survivorship to stage compared to original population, N is total number of organisms surviving, q_x is mortality rate at that stage.

The "making live" of island marble butterflies in the American Camp prairie depends heavily on those interventions, including the exclusion of deer from the spaces of the experimental plots. The decision to focus the IMHRP on *Brassica* habitat, as opposed to *Lepidium* or *Sisymbrium,* was primarily pragmatic: research showed that the highest island marble mortality occurred during the egg and larval stages on *Brassica*, and was largely the result of deer browsing (Lambert, 2016a). This type of mortality, unlike other forms of predation, was a clear candidate for preventative intervention. As Amy Lambert told me, "the reason that I'm working on field mustard, as opposed to *Sisymbrium* or *Lepidium,* is that I felt like – and I think other people on the team felt like – deer herbivory is something we can do something about. We're not gonna pull spiders off of plants. But we *can* exclude deer. So if we could take out the difference of deer, we could actually increase the population [of island marble] overall" (personal communication,

2016). Put another way, mortality caused by spiders or other predators would necessitate management on the level of individual bodies, whereas deer can be managed biopolitically, on the scale of the population, with significantly lower investment of time and money. In this context, the *Brassica* host plant is itself not only a living organism but also a crucial element of the assemblage of biopolitical technologies, alongside backpack sprayers, life tables, and so on, that can be deployed in a particular way (and as we have seen, at a very particular time of year) to enable butterfly life. *Brassica* thereby gains a new source of human value – dependent on its particular relations with people, deer, and butterflies, and having less to do with where it is *placed* in the world – as a result of its role in this biopolitical intervention.

"Taking out the difference of deer" was accomplished by fencing off the plots, which were grouped in clusters of twenty in the experimental design to facilitate this exclosure (see figure 7, above, in which five bare plots, erratically but intentionally placed, can be seen clearly in each cluster). Starting in 2013, land managers put up electric fences, but they were surprised to find how resistant the animals were to that form of disciplinary power: deer consistently jumped over the fences into the enclosures in search of *Brassica* to eat. In 2016, the decision was made to switch to heavy duty, two-inch gauge plastic mesh, which provides a physical barrier that deer are unable to pass rather than relying on conditioning the animal's behavior (observation, 2016). This change in practice was successful, and 2016 marked the first year with zero evidence of deer browse within the experimental plots. The effect of that change on butterfly populations will be measured over the course of the coming reproductive season, but land managers are confident that this was an effective intervention to foster the butterfly population.

In Foucauldian terms, the fence acts as a mechanism of security that works to limit the circulation of certain forms of life (deer), territorializing the space of the restoration site to allow for the secure reproduction of others (butterflies). The fences are installed in April, after an initial round of deer browsing to create a flush of *Brassica* flowers, and removed again in July, after the larval stage of island marble is complete. Ecologically, this timing allows for deer to play the desired role of stimulating *Brassica* habitat in March without causing mortality in May – that is, "making a division between good and bad circulation, and maximizing the good circulation by diminishing the bad" (Foucault, 2007, p.18). The land managers also cite more practical – and human-oriented – reasons for going to the significant trouble, and expense, of removing the fences each year. The heavy-duty black plastic fence, which is over eight feet tall, is seen by many visitors as an eyesore, marring the view of the prairie and the overlook toward Puget Sound, and the Park has received complaints about the visual effect of these exclosures on the historic landscape of American Camp.

While the aesthetic appeal, or lack thereof, of the fences is open to debate, there can be little question that they create a clear visual impact on the landscape. The *place* of the restoration site is delineated, in no uncertain terms, as a black rectangle stretching across the prairie. The barrier, while intended primarily for deer, keeps human visitors out as well, making a space inside the fences where butterflies, host and nectar plants, and the occasional researcher are understood to *belong*, while tourists and deer passing by can only look in through the two-inch mesh squares. The biopolitical processes of fostering the lives of island marble and *Brassica* are thus spatially defined by the enclosure: the restoration site is a place for making butterflies live, bounded and

separated from the surrounding place of the open prairie. (The proliferation of *Brassica* increases the visual effect, at certain times of year, as the land inside the fences bursts with bright yellow flowers.) As complaints about the fences demonstrate, these place-making practices of restoration stand in sharp contrast to the popular understandings of the prairie either as a pristine, wild place (a natural ecosystem, valued by humans for its aesthetics and its purity) or a cultural landscape (a National Historical Park, valued for its role in commemorating a particular human past).

Figure 9: Boundary of restoration site on American Camp prairie. Photo credit: Associated Press (2016).

The prairie plots exemplify a particular kind of place-making, framed around the small scale on which island marble butterfly lives (and deaths) take place. Because the organism spends its

larval phase entirely on a single plant, and only crawls at most a few meters away to form its chrysalis, the enclosed plots encompass its entire habitat for all except the adult (butterfly) stage of life. The individual host plant on which an egg is laid, and which is (or is not) subsequently eaten by deer, is the critical site at which island marble mortality occurs. Human intervention at this scale is therefore able to completely remake the assemblage of species that make up the life world of an island marble larva. The entire web of relations within which the animal lives is human-produced: desirable host plants were installed, their competitors were killed off, and predators such as deer were carefully excluded. Making *Brassica* live thus amounts to making *a place for life* for the island marble butterfly. The practices commonly called "habitat restoration" are the biopolitical administration of one organism's life and death in order to produce the conditions that allow for the reproduction of another that is dependent on it.

Because the scale of the restoration site is not designed to the spatial practices of the adult butterfly, the task of keeping deer out comes with the added challenge of allowing adult butterflies to move through. Ideally, butterflies would move freely in and out of the exclosures, but the new fencing method has the land managers a bit worried: although the two-inch squares are large enough for island marble butterflies to pass through, the butterflies "don't seem to know that" (or, perhaps, are unable to fly with sufficient precision to aim for the gaps) and often bounce along the inside of the fence, potentially injuring themselves as well as limiting their mobility across the landscape (observation, 2016). The scientists tried installing "windows" made of a larger mesh to facilitate movement, with little evidence that the butterflies were able to find or use them. Moreover, one scientist tells me that they don't know exactly what kinds of

ecological processes might be affected, since both other animals and potentially the dispersal of plant seeds may be limited by the presence of the fences. For this reason, taking the fences down for as much of the year as possible is a way of minimizing "unanticipated ecological effects" (Shrum, personal communication, 2016). Still, this approach is considered a success, especially compared to the electric fences that failed to adequately discipline the deer population to create the necessary butterfly habitat.

Making butterflies live: the captive rearing lab

Even before the National Park Service began to implement the IMHRP on the American Camp prairie, an even more explicit effort to "make butterflies live" was already under way. What is now called the island marble "captive rearing lab" had its start in 2010, when a neighbor living nearby to the Park began collecting and caring for island marble butterflies, raising them from egg to adult in captivity right in her living room (Cauvel, 2016). In recent years, this captive rearing effort has moved to the back room of a former storage shed on National Park Service property, and is now managed by staff from the Park, in consultation with both the volunteer who pioneered the program and staff from Woodland Park Zoo in Seattle. Island marble eggs are gathered from the field in the American Camp prairie and moved to host plants enclosed in cages in the lab. There, they hatch into caterpillars and are closely monitored through the five stages of larval development. When they are fully grown, caterpillars are moved out of the cages to a "pupation box," (a large Tupperware container) stocked with the shish-ka-bob skewers onto which the caterpillars attach themselves to form their chrysalides (see figure 3, page 60). These

are kept warm through the winter until adult butterflies emerge and are released back onto the prairie (observation, 2016).

The practices of the captive rearing lab, even more explicitly than the *Brassica* plots on the prairie, entail making island marble butterflies live, using a suite of biopolitical technologies that includes Tupperware bins, shish-ka-bob skewers, and central heating, among others. Born out of a sense of crisis, in response to the perceived risk of immediate extinction of the species, the captive rearing lab marks the culmination of the scientific effort to measure, quantify and understand the butterfly's reproductive processes as a means of intervening to foster its continued existence. The timeline of this project is urgent, with success measured from year to year by the number of living butterflies that are successfully produced and returned to the "wild" landscape.

The rearing lab is thus also a *place-for-butterflies*, albeit of a very different kind than the prairie restoration plot. The spatial dimensions of making butterflies live in the lab are even more localized than on the prairie: individual host plants, grown onsite, are brought in to the lab each season, and individual animals are placed on them. Over the course of six seasons raising caterpillars, volunteers and Park staff have learned a great deal, mainly through trial and error, about the spatial practices that that facilitate this reproductive process – practices that, like the fences on the prairie, manage the circulation of bodies in ways that promote the life of the population. Park staff explain to me, for example, that older (fifth instar) caterpillars must be kept in separate cages from younger (first instar) ones, lest the larger caterpillars consume either their younger brethren or the stems on which they live. Chrysalides that are formed on the side of

the container are carefully scraped off and both glued and tied to the skewers with thread to hold them in place through the winter. These skewers themselves are positioned carefully, leaving just enough space below the chrysalis for emergent butterflies to unfold their delicate, newly-formed wings without causing damage (Shrum, personal communication, 2016). The spatial processes of island marble reproduction are thus measured and recreated in the lab, down to the exact number of centimeters of space needed for the unfolding of butterfly wings.

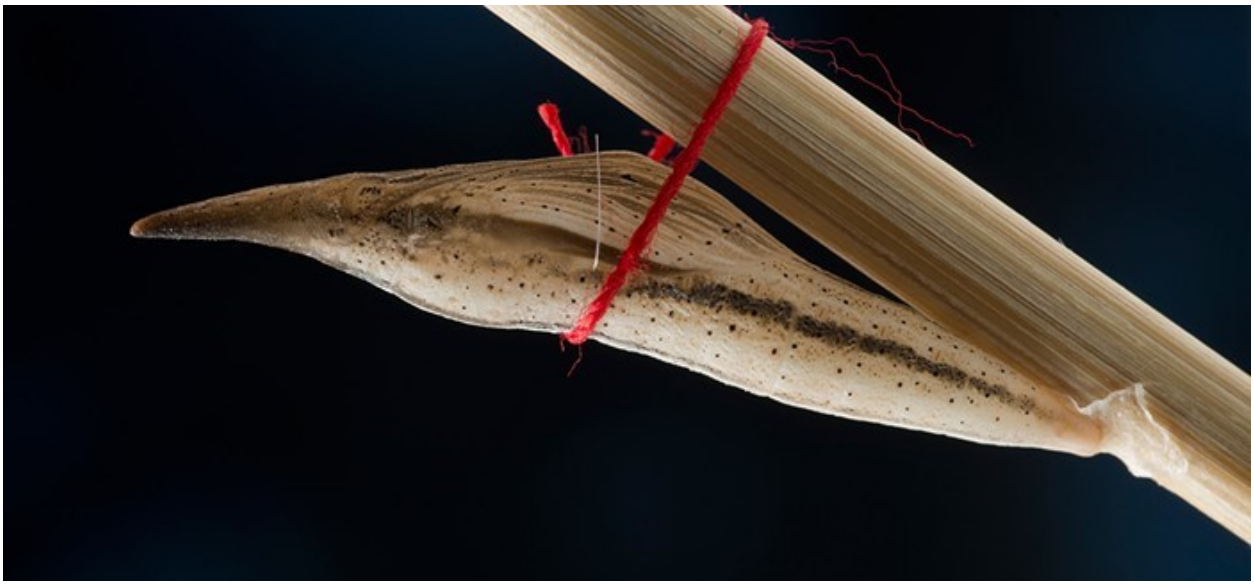

Figure 10: Island marble chrysalis, with thread, skewer and glue. Photo credit Gary Tarelton (2016).

The captive rearing lab functions as a biopolitical mechanism of security for maintaining the island marble population: in the event of unexpected mortality "in the wild," for example, the captive-reared animals can be literally counted on to supplement the population. Biologists collecting the eggs to bring into the lab are able to target areas where high mortality is expected, such as unfenced areas where deer browse (observation, 2016). Ann Potter, wildlife biologist for the Washington Department of Fish and Wildlife, described the reasoning behind developing the

program: “we thought it might be necessary to develop methods of captive rearing because there were so few of the butterflies left and there were some situations where we would know there were eggs or caterpillars that wouldn't survive” (cited in Cauvel, 2016). In this way, the biopolitical interventions of the laboratory program are interwoven with those taking place on the prairie. While the captive rearing lab’s technologies for fostering life are borrowed heavily from the practices of zoos and other “ex situ” conservation efforts, it is important to note that the butterflies being kept in captivity temporarily are still very much a part of the same broader population that is being sustained on the prairies. There is no copulation of butterflies taking place in the lab; all adults are released back onto the prairie and new eggs are collected the following year.

In this hybrid, “inter-situ” dynamic (Braverman, 2015), the lab and “wild” animals are spatially separated and differently managed, and yet neither would continue to exist without the other – nor, of course, without the human interventions that make both live. As Braverman points out, such practices and issues are increasingly common in contemporary conservation, yet do not align well with the conceptual categories, such as the dichotomy of “captive” and “wild” animals, that conservationists use to describe them. An NPS staff biologist tells me that they “could easily maintain a lab population,” but do not want island marble conservation to turn into a “outdoor zoo” (Shrum, personal communication, 2016). This distinction is premised on the idea that captive rearing is merely a supplement, and a temporary one, rather than the primary or permanent mode of reproduction of the animals. Indeed, the captive rearing program is generally considered to be an urgent, short-term effort to recover the population and prevent extinction – as

Amy Lambert puts it, to "get these animals back on the landscape so they don't blink out" (personal communication, 2016). In the long-term, scientists hope to create a self-sustaining population in the wild that will not need such active intervention.

In the meantime, the laboratory also provides a space for experimentation with the processes of butterfly reproduction, thereby producing scientific knowledges that can, in turn, be applied back to the practices of restoring butterfly population. In 2015, for example, Park staff noticed a problem with late eclosion – the butterflies from the lab were emerging too late in the season, after the wild adult population had already disappeared, and more importantly, after host plants had finished flowering, eliminating habitat for oviposition. After consulting with expert entomologists from the Woodland Park Zoo, an experiment was devised to turn up the heat in the captive rearing lab in an effort to more closely match outdoor temperatures – "plus a little extra," as one staff member described it, to account for the increased solar radiation near ground level where chrysalides are found (observation, 2016). This experiment was successful in 2016, with adults emerging synchronously with the wild population.

The captive rearing program successfully introduced 111 adult butterflies back to the prairie between April 20th and June 5th, 2016, from 177 eggs that were initially brought into the lab. Notably, this could represent as much as half of the total population, based on best estimates of 200-500 individual butterflies in a given year. While wild reproduction rates are not known precisely, the average adult female is believed to lay between 30 and 60 eggs, making the rate of 63% survival in the lab a cause for optimism for the likelihood of increasing the population over time (personal communication/observation, 2016).

"We've got to let them out of the fences": restoration of island marble on the American Camp landscape

The captive rearing program focuses on the immediate survival of the species through reproduction in a highly controlled laboratory space, and the *Brassica* plots on the prairie aim to create habitat outside the lab under experimental, heavily managed, semi-enclosed conditions. However, the long-term vision of island marble restoration, the scientists tell me, is to develop the ecological conditions of the landscape to the point where such active human interventions would not be necessary – that is, to create the kind of *place* where an island marble population *will* live, without be so actively "made" to live. This goal of restoring island marble habitat on a landscape scale means, among other things, having the right suite of host and nectar plants, well-established and self-seeding from year to year, and blooming at the right time to match the needs of island marble in the various stages of its development. Based on the results of the five-year experimental plan, the land managers hope to develop a strategy to create such a self-sustaining assemblage of plants across the prairie landscape that can support a sustainable island marble butterfly population in the long term.

Amy Lambert describes the palette of species to be used in such a restoration effort as including "both weedy and native species," with the former certainly including *Brassica* (observation, 2016). Optimal habitat for island marble, she tells me, includes *Brassica* with varying phenology (i.e., at a range of stages of development) in scattered, moderately-sized patches across the prairie. (The experimental plots, she notes, have sometimes been too thick with *Brassica*, to the point that butterflies appear to shy away from the dense bursts of yellow flowers). Creating this

landscape-scale change may require, among other effects, reducing the size of the deer population through culling (though no efforts to do so are underway at this time), or else simply planting *Brassica* widely enough across the prairie that deer can be allowed to browse without threatening the island marble population. Ideally, the fences would be taken down for good, use of herbicides and manual disturbance of the prairie would be reduced or even eliminated, and the need for annual planting of host and nectar plants would be significantly reduced. "If we ultimately want to conserve the species, we need to let them out of the fences," Lambert says (personal communication, 2016). The alternative, of continuing to maintain the population through active biopolitical intervention, would amount to the “outdoor zoo” that conservationists wish to avoid.

The vision of a self-sustaining island marble population also extends beyond the landscape of American Camp itself, to include nearby private properties, typically agricultural lands, where butterflies might thrive. A coalition of local environmentalist groups is actively working on developing potential habitat on such lands, creating what they call “Suitable Habitat Patches” (San Juan Preservation Trust, n.d.). Their approach uses a design based on, but significantly modified from, the prairie *Brassica* plots at American Camp, using practices that fit an agricultural, rather than a typical restoration, approach. Avoiding herbicide use that might be frowned on by local residents, this model calls for initial disturbance in the form of turning over the soil with a tractor. The plots are then fenced off, *Brassica* and nectar plants are sown, undesirable weeds are removed, and the size and phenology of host plant habitat is monitored carefully through the growing season. A staff member from the San Juan County Land Bank

describes this as an "opportunistic" approach, taking advantage of elements of the agricultural setting and "using weeds" to create habitat[7] (observation, 2016). The project also benefits from the local knowledges and skillsets of the landowners, farmers who rent their land to the land bank to participate in this project. At least one of those local landowners has also become a part-time employee of the project, doing the on-the-ground work of tilling, seeding and weeding the plots. "They must think we're crazy," the conservationist says, noting that *Brassica* is itself a common weed on this landscape that farmers would frequently till under in their fields (observation, 2016). Whatever they think of it, however, several farmers have accepted payment for the use of their land to begin cultivating *Brassica* instead.

The missing piece of the puzzle at the "Suitable Habitat Patches," at this point, is the island marble butterfly itself, which has not been introduced. Butterflies are not likely to find their way to these habitat patches unassisted – a frequent challenge encountered with conservation of rare butterfly species, whose dispersal patterns tend to be limited. "For many of the rare butterflies of the WPG ecoregion, natural recolonization of historically occupied sites is unlikely due to the isolated nature of remaining prairie patches. Reintroductions are the only option for a species to establish in restored prairie habitat at sites where they were previously extirpated" (Schultz et al., 2011, p. 374). In the case of island marble, the commonly-used term is not "reintroduction" but "translocation," pointing to the absence of knowledge about the species' historic range and past use of the landscape.

[7] She also, notably, describes the SHP as a "novel" ecosystem, in contrast with one restorationist working on the Park project who explicitly avoids that terminology.

At the annual partner's meeting I attended in the fall of 2016, discussion of translocation of butterflies was slotted into a mere few minutes on the agenda, but passionate debate over this issue lasted well beyond the allotted time, and even continued out the door and onto the ferryboat returning to the mainland. Everyone agreed, at least in principle, on two points: that translocation should not be attempted without a locally stable population (at American Camp and/or in the captive rearing lab) to pull from; and that the habitat into which the animals would be introduced must be safe and, indeed, "suitable," to allow them to thrive. As Schultz et al. write, "key to the success of reintroduction programs is a solid understanding of the basic ecology and habitat requirements for all life stages of the species, identifying and removing the initial cause of decline, and only reintroducing individuals where high quality habitat exists" (2011, 374). Yet standards for "high quality habitat" are difficult to define. "What are our minimum criteria for habitat?" asked one scientist. "Can we *ever* be sure that a site is ready to support a population?" asked another. Some scientists felt much more willing to take chances with these uncertainties than others, causing the debate to rise a notch in passion and rhetoric. "What if we decide to play God [with this population] and all the animals die?" asked one biologist provocatively. Another shot back, "We could ask these questions forever," and risk losing the existing island marble population in the meantime (observation, 2016).

The debate over translocation, which I will revisit in Chapter 6, highlights the fact that, despite the best efforts of the many scientists working on the project, much remains unknown – and some of it even, perhaps, unknowable – about island marble reproduction, ecology, and history. Among the unknowns: When and how did island marble butterflies arrive on San Juan Island?

When was *Brassica* introduced, and how did the butterfly make the switch to it from some other host plant? What was the original habitat type and host plant associated with the animal? When and how do butterflies migrate back and forth between the existing host plants, and are there any genetic differences between the different groups of butterflies? How large is the existing "wild" population, and how large would it need to be to be considered "stable?" How significant a role does the captive breeding program play in stabilizing the "wild" population? How large of a population would need to be moved, and into what kind of ecological conditions, for a translocation program to be successful?

All of these questions remain unanswered, even after two decades, in some cases, of scientific inquiry. The unique historical circumstances of the island marble butterfly case make the historical questions, at least, practically impossible to ever answer – thereby destabilizing, as I will discuss in detail in the next chapter, the objective of restoring the ecosystem to any kind of historical baseline. Questions about stability of the population and the effects of captive breeding, on the other hand, could theoretically be explored through further experimentation – but that would generally require a control group against which to compare results, a luxury unavailable in the case of an urgent effort to protect a single population of an endangered animal. A pilot program for translocation of animals to the "Suitable Habitat Patches," for example, would be an experiment in which failure would be inconclusive, as the biologist who feared "playing god" implied through her rhetorical question. If all the introduced butterflies died, there would be little way of knowing *why:* were habitat conditions the problem, or something about

the genetics of the animals themselves, or the weather conditions that particular season? The range of possible causes for mortality could never be completely controlled in the field.

The case thus points to a challenge inherent in simultaneously *producing* and *applying* scientific knowledge – that is, the interwoven practices of restoration ecology and ecological restoration. The first aims to produce the kinds of knowledge that will enable the second to foster life, or at least the particular forms of it that are valued. Yet producing biological and ecological knowledges often requires putting that same life at risk. Translocation, if attempted, would be what Lorimer (2015) terms a "wild experiment," aimed less at testing a particular hypothesis under managed conditions with relevant control groups, than in "a trial or a venture into the unknown" (Gross, 2010, p. 4). In this context, surprise findings, rather than only those that science is able to predict or hypothesize, are highly valued.

As Lorimer suggests, such "wild experiments" are an increasingly common circumstance in the global practices of conservation, yet they require a different theoretical and epistemological approach than conventional scientific practice. Working in a field or hybrid "inter situ" setting, with populations of lively plants and animals whose actions frequently defy restorationists' efforts to discipline and manage them, scientists must recognize the limits of their ability to control for all the variables – that is, to exercise control over nature itself – as seen in the second biologist's comment, "we could ask these questions all day." As the island marble case thus demonstrates, the biopolitical effort to foster life by measuring, calculating and intervening in its reproductive and circulatory processes runs up against the scarce resources and time available, and even the very limits of scientific methods, to develop the knowledge necessary for such

administration. As I will discuss further in Chapter 5, these challenges of the island marble case thus reflect deep-seated tensions in the practice of ecological restoration more generally, and the capacity of human (scientific) knowledge to define and enable the right kinds of interventions into "natural" ecosystems.

Making lives as making places

In this chapter, I have framed the effort to protect the island marble butterfly as a form of conservation biopolitics, in which human management practices work to foster the lives of butterflies, host plants, and other related species. I have also suggested that the biopolitical project of "making butterflies live" is also a deeply spatial process, in which making *places for butterflies* to live is just as important as, and deeply intertwined with, the production of the animal lives themselves. The creation of effective habitat conditions for butterflies is done on a range of interrelated scales, from the morphology of individual host plants, to experimental plots for examining plant succession processes and growing populations of *Brassica* host plants, to the long-term vision of a landscape-scale shift in the ecological suite of species present on the prairie.

I have examined three distinct, though interrelated, efforts to "make place" for the lives of butterflies. The captive rearing laboratory, a place constructed by conservationists with the explicit purpose of using scientific knowledge to facilitate reproduction (thereby making butterfly lives), seeks to protect the existence of the population on a short-term basis, guarding against the risk of extermination in "the wild." The plots on the prairie, fenced off to exclude

"out-of-place" life (like tourists and deer) that pose threats to the butterfly population, are an example of the kind of hybrid socio-ecological place commonly known as a "restoration site." Envisioned as a blank slate or canvas to be carefully repopulated with forms of life chosen from the restorationist's palette, the restoration site allows for the fostering of certain lives, while disallowing others. The process of restoration, in this place, thereby remakes the ecological assemblage of species toward a particular set of desired conditions – including those that allow for the reproduction of particularly desirable species such as the butterfly. Yet the highly-managed landscape of the restoration site is also intended to eventually grow into something "wilder," in which specific habitat conditions are not fixed in place, but produced by dynamic ecological processes. The imaginary of place embodied by the restorationists' vision of the future prairie at American Camp, then, is a complex, biodiverse landscape in which butterflies, deer, *Brassica*, human visitors, and other species all co-produce the conditions in which they can thrive together.

To a large extent, the scientists and land managers working on the island marble project agree on its fundamental biopolitical goals: they all seek, through various practices, to sustain a butterfly population, and to make the kinds of places that are necessary for butterfly survival. Yet as I will explore in the next chapter, questions of how (and where) to do so are far from settled. The places in which island marble butterflies live, as much as the lives themselves, are biopolitical objects, imbued with human norms and values and subject to political debate. An understanding of island marble conservation as a form – or, in fact, multiple competing forms – of biopolitics therefore has implications far beyond the "making live and letting die" of plants and animals.

Profound layers of social and political significance are imposed on, and imbued in, the day-to-day material practices of scientists working to protect the butterfly population. In the next chapter, I turn from the material practices to the *discourse* of restoration, looking at the human values and power relations that shape how life, both human and nonhuman, is administered through these practices.

Chapter 5. Discourse(s) of island marble restoration

I am in the company of poets. They are students of poetry, or more precisely, students of poetry and science: they have come to San Juan Island to take a course in the relationships between poetry and science, and they have come to learn about the island marble project to see whether something poetic might be found there. I join them, introducing myself as a graduate student "interested in the social and cultural implications of the restoration project" and then making my best ethnographic effort to disappear, taking notes quietly, trying not to influence the directions that this conversation might take by inserting my theoretical predispositions. Also in our company is a journalist, taking a similar tactic, scribbling notes toward the newspaper article he plans to write. We are on a tour of the captive rearing lab. A National Park Service biologist is walking us through the details of island marble reproduction when one poet asks the question that, perhaps, we are all thinking: "So *why* are we doing all this?"

Why *are* we doing all this?

She expands on her meaning – why protect this butterfly? Why not let it die, or live, if it's going to? Why this tremendous effort of technology and labor to help this animal survive?

The NPS biologist pauses for a moment to consider her answer, then reels off a list of possible reasons. One: because the National Park Service has a mandate to support the Endangered Species Act, and it is therefore their job to do all they can to protect listed species on property they manage. (In an aside, she disavows responsibility for the politics of listing endangered

species and thereby deciding which ones matter: “I’m glad it’s not my job to make those decisions.”) Two: because of the rarity of the species – how limited its range and reproductive capability is, how serious the threats to its habitat are, and therefore how likely it is to become extinct. Three: simply because it exists, and has a right to existence. Four: because losing the butterfly *might* be an indicator of deeper ecological issues, a sign that the ecosystem has unraveled in some important way. (She clarifies that there is no particular evidence to suggest that island marble is a keystone species – that is, no reason to think that there would be a trophic cascade resulting in major ecological changes if the butterfly did go extinct). Five: despite not being a keystone species, though, island marble may still be a metric of the broader health of the coastal prairie, and a sort of “canary in the coal mine” by which we might be alerted to the degradation of that ecosystem. Satisfied with this collection of possible answers, we move on from the “why” to the “how” of island marble captive breeding (observation, 2016).

A few weeks later, the journalist’s account of this tour is published in the local weekly newspaper in Seattle, *The Stranger.* Entitled “Why You Should Give a Damn About the Potentially Endangered Island Marble Butterfly” (Smith, 2016), this account focuses on the same question the poet asked: *“*bright, talented biologists are spending their time tying cocoons to dowels to save a single species of butterfly from extinction. How could they possibly care?” Dispensing fairly quickly with concerns about possible ecological collapse, the author zeroes in on the question of whether or not the butterfly has some intrinsic value or “right to exist,” or on the other hand, should be valued primarily in terms of human use:

> “Matthew Shepherd, communications director and former conservationist at the Xerces Society… argues that "every animal has a right to survival." Quoting

> E.O. Wilson, he says, "Insects are the little things that run the world," adding, "96 percent of our songbirds in North America feed their young on insects." He insists, "We shouldn't just be trying to tie some economic value or human benefit to conservation," there is value in admitting that we don't totally understand the complexities of nature…
>
> But it's true: None of the people with whom I spoke could draw a direct line from a recently restored species to a tangible human benefit. [U.S. Fish and Wildlife Service] communications manager Taylor Goforth argued for the symbolic importance of the American bald eagle, the cultural importance of returning bull trout back to native streams, and the good god glory of Yellowstone. The reintroduction of wolves in that park, [NPS biologist Jenny] Shrum enthusiastically points out, significantly and surprisingly revitalized that landscape. But no one could say, "Thank god we saved that fuckin' condor, 'cause we just figured out its feathers cure cancer." (Smith, 2016)

In response to this article, one commenter on *The Stranger*'s webpage wrote, "why does every article on conservation have to take the "but what can the butterfly do for me" sociopath angle? Even if you can't use them for anything, a butterfly is important just being a butterfly." Another responded, "I don't think it's sociopathy. There have been a billion extinctions and there will be a billion more. We will actually have to choose which ones to save and/or reintroduce and/or focus on habitat restoration. It'll take an army just to save a precious few" (Smith, 2016, see online comments).

In this chapter, I am less interested in *answering* the question of "why should we care?" than in examining the "proliferation of discourses" (Foucault, 1990, p. 18) about this question in contemporary conservation, exemplified by the above conversations about the island marble butterfly. As I discussed in Chapter 2, the question of how to determine which plants and animals *belong* (and who has the power to make such decisions) is a central challenge of contemporary conservation and restoration. The question of belonging is a spatial one – to *belong* is to be in the

right place – but it is also a question of human values. “We” (and I will say more about the frequent use of this collective pronoun) are the ones who decide what belongs, and therefore what will live or die. Asking “why should we care?,” then, is another way of asking “what belongs?,” and thereby examining the human values that drive “our” environmental politics. The follow-up “and who decides?,” I will argue, is a question that cannot be answered simply by pointing to a singular source of power, an overarching political entity or institution of governance that passes final judgments on which species to save and which to kill (despite, of course, the fact that certain institutional entities do exist precisely for this purpose). Instead, the source of power to make such judgments is diffuse, and based in the construction of the particular knowledges that normalize the practices of life and death: that is, it is a form of Foucauldian biopower. This chapter interrogates the construction of the messy, interwoven discursive fields of knowledge-power that inform and justify (as well as themselves being reshaped by) the practices of caring about (and caring for) a particular species, the island marble butterfly.

By interrogating the various answers given to the questions of “what belongs?” and “why should we care?”, I seek to explore not only the island marble project, but also the implicit values of American environmentalism more broadly. I frame the overlapping scientific fields of ecological restoration and endangered species conservation, in particular, as the construction of a social discourse, or set of interwoven discourses. The emphasis on social discourse, here, builds on my argument that the practices of restoration are biopolitical. In Chapter 4, I argued that island marble restoration is biopolitical because it entails the “making live and letting die” of

butterflies, host plants, and competitors. The biopolitical nature of conservation, as I will discuss it here, amounts to not only the administration of nonhuman life and death, but also the construction of certain knowledges (or forms of knowledge-power) that normalize the human practices that produce that life and death. In this way, conservation discourses discipline human behavior through the elaboration of social norms (including scientific norms) that define the value of nonhuman life, thereby establishing what plants and animals belong and should therefore live or die. As demonstrated by the example of *The Stranger* article and subsequent online debate cited above, it is a short slide from the specifics of the island marble butterfly case to a much broader discourse of environmental values that encompasses bald eagles, bull trout, wolves, condors, and so on. This is not to say that all these species are treated or valued the same – they certainly are not – and I will attempt to be as clear as possible about the specific (in both the common and the biological senses of the word) application of human values to the particular case at hand. Nonetheless, the discourses that inform and are informed by the practices of island marble conservation are broader than the case alone.

I use the word "discourses" in the plural because, as the various answers to the question "Why should we care?" aptly demonstrate, there is no singular way of thinking (or acting) with regard to island marble butterfly protection. Instead, there are multiple, often overlapping understandings, drawing on broader cultural discourses of environmental protection and relations with the natural world, which this chapter seeks to explore. I begin that exploration with an examination of the discourse of endangered species conservation, before turning to ecological restoration, which I have also addressed in Chapter 2. The latter receives this sustained attention

because, as I have previously suggested, the study of island marble can be read as an "anomalous case" that "does not bear out what either theory or common sense would expect" (Herbert, 2010, p. 78) in the context of ecological restoration. The island marble case is anomalous, from the perspective of the normalized practice of restoration, in that non-native plants are made to live rather than being targeted for eradication. In the context of the crisis of contemporary conservation that I have discussed in Chapter 2, this case can thus be used as a critical tool with which to explore the competing, sometimes contradictory discourses at work, and the emergence of new elements of the discourse (or even, perhaps, new discourses) of environmentalism in the Anthropocene, as I explore in the final section.

This chapter seeks to examine the discourses of island marble restoration and conservation that both shape, and are shaped by, the material practices discussed in Chapter 4. What are the narratives put forward by the project to "restore" or "conserve" the island marble butterfly, and what kinds of imaginaries of the "natural" world are inscribed in the discursive construction of the project? What plants and animals are understood to belong in this place? What are the relationships being articulated between people and the natural components such as plants, animals, soils, and so on, in the ecosystem? In short, what belongs, and who decides – and who says so? I focus, in particular, on the designation of certain valued species as worthy of protection and "making live" while others are excluded or killed. *Brassica*, for instance, once understood as a common "weed" to be (at best) ignored or (at worst) poisoned with herbicide, has undergone a discursive shift as a result of its relationship with the rediscovered, and highly valued, butterfly. This shift results in its transformation from a "weed" to a "host plant," to be

carefully propagated and made to live as a central element of island marble habitat. Meanwhile, other plants continue to be killed to create these habitat patches, and deer are carefully fenced out of the restoration site. These practices of life and death, and inclusion and exclusion, are normalized by the particular discursive formations that encompass the project.

Discourses of endangerment

> "Once the adult marbles disappear at the end of spring, the old adage "out of sight, out of mind" seems to apply. Most islanders don't realize that this rare resident continues its struggle to survive throughout the year. Those tiny gray chrysalides… remain precariously tucked away in the grasses of our meadows, in roadside vegetation, in vacant lots, under split rail fences, and even at new construction sites. They go unnoticed, but not necessarily unharmed, waiting for spring and a chance to emerge, reproduce, and continue their kind. Predators including voles and snails may devour them, harsh winter rains and snow assail them and, along the coastline, tidal surges may inundate their habitat. With a population thought to be only several hundred individuals, the island marbles' continuing presence in the San Juans clearly hangs in the balance."
>
> – Susan Vernon, in the San Juan Islander newspaper, May 10, 2010 (Vernon, 2010)

> "Because of its rarity and fragility, governments in British Columbia and the US have listed the Island Marble as a Species of Conservation Concern… Washington State Department of Fish and Wildlife has listed the Island Marble as a State Candidate species for possible listing as endangered, threatened, or sensitive. This is the only known place in the world where this tiny creature lives, and its future lays in our hands."
>
> – San Juan Preservation Trust website (n.d.)

> "Will the island marble slip away under the watch of the agency responsible for its protection?" – Sarina Jepsen, the Xerces Society blog (Jepsen, 2016)

The rhetoric of endangerment is a predominant element of the discourse surrounding the island marble butterfly. As the above quotes exemplify, hardly a newspaper article or blog post has been written about the subject of island marble conservation that doesn't dedicate a significant

amount of space to, as one newspaper puts it, the "imminent danger of extinction" of one of the "most imperiled animals in the world" (The Island Guardian, 2012). Many, like Susan Vernon's account above, emphasize the various threats and risk factors faced by the butterflies, though these often stress human-caused changes over the more "natural" issues of predation and weather that she cites. The Washington Department of Fish and Wildlife lists "factors contributing to larval mortality includ[ing] predation, herbivory (primarily by deer), human disturbance, storm tides, mowing, landscaping or yard maintenance, site development, and weather events" (WDFW, 2012). The San Juan Preservation Trust website adds grazing, plowing, and use of herbicides to this list (San Juan Preservation Trust, n.d.), and the Xerces Society describes the "principle threats" as "herbivory by black-tailed deer and European rabbits, plant succession and competition with invasive species, and a projected increased frequency in storm surges, which could all reduce or destroy habitat" (The Xerces Society, n.d.).

In particular, many accounts emphasize the risk that human-managed landscapes such as agricultural lands, which are often rich in *Brassica*, can act as ecological sinks: they lure island marble butterflies to lay eggs that will be killed when the soil is disturbed again. The Washington Department of Fish and Wildlife exemplifies these accounts, writing that "mustards, the larval host plants for the Island marble, germinate and grow after ground disturbing activities like plowing, burning, and digging by animals and humans. While these activities can help create habitat for the Island marble, they can be damaging once the mustards are present. Mowing, grazing, trampling of vegetation, burning, plowing, and herbicides can harm or kill mustard plants." These extensive lists of risk factors are coupled with the small size of the population to

produce the story of imminent, anthropogenic extinction: one newspaper article goes so far as stating that human activities such as "agriculture, development, fire suppression and invasive species are blamed for swatting the population down to as few as 10 butterflies at last count" (Stiffler, 2005), although there is little evidence to corroborate that the population ever dipped quite so low.

This discourse of endangerment works to produce the island marble butterfly as a valued species, worthy of particular protection, and to justify the tremendous effort being undertaken to sustain it. The valuing of island marble also extends beyond the species itself. It encompasses ecological codependents such as host and nectar plants – the non-native *Brassica,* for instance, is seen to belong in the prairie due to its role in island marble reproduction – while inversely devaluing predators such as deer. The *place* of the American Camp prairie is reconstituted as island marble habitat, with a somewhat different assemblage of desirable species, while the agricultural landscape nearby becomes contested: either island marble butterflies do not belong there, and must be kept out – somehow – in order to prevent the ecological sink effect; or on the other hand, certain types of agricultural practices do not belong and should be limited within the range of possible island marble habitat.

The scale of the discourse of endangerment is global, inasmuch as the endangered butterfly is valued precisely because this is the "only known place in the world where this tiny creature lives," or as Pyle puts it, "this taxon's sole global occurrence, making it one of the most restricted U. S. endemics" (2006). That is to say, it is the absence of the species anywhere else in the world that gives it the particular value that it has here, a value that is in turn carried over to the place

itself. Rooted in a species-based approach to biodiversity, in which “it is life on the level of the (imperiled) species that must be saved” (Braverman, 2015, p. 228), the discourse of endangerment appeals to the broader concept of species biodiversity at the global scale. At the same time, though, an emphasis on the unique character of the local place that supports a rare species is nearly as ubiquitous to the discourse as the threats to that species’ existence. "I think it's really important for people to know we have these endemic species. It's another reflection of what makes a place special and unique," says WDFW biologist Ann Potter (cited in Cauvel, 2016). Stephanie Buffum, executive director of the Friends of the San Juans, appeals to grief for previous losses to make this argument even more profoundly: “The streaked horned lark, northern goshawk and Taylor’s checkerspot butterfly are already gone from the San Juan Islands. We have to do everything in our power to save the island marble. A part of the mystery and beauty that is the San Juan Islands disappears with every species that becomes extinct” (cited in Center for Biological Diversity, 2002).

To be clear, identifying this rhetorical move (placing emphasis on the risk of extinction) as part of the construction of a particular discourse of endangerment is not to dismiss the scientific evidence that the animal is, indeed, at risk. The newspaper accounts that I have summarized here largely reproduce the story that is told by the local scientists as well: as Shrum puts it, “One bad year, one wicked storm—all it takes is one event and the butterfly is kaput” (cited in Smith, 2016). Awareness of the urgency of the butterfly’s situation is, as I have already discussed, the reason for the implementation of the captive rearing lab, established as a short-term techno-fix to prevent the population “blinking out,” and the scientists working on the project are also quick to

emphasize how real and immediate the possibility of extinction is. Although recent monitoring data suggests that the population may be back on the rise (2016 was "a good year," one scientist tells me), that short-term success could itself be dangerous for the butterfly, as any sense of decreasing urgency might result in deprioritization of the project and less available funding (personal communication, 2016).

The discourse of endangerment also works to encourage taking action to protect the species, even in the absence of complete scientific knowledge that might inform those actions. In the debate over translocation, for instance, the risk of extinction is invoked to justify trying a pilot project with just a few animals, by the argument that the species might be lost completely while waiting for the results of further studies to better define suitable habitat and determine risk factors. As Shrum tells me, the typical approach for scientists is "to act, because we have to do *something.*" Even using the best science currently available, she tells me, this results in restoration plans that involve a fair amount of guesswork and "no mild amount of hubris." She describes herself as somewhat skeptical of this approach, wondering if there might not, sometimes, be as much value to inaction as action, but what she describes as the "endangered species mentality" emphasizes intervening to find immediate solutions to the problem of extinction, even when that problem itself may be the result of previous human interventions (personal communication, 2016).

In this way, island marble as a species at risk is co-constructed with the identity of the conservationist as a subject who acts to protect it. This process of "agential subjectification" (Srinivasan, 2014), through which people come to understand themselves as acting on behalf of

animals, points to an additional key insight to be taken from the application of Foucauldian biopolitics to the field of conservation. As Rose puts it, a discourse "disciplines subjects into certain ways of thinking and acting, but this is not simply repressive; it does not impose rules for thought and behavior on a preexisting human agent. Instead, human agents are produced through discourses. Our sense of our self is made through the operation of discourse. So too are objects, relations, place, scenes: discourse produces the world as it understands it" (2001, p. 136). What Shrum calls the "endangered species mentality," or what I have called a discourse of endangerment, is also the simultaneous creation of a particular kind of conservationist subject with a personal investment in the protection of the species at hand. This discourse works to draw "the observer into responsibility for Earth's many endangered species" (Fredriksen, 2016, p. 691), conjuring a unified and collective image of humanity acting on behalf of these powerless species. The use of the collective pronoun "we," in the poet's question "why are we doing all this?" is a demonstration of the willingness on the part of the speaker to be interpellated into this subjectivity, to accept the common and shared identity of protectors of island marble butterflies. The biologist's list of possible answers to the question works to reinforce that identity, stressing endangerment and both intrinsic and human-centered reasons to value the butterfly – all while simultaneously appealing to higher authorities to justify the practices of killing and making live that take place in the captive rearing lab.

As I have suggested above, this discourse also has a particular spatial logic that is simultaneously global and local. At the local level, the spatial logic of island marble conservation encompasses another contradiction. On the one hand, protection of island marble larvae requires the exclusion

of not only deer but also people, since trampling is one of the key risk factors. The habitat areas (both prairie plots and "suitable habitat patches" on agricultural land, as well as the captive rearing lab) are therefore constructed as places that are closed to neighbors and passersby – an example, as I have argued in Chapter 4, of security mechanisms to foster life by reducing dangerous circulations. This is akin to the traditional model of "fortress conservation" (Brockington, 2002), albeit on a smaller scale, and is manifested in the heavy-duty fences that stretch across the prairie landscape, defining the spatial limits of island marble restoration. On the other hand, island marble life continuously escapes these boundaries, with butterflies fluttering past the fences, and laying eggs in new, unexpected areas. This escape is an additional risk factor for the species, but can also be a model of reproductive success (as demonstrated by the story of the Cattle Point road restoration project discussed in Chapter 1).

The tension between spatial enclosure, for security of the population, and openness to escape, for the potential of growth, is related to tensions in the spatial imaginaries suggested by the common discursive categories, such as "habitat" and "ecosystem," that conservation science uses to describe places (as discussed in chapter 4). Island marble "habitat" can be literally constructed, in the sense of creating oviposition sites, food sources, and so on. This is evidenced by the captive rearing lab and the prairie restoration plots, both explicitly and successfully built as places-for-butterflies to live. At the same time, habitat – broadly conceived as the collection of places where butterflies might choose to make their lives – is not conceptually commensurate with a bounded, contiguous space, such as that contained by a typical restoration site. Habitat for a particular species is instead always part of, and deeply interconnected with, the broader place

understood as the "ecosystem". In this case, the ecosystem is usually defined by the coastal prairie, a place that stretches beyond fences and across property lines. The imperative to encompass this broader spatial imaginary in the act of restoring the butterfly, made explicit by the statement "we've got to let them out of the fences," demonstrates a tension within the discourse of endangered species conservation between the focus on the individual species and the recognition of the ways it is always in relation with broader ecological processes.

Restoration as historical fidelity

> "Keeping the stories told by native plants alive in the landscape is a daunting and difficult task."
>
> - San Juan Island National Historic Park website (National Park Service, n.d.)

The project to protect the island marble butterfly is also defined in terms of a discourse shaped by the conventions of the scientific field of restoration ecology, and the corresponding applied science of ecological restoration. As I have discussed in Chapter 2, the conventional approach to ecological restoration is based on an idea of putting back ecological conditions that used to exist in a particular place, at a "baseline" historical time prior to human "impacts." In the Pacific Northwest, that baseline is typically drawn prior to European settlement, demarcating those species that existed in the region at that time as "native." Although this approach has been significantly critiqued, the assignment of human values to particular plants and animals, and related understandings of whether these species "belong" in a particular place, are frequently based on the spatial and temporal relationships framed by the discourse of restoration. In contrast to the discourse of endangerment's focus on a particular threatened animal (the butterfly), the discourse of restoration emphasizes the need to protect and "make live" the plants

and animals that are defined as native to the place (southern San Juan island, and/or the prairie more generally). As noted in Chapter 4, too, the effort to restore the prairie at American Camp is further motivated by the sense that it represent a particularly rare ecosystem type, the Puget Sound coastal prairie, that itself provides habitat for rare native species of plants and animals. To the extent that restoration has turned away from an emphasis on re-creating particular conditions, as I discussed in chapter 2, this discourse seeks to restore the ecological processes that are understood to have shaped that place, and the ecological assemblage of native species that inhabit it, prior to human (or at least non-indigenous) interventions.

The widespread use, in restoration discourse, of the distinction between native and non-native species obscures the fact that "nativeness" is a relational construction dependent on both the place where it is found and its history of human introduction. As Lesley Head (2012) argues, the definition of a native species in terms of the arrival of Western settlers is an inscription of the spatial and temporal boundaries of colonialism, and thus a deeply cultural human value, yet both popular and scientific discourses often treat it as an innate and unquestioned characteristic of a plant or animal species. The website of San Juan Island NHP, in its section on "Nature," uses typical language in its description of the risks posed by non-native species: "One of the most critical threats to the rare plants and native habitats of San Juan Island NHP is the presence of non-native plant species. Introduced from early settlers, their animals, and landscape plantings, non-native plants and seeds have taken hold at San Juan Island National Historical Park. Non-native animals are also encountered in the park: feral cats, red fox, and the ubiquitous European rabbit" (National Park Service, n.d.). That page, entitled "Nonnative species," makes no mention

of the island marble host plants, though just next door under the heading "Island marble Butterfly" we learn that "the next step includes determining if [the butterfly] can adapt to feeding and laying eggs on native rather than the nonnative mustards it is currently utilizing at American Camp. This will be critical in determining *whether or not the park incorporates native mustard plants* into its ongoing prairie restoration plan" (National Park Service n.d., emphasis mine). That this should be understood as the "next step" makes clear that the idea of incorporating *non-natives* was, at the time this was written at least, not even up for consideration.

In the case of the American Camp prairies, the typical restoration approach would define *Brassica* as non-belonging, and potentially a risk for negative ecological effects such as outcompeting native prairie plants. Indeed, prior to the rediscovery of island marble, *Brassica* was generally slated for removal as part of ongoing prairie restoration efforts. The official Conservation Agreement and Strategy for the Island Marble Butterfly, signed by the National Park Service and the U.S. Fish and Wildlife Service in 2006, explains that the rediscovery and prioritization of island marble poses "an enigmatic management challenge whereby a species of high concern depends upon non-native species whose eradication in native-dominated habitats, if not a priority, would be otherwise desirable" (Pyle, 2006). This is an increasingly common conundrum in conservation practice, in which a particular species has a "dual status" of simultaneous belonging and non-belonging. As Benjamin Cooke and Ruth Lane put it, "not only is this dual status emblematic of the spatial and temporal construction of species nativeness, but its physical presence also creates uncertainty for environmental management – should it be retained or removed?" (2015).

This challenge is not unique to the island marble case: Shrum compares the situation to the better-known example of the Southwestern willow flycatcher (*Empidonax trailii extimus),* an endangered bird that has been found to nest in non-native tamarisk trees (*Tamarix* spp.), leading to a reevaluation of ongoing efforts to eradicate those trees. Yet the unique relationship of island marble and *Brassica* takes this a step farther, as NPS staff have moved past the question of whether to "retain or remove" existing non-natives, and are now actively planting and cultivating *Brassica*, despite an official NPS policy standard of using only native species in any planting efforts. Shrum tells me that they gained approval for this shift on an experimental scale, justifying it as an urgent necessity for the survival of the butterfly (appealing, that is, to the discourse of endangerment). She expects resistance from the NPS bureaucracy, though, to efforts to make *Brassica* an official part of the long-term restoration plan, due to the prevailing attitude of disapproval toward non-native species (personal communication, 2016).

That prevailing disapproval is normalized and reinforced through the construction of the apparently objective scientific categories of "native" and "non-native" that are central to restoration ecology as a discipline. Those categories, in turn, shape the subjectivities of the botanists, biologists and ecologists (and, perhaps to a lesser extent, bureaucrats, politicians and others) who create those official policies. In this way, a "restorationist" subjectivity is quite different from the "endangered species mentality" described above. Amy Lambert, describing her own initial reluctance to propagate and plant a non-native species, characterizes the difference as an aspect of different scientific training: "now, I get it. Lepidopterists, who are very focused on butterflies, they don't care: they see plant families [that function as host plants], they

don't see native/nonnative. They just see plant families, and habitat. But when you talk about local biologists or restoration ecologists, they're very specific… I said, I'm not gonna do that. Let's look at other *native* mustards" (interview, 2016). As a trained restoration ecologist, Lambert initially shared the commitment to historical fidelity, and the associated temporal-spatial sense of what plants do and do not belong, that underlies that discipline, and which framed the early effort to protect island marble. A significant portion of her doctoral dissertation, on the ecology of island marble, was dedicated to an experimental effort to find alternative, native host plants, including a substantial effort to work with the "original larval foodplant," *Arabis hirsuta* (Lambert, 2011; quote from Shepard, 2000). The Parks website cited above, which describes "the next step" as research into native hosts, is undated but may well have been written at that time, since its description lags well behind the current effort.

The formation of the restorationist as a self-disciplining subject, committed to historical fidelity of ecosystems, is not limited to the scientific community but also includes the general public. A fairly common road sign in Washington state reads, "Do Your Part – Stop the Spread of Noxious Weeds!," calling on (and thus also calling into being) the responsible citizen as an agent to prevent the circulation of these non-belonging forms of life. Examining the political ecology of the lawn in the U.S. suburbs, Robbins (2007) describes the formation of what he call the "Turfgrass Subject," disciplined through predominant social structures to understand themselves as personally responsible for mowing, fertilizing and weeding the grass in their lawns. A similar formulation might well be applied to the "native plant subject," replacing their lawn and non-native ornamental species with a palette of natives, or volunteering to help remove weeds from

their local parks. This restorationist subjectivity is particular to the local context – in contrast, to a certain extent, to the global scope of environmental responsibility that is implied by the discourse of endangered species. The subject formed by a restoration discourse is uniquely a San Juan Islander, with a particular set of values (and a sense of their *own* belonging) based in their relationships with the plants and animals of the local ecosystem.

Applied to the specific landscape of the American Camp prairie, this discourse works to construct *place* according to a temporal-spatial imaginary that is based on historic conditions and ecological relationships – as an "ecosystem," that is, but a particularly local and historically referenced ecosystem. Southern San Juan Island is understood, in this context, as part of the broader place defined by the ecological type of the Puget Sound coastal prairie. The primary goals of coastal prairie restoration are, as Pyle puts it, to "restore native grassland ecosystem components" (2006, p. 10), meaning native species. This typically entails removing non-native pasture grasses and other weeds by either burning or herbicide. In this way, as I have already suggested, the discourse of restoration is a spatial ordering that determines the assemblage of living things that are valued and understood to belong in this ecosystem, and justifies the killing or "letting die" of those that are not. The value of living things, in this ordering, is derived from historical conditions – what *belongs* is what *used to be* here – creating a spatial imaginary of belonging that looks to the past for confirmation of boundaries of inclusion and exclusion.

By contrast, the discourse of endangerment, as I have suggested, tends to emphasize place primarily as "habitat," serving the reproductive needs of the particular organism of interest that lives there in the present moment. I do not mean to suggest that the spatial and temporal

imaginaries of the two discourses are incompatible: an emphasis on habitat for a particular species is deeply interrelated with attention to the ecological relations in which they thrive. In both discursive contexts, categories such as *habitat* and *ecosystem* are overlapping and interwoven, and understandings of past, present, and future ecologies based on these categories are continually negotiated in relation to one another. Nonetheless, the differing spatial and temporal logics of these discourses do lead to tensions with regard to the question of which species belong where. These tensions are played out in the specific practices of "making live and letting die" that are entailed in the process of restoration, as I will explore in Chapter 6.

(Re)thinking restoration discourses

In the above discussion, I have attempted to sketch, in admittedly broad strokes, the biopolitical and place-making implications of two different though overlapping discourses, both at work in the island marble project, which I have called discourses of endangerment and restoration. It is worth noting that this dualistic approach, which I have found useful for the sake of contrasting differences between these two approaches, is itself an oversimplification of the complex and interwoven influences that shape the discursive terrain of the island marble project. What I have sometimes described in the above section as the "discourse of restoration" (and a correlated "restorationist subjectivity") is more precisely figured as a discourse of historical fidelity, in its emphasis on a return to past conditions. Moreover, the spatial conceptualizations of both "habitat" and "ecosystem," which I have very loosely mapped as corresponding to the dualism of endangerment and restoration, can both be accommodated under the rubric of restoration practices, often by use of the qualifiers "habitat restoration" and "ecological restoration." (The

distinction between the two is sometimes elided by the use of a third, overarching term, "*environmental* restoration.") In these ways, and as I have argued in chapter 2, restoration can and should also be understood as a much more complex and nuanced discourse, inadequately represented by the oversimplification of returning to past conditions or using only native species.

Lest my use of the term "restoration" in the above discussion be taken to reify that oversimplification (and at the risk of putting excessive emphasis on a single word) it is worth dwelling a moment longer on how the term is used by practitioners. Ongoing debates in the academic literature over its use and meaning, which I have briefly outlined in Chapter 2, are echoed in the island marble case. One scientist tells me he prefers not to use the term "restoration" at all, instead calling the project "habitat enhancement." He argues that this terminology more accurately articulates the role that people play in creating the conditions they want, a recognition that, as he puts it, "every square foot of the planet is managed" by people (personal communication, 2016) – an acknowledgment quite similar to what I signify by use of the term "Anthropocene." On the other hand, Amy Lambert points out that restoration is commonly defined not by its outcomes, but by the collection of practices used: "I do [describe this project as 'restoration'], because it's planting. There's some weeding, and planting, and herbicide (laughs) …so I say it in tandem, I say 'restoration and conservation.' And the conservation kind of offsets the traditional norms that are associated with restoration ecology" (interview, 2016).

As the above quote suggests, the discursive terrain of island marble restoration cannot be understood in terms of a single discourse, nor even a dualism, but multiple discursive threads

that are interwoven – at times reinforcing one another, at other times competing in their implications. As I have argued in this chapter, these discourses are biopolitical not only in the sense that they amount to the "making live and letting die" of nonhuman populations, but also because they enable the construction of particular human subjectivities, disciplining and normalizing particular human behaviors. An emphasis on subjectivity, focused through the empirics of the particular case of island marble, allows for a deeper understanding of how restoration discourses are not static but continuously evolving, reproduced by (and also reproducing) the identities of the people who actually *do* restoration. As they take on and reproduce – and sometimes, reevaluate and change – the collection of norms, values and assumptions that are inherent to those discourses, restoration practitioners enact discourse as material practice – thereby also shaping both themselves and the places that they know as ecosystems, habitats, restoration sites, or simply "nature."

In the next chapter, I will turn to a closer analysis of how the discourses that I have outlined in this chapter are materialized in the actual restoration efforts that I described in chapter 4 – and in turn, how the materiality of the nonhuman world, such as the actions of plants and animals, present challenges to and demand the reworking of existing discourses. What happens when competing discourses come to a head, requiring incompatible practices? What happens when the material conditions at hand don't seem to fit, or can't be fully understood by, the existing discursive framework? I hope that the perspective that I have attempted to offer here, exploring restoration as an evolving coalition of spatial and biopolitical discourses and material practices that are reproduced through the statements and actions of restorationist subjects, will allow for a

better understanding of the contemporary crisis of conservation in the Anthropocene. The arrival of the Anthropocene, as both discursive concept and an increasingly self-evident material reality, poses challenges to the conventional discourses of both restoration and endangerment. Yet as I have already suggested, ways of thinking that are both new, and also continuous with the past, have begun to emerge, and can be seen in the restoration and conservation of the island marble butterfly.

Chapter 6. Relations of discourse and practice

> "We recognize that the unusual necessity of managing around, with, and even for two non-native, invasive species of plants that would normally be a target for removal on an NPS unit may limit our ability for restoration to pristine prairie conditions; and that these plants will probably remain important to the island marble's survival into the foreseeable future. However, implementation of these conservation measures should ensure the continued existence of the island marble butterfly at American Camp."
>
> – Conservation Agreement and Strategy for the Island Marble Butterfly (Pyle 2006)

> "Even something as simple as constructing a temporary deer fence to protect the area where the butterflies breed causes some damage. Mowing the perimeter kills snakes, and the fence posts provide perches for birds to wreak havoc on insects that live in the surrounding grasses, and possibly even the island marbles themselves. The choice to preserve one animal means potentially killing others."
>
> – *The Stranger*, May 16, 2016 (Smith 2016)

> "You know, I don't think people have that much difficulty with killing grasses, but they do have a hard time killing fuzzy things." – Amy Lambert (interview)

The story of the Cattle Road realignment project, where island marble butterflies popped up unexpectedly in the midst of a highly-disturbed revegetation project (see Chapter 1), highlights the capacity of this animal to surprise even the most knowledgeable and experienced scientists and land managers. An unanticipated collection of material conditions – including a disturbed embankment of open soil, a self-seeding weedy host plant, a highly mobile butterfly, and a common erosion-control material with a plastic netting – came together to pose a challenge to the common understanding of the *place* of the prairie restoration site. Did the butterflies (and their host plants) belong there? Was the revegetated road bed a new area of habitat for an endangered species, on the one hand, or a potential ecological sink, on the other? Not only did the land managers ask themselves whether island marble butterflies should be allowed or

excluded, they also had to wonder about their own capability to make such decisions on behalf of the butterfly. How could butterflies be "made to live," in the places designated for them, when their eggs and larvae were already tucked away beneath the flowers of host plants, where scientists were unlikely to be able to find, move, or even develop a plan for all of them?

By contrast, the story of the creation of the Suitable Habitat Patches, where ideal habitat conditions are being carefully built using agricultural and restorationist techniques (see Chapter 4), demonstrates how the material conditions of places can be made in the image of human values. Animal habitat, in this model, is a built environment, constructed to detailed specifications developed through the knowledges produced by ecological science. The discursive understandings of restoration ecology produce the physical places where wild animals might live. Butterflies, though, are highly unlikely to migrate to these landscapes unassisted, raising further questions about the role of human management. Should the scientific administration of butterfly life take the further step of reintroduction, physically bringing butterflies onto a landscape where they have never lived before? Or is that a step too far, leading to concerns that scientists have begun "playing god" with the lives, and material worlds, of these organisms?

These two stories, taken together, demonstrate the complex interplay between discourse and material practice in ecological restoration. In Chapter 4, I sought to give an in-depth and detailed empirical account of the material practices that shape the lives of island marble butterflies and the places where they live. These practices include human activities, such as the steps undertaken in the name of "ecological restoration," and nonhuman activities, or what might be called "natural" environmental processes, although the distinction between the two categories is not

always so clear or precise. In Chapter 5, I sought to describe the discourse that informs many of those material practices –at least the ones that fall, more or less, within the realm of human control. I have argued that material practices are deeply shaped by discourses: for example, the decision to kill a particular plant by spraying it with herbicide is dictated by the understanding that it does not belong in a particular place. The reverse is also true: discourse responds to and is challenged by the on-the-ground realities of the material world. When an endangered butterfly appears in a place it was not expected (a revegetated road restoration site, say, or San Juan Island in general), people are forced to re-examine their values about which plants and animals do belong, and should live or die.

In this concluding chapter, I focus my attention on the *relationships* between discourses and practices, examining the ways that the things that people say and think, the actions they take, and the material realities of the landscape work to shape and affect one another. As I have argued in Chapter 5, the discourses at work on the project are multiple and complex, and even my characterization of two distinct discursive themes – endangerment and restoration – is, no doubt, an oversimplification. The multiplicity of discourses at work in the project includes not only discourses about practices – e.g., should a particular plant species be permitted on the site, or not? – but also discourses about discourses – e.g., if that plant is not permitted, is the decision based on a belief that it is more or less "natural," or a pragmatic reason, or something else? Is it, perhaps, "playing god?" My hope is that highlighting such debates in the case of the island marble butterfly ecosystem opens opportunities for a broader examination of the discourses and practices through which humans relate to the natural world, or what we call environmentalism(s).

At the same time, I strive to continue to pay close attention to the ways that the material world cannot be fully captured by these discourses. The contemporary moment is one of great instability in what we call "nature," exemplified by global climate change and anthropogenic mass extinction, among other instances, about which even experts cannot anticipate what might happen next. In such a moment, the idea of "nature" as a social construction, or mere discourse, may seem laughable. Nonetheless, as I will argue further below, the recognition that we are constantly engaged in the process of *making the places* that we call natural is of critical importance to the understanding of environmentalism in the Anthropocene.

"An enigmatic management challenge": discourses in tension

As I have argued in Chapters 2 and 5, the conventional wisdom of ecological restoration is characterized by a commitment to a localized historical fidelity. The ecological conditions to which a particular place should be restored are generally determined with reference to what that particular place used to look like, and the species that belong there are the native ones, which existed in that place prior to a particular historical baseline. Yet while this discursive approach is clearly present in the case of the American Camp prairie restoration, it does not align particularly well with the actual goals seen in the island marble restoration project. The discourse of restoration, in which non-native species do not belong, appears to be at odds with discourse of endangerment, in which rare and at-risk species deserve protection. These discourses represent potentially conflicting modes of biopolitics in conservation, in which the same species can be constructed as either a threat to the ecosystem, or a necessary component of it. Indeed, this apparent contradiction of this "dual status" has been noted by the restoration ecologists working

on the project, as evidenced in the Conservation Strategy for the island marble butterfly (Pyle 2006, see epigraph above). Written in 2006, the Conservation Strategy document is emblematic of the early effort to make the project conform to the norms of restoration ecology, emphasizing the desire to find native host plants to be propagated "in the hope of reducing the island marble's dependency upon nonnative, invasive species of mustards" (Pyle, 2006, p. 14).

In more recent years, the priority of many of the scientists working on the project has shifted to facilitating the successful reproduction of butterflies, and the creation of effective habitat for them, as described in chapters 4 and 5. The primary goal of the project would seem to be the fostering of a sustainable population of butterflies. In a sense, then, what I have characterized as an "endangerment discourse" seems to have won out, substantially replacing the traditional conceptualization of restoration. Non-native *Brassica* and *Sisymbrium* are valued, with the former even being carefully propagated across the landscape. The shift in the terminology that is commonly used to describe these plants – once called non-native "weeds," they are now typically described only as important host plants – can be taken as an indicator of a broader shift in the discursive categorizations and values that are ascribed to the various plants and animals on this landscape. The discourse of the project has clearly moved past a rigid commitment to restoring past ecological conditions. This discursive shift has very real effects on the materiality of the landscape, leading to the promotion and thriving of a new assemblage of species, without a historical ecological precedent, on the American Camp prairie.

Despite this shift, though, the project still goes by the name of "restoration," albeit with occasional caveats such as "restoration-and-conservation," "habitat restoration," or "twenty-first-

century restoration," contravening a simplistic story in which the discourse of restoration is merely overcome and replaced by one of endangerment. Instead of that simple story, I interpret the discursive shifts evidenced in the island marble project as part of a complex, and ongoing, evolution of the discourse of ecological restoration. This discourse has been reshaped through both its interactions with alternative approaches to environmentalism, such as the discourse of endangerment, as well as in response to the material realities of the landscapes, plants and animals that are being restored. As I have suggested, conflicts or tensions between discourses, or between discourse and materiality, lead to the reworking and modification of ideas about nature and restoration. At the same time, restorationists internalize the norms and knowledges of these discourses, reproducing their own subjectivities in relation to the natural worlds they are working on and with.

In the case of the island marble butterfly, the discourse of endangerment represents a key intervention into, and challenge to the norms of, the discourse that typically governs the practice of ecological restoration. These competing discursive formulations, as I have argued, work to create particular spatial and temporal imaginaries. The "shocking rediscovery" of the butterfly in 1998 thus sparked a reevaluation of the *place* of the American Camp prairie. Already layered with multiple constructions of meaning as an important historical, cultural, and ecological site, the American Camp prairie was now also understood to be a habitat for an endangered species. I argued in Chapter 5 that the absence of a species *elsewhere* gives it greater value in the particular place where it *is* found, and that value is carried over to the place itself. The American Camp prairie, then, is now valued precisely because "there is no place else in the world" that the island

marble butterfly exists. In this way, endangered species conservation brings to bear the global scale of the discourse of biodiversity, with critical implications for the local place. This stands in contrast to – and indeed, takes precedence over – the conventional discourse of ecological restoration, in which, as I have argued, value derives from historical fidelity: what *belongs* is what *used to be* here.

Dissolving categories and assumptions

Yet even as the butterfly is valued through the discourse of endangerment, with important implications for the host plants and the place, the animal's own status as an object of conservation is simultaneously called into question. The shift toward "habitat restoration" – that is, restoration of *place-for-species* – is troubled by the question of what the *species* is supposed to be. The island marble was, and still is, categorized as a distinct subspecies of the more widespread large marble butterfly partly on the basis of its place in the world. These butterflies are found on the islands of the Puget Sound, far from the nearest large marble populations across the Cascade Mountains in central Washington. This particular emplacement, together with certain distinctions in appearance and behavior, are sufficient to draw the subspecies distinction upon which an endangered species listing can be predicated. Yet even as the animal's place in the world shifted – from Vancouver Island to San Juan Island, at some unknown point in the 20th century after it was originally identified and classified – its behavior also shifted significantly, including making the switch to at least two new host plants that are human-introduced. As the Xerces Society argues (citing Pyle 2004), "it is possible that island marble wasn't aboriginally a meadow organism, but a coastal strand specialist on *L[epidium] virginicum…* that moved

upslope only with the introduction of exotic mustards." (The Xerces Society, n.d.). One restoration ecologist suggested to me that this may be evidence of evolutionary processes at work in the century since the subspecies was originally discovered. For lack of genomic information, no one knows whether the use of a particular host plant is genetically encoded in the organism. Moreover, since the introduction of non-native mustards likely happened as early as the 1850s, well before the butterfly was ever discovered by people, it is impossible to do anything more than speculate about the "aboriginal conditions" of the butterfly itself of the places where it may have lived.

Under these circumstances, looking to historic conditions for guidance for conservation-and-restoration appears nearly futile. This poses a challenge to the discourse of restoration as historical fidelity, of course, but also challenges the endangerment discourse, which is predicated on the existence of (and risk to) unique animal species on their own terms. An understanding of animal life as constantly becoming-something-else demonstrates how the categorizations of "species" and "subspecies" are human discursive constructions (Crifasi, 2007; Fredriksen, 2016). These categories, on which the discourse of biodiversity and the politics of endangered-species listing rely, break down when faced by an animal whose entire life cycle and reproduction has become dependent on the interventions of, and places made by, human activities. The history of the species, including its 100-year disappearance from the gaze of scientific knowledge-making, challenges the idea that anything is really being "conserved" or "restored" at all, as opposed to simply created in the present day and for the future. Certainly neither the butterfly itself, nor the ecosystem that supports it, can be known or understood – which is the objective, after all, of the

natural sciences – without critical assessment of the ways in which human activities have worked to create them both throughout their entire knowable histories.

This is a challenging idea, clearly, for scientific discourses to adapt to. At American Camp, scientists continue to labor to keep what they describe as a "wild" population alive, even as the "wild" becomes more and more zoo-like: enclosed by fences, with only certain plants and animals allowed in, and with the population of animals supplemented by a captive breeding program. Of course, they hope that this is only a temporary condition while the animal population is recovered, but this is increasingly the condition of conservation around the world as "ex situ" and "in situ" efforts collapse toward one another (Braverman, 2015). While the island marble butterfly provides a particularly evocative example of these shifts, it may be increasingly the case – indeed, perhaps always has been the case – that the animals and places we think of as wild are all, at least in part, human-created.

Both the endangerment discourse, aimed at preventing anthropogenic extinction, and the restoration discourse, aimed at replacing historical conditions, thus rely on categorizations of nonhuman lives that appear to be essentially fixed. Categories such as "wild," "native," and even "species" (as the basis for understanding biodiversity) are understood to be self-evident and scientific, hiding how the value judgments that these terms imply are relationally derived from and through the places, plants and animals, and humans that co-produce them. In the case of the discursive shift of *Brassica* from "weed" to "host," for instance, nothing about the plant itself was changed, only its perceived relations with the place of the American Camp landscape, and the animals (including, particularly, the butterflies and the humans) found there. As in the

construction of the distinction between "native" and "non-native" species, though, the relational nature of the source of value for the species is obscured by the apparent objectivity of scientific discourse. Describing *Brassica* as a valuable host plant for an endangered animal allows it to appear perfectly "natural" that these plants should now be a high priority for conservation and restoration activities.

It appears natural, that is, to a particular kind of contemporary environmentalist subject. Amy Lambert tells me that people who approach restoration from a more traditional perspective still "might not get it," evidence of the continued persistence of an environmentalist subjectivity that remains rooted in the discourse of restoration as historical fidelity (interview, 2016). Yet while entrenched camps of such dedicated, old-school restorationists may remain, the comments of nearly everyone involved in the island marble butterfly project evince comfort with, and even strong desire for, the continued thriving of both *Brassica* and island marble on the landscape, even as they continue to label them as "non-native" and "wild" species, respectively. In this way, the conflict or tension between what I have described as the discourses of endangerment and restoration is not necessarily a struggle between two different groups of people with different agendas, motivations, or goals for the landscape, as environmental debates are often framed. Instead, these approaches represent variations of environmentalist discourses, often articulated by the very same people, that create multiple internal tensions within human subjectivity itself, offering alternative ways of thinking about nature, place, and belonging.

Indeed, even those who do "get it" with regard to the reconsideration of *Brassica*'s status might continue to worry, quite reasonably, about "playing god" when it comes to the human

interventions involved in captive rearing and, especially, translocation. The passionate debate over translocation that I discussed in Chapter 4 can be understood as the meeting of competing biopolitical approaches to conservation. The more conservative approach, which argues that more scientific knowledge is needed before attempting translocation, is rooted in the biopolitical discourse of endangerment: it emphasizes the risk posed by potentially allowing the deaths of any individuals from a very small and highly endangered population. The argument for translocation, on the other hand, is that such risk is a necessary part of "a trial or a venture into the unknown" (Gross, 2010, p. 4).

The latter approach, as a "wild experiment," emphasizes the capacity of ecological systems to behave unpredictably, sometimes with beneficial biopolitical results. Lorimer and Driessen (2016) describe this as "the biopolitics of rewilding—when rewilding is not about re-creating a stable, lost wilderness but figures as a process of *living with* (rather than the *control over*) human and nonhuman difference" (p. 634, emphasis mine). In this sense, the island marble restoration project might be described as a kind of rewilding project, despite the absence of such terminology in the prevailing discourses of the project. Conceptualizing rewilding as the opening of "divergent future ecologies" (Lorimer, 2015, p. 102), as I discussed in Chapter 2, is quite different from a definition of the term based primarily on the reintroduction of predators or megafauna. The objective of rewilding in this sense is to turn attention to the ecological processes at work that make these future ecologies, rather than simply the extant (or past) forms that life may take. (As I have already suggested, this is also a major goal of contemporary ecological restoration, contravening the assumed ontological differences between restoration and

rewilding practices.) In this way, rewilding seeks to "make live" those forms of life that are themselves generative of biological productivity – that is, life that makes more life. A translocated population of butterflies on private land may have the potential to reproduce itself, thereby advancing the biopolitical goals of the restoration project.

There is also, of course, the very real risk that it will fail to do so, so my objective in identifying the different biopolitical discourses evidenced by the translocation debate is not to endorse one or the other, but to point to the political stakes they have for restoration science. As Lorimer (2015) further argues, wild experiments are based on "emergent collectives for generating and deliberating knowledge" rather than a traditional scientific model in which "science creates facts [and] politics decides what matters" (p. 105). While such a distinction of models may be overly stark, one implication of the shift toward wild experimentation (as "living with") could be to re-embed questions of human *values* in the processes of the production of science, as I will discuss further in the final section of this chapter. Indeed, the active debate over translocation at the island marble partner's meeting demonstrates the realization of such an "emergent collective for generating and deliberating knowledge." Rather than fearing politicizing science, these scientists are deeply engaged in active political and ethical debates over the value judgments, both implicit and explicit, that are involved in their work. In this way, an advantage of the "biopolitics of rewilding," in the sense used by Lorimer and Driessen, may be that this discursive approach can be more *self-consciously* biopolitical. By this, I mean that the scientists engaging in such practices are conscientious of the fact that their own words and actions (or what I have called discourses and practices) serve to normalize the processes and value judgments by which

nonhuman beings are made to live and die, thereby shaping the ways that human beings understand ourselves in relation to the other forms of life that we live in the world alongside.

Shifting scales and human values

Where the restoration of ecosystems and the conservation of endangered species meet, then, may also be an opening for further intervention into the spatial-temporal imaginaries that underlie understandings of nature and the environment. The increasing recognition that there is no place or animal that can be understood as truly "natural" in the sense of being pristine or without human influence, perhaps even in the past, demands a shift in the understanding of the human role in administration of nonhuman life. This is the intervention I signal in my use of the term "Anthropocene," as discussed in Chapter 2, referring to the thorough interweaving of human activities and ways of life with the places (and nonhuman lives) that we think of as "natural" or "wild." In the absence of pristine Nature to refer to – whether that Nature be another place in the world, or a point in the past – there is no "outside" to the spaces of conservation biopolitics. The conceptual boundaries that defined the range across which conservation took place – pristine Nature on one end, human management on the other, and conservation and restoration at the intersection of the two – are collapsed together. Conservation thus cannot take/make place at the scale of a bounded protected area, a restoration site, or a particular habitat, but must also always consider how those particular scales are relationally connected with supposedly "wilder" places and more "human" ones, on scales that encompass the entire planet.

Efforts at conservation and restoration in the Anthropocene thus require a shift in spatial and temporal thinking, from protecting locally-bounded places, plants or animals in their historic or present conditions, to restoring – or perhaps, creating anew – the ecological processes that create and sustain desirable forms of life across the globe. Conservation, as a biopolitical endeavor, would seem to have little choice but to seek to administer the lives and deaths of plants and animals as subsets of global populations that are produced through human (or at least, human-influenced) processes. Such a shift in thinking may be more provocative with regard to the discourse of ecological restoration than it is to endangered-species conservation, since the latter form of biopolitics is already, as I have argued, largely justified at the global scale of species biodiversity. The case study of island marble exemplifies the major effects that this shift in scale has, though, on the discourse of ecological restoration, particularly with regard to the question of what plants and animals belong in a particular place. As I have suggested above, this case study offers evidence of a rethinking, on the part of restoration practitioners, of the role of history and historical fidelity, a decreased reliance on the received wisdom of certain categories, such as the native/nonnative species distinction, and a willingness to experiment with new ecologies. Protection of "nature" on a planetary scale, such as an endangered species, trumps protection on a local scale, which might otherwise look more like re-creation of past conditions. Because the past cannot be re-created globally, a local restoration project might indeed create something very different than what used to be *there*, all while still aimed at preserving what used to be *somewhere*.

Perhaps even more important, though, is the shift toward recognition and acknowledgment that biopolitical decision-making inherent to the practice of conservation is necessarily value-driven, and that hard decisions about the relational values of plants and animals must be made without recourse to apparently value-free categories like "native," "wild," or even "biodiverse." The question that is initially posed by the crisis of Anthropocene conservation – "what belongs?" – is thus replaced by a secondary question: what is the capability of a scientific epistemology to effectively *answer* such a question? Can the natural sciences, such as conservation biology or restoration ecology, actually tell us what plants and animals *should* be in a particular place, or are such decisions ultimately based only in human values – and different scientific discourses should be understood as different renderings and legitimizations of those values? Robbins and Moore, following up on their diagnosis of post-Natural "ecological anxiety disorder," hint at the latter conclusion, arguing that "no specific ecological intervention is, a priori, better than another. Neither destroying exotic species nor setting more of them loose on the landscape can be known in advance to be preferable or problematic" (2013, p. 16). Yet as they also point out, such conundrums are exactly the decisions that restoration ecologists face on a daily basis. The insight that difficult decisions about what landscapes should look like, and what plants and animals should live or die, are issues of human values requiring political and ethical judgment (and not strictly objective science) is certainly not news to many practitioners of ecological restoration.

The example of the Cattle Point Road realignment project, with which I opened this thesis, demonstrates the challenging cultural and political dilemmas of *making butterflies live*. In Chapter 1, we left the scientists in a "cycle of total panic," scrambling to sort out the possible

effects of the butterfly migration into the disturbed-and-restored former road bed. As the animals continued to develop over the course of the 2016 season, the concerns began to seem somewhat less grave than initially thought. The host plants and caterpillars appear to have developed normally. Restoration crews adjusted their plans, postponing many weed removal and planting tasks by a season, in order to leave areas with known pupae untouched and allow the animals to grow undisturbed. It remains to be seen, as I write this in the spring of 2017, whether adult butterflies will successfully emerge from pupae set on the plastic monofilament. In the meantime, though, the captive population appears to be healthy and can be used to supplement the wild animals. The monofilament, too, is beginning to photodegrade as intended, suggesting that by the next season of larval development, the animals should likely return to their "normal" behavior and set their pupae on plants rather than plastic. Disaster, it seems, was averted, and the restored road bed will likely become a new *place-for-butterflies*, carefully managed as habitat by restoration planners. Like the rest of the butterfly's habitat, though, it will be just as much a *place-for-people* – designed, constructed, and managed according to explicit human specifications and values – even if part of that management might be exclusion of people from the landscape.

Indeed, as I have sought to show through my empirical case study, the material practice of ecological restoration is quite literally a process of *making ecosystems*: shaping environmental conditions to make the places where certain kinds of plants and animals are allowed to live or die. This aspect of human intervention into ecology, as I have argued in Chapter 2, has deep roots in the history of restoration, and provides a foundation for a more self-aware and critical

mode of ecological restoration – what I have described as a restoration biopolitics for the Anthropocene – in which natural scientists and environmentalists are, indeed, asking critical questions about what plants and animals belong in a particular landscape, and how we should go about making those decisions. My study therefore follows Robbins and Moore's call for "confronting what we *want* as scientists and citizens… [and] naming the politics of intervention and admitting the struggle that follows from embracing novelty" (2003, p. 16, emphasis in original) – but it also acknowledges that such work is *already being done* semi-routinely by practitioners of restoration ecology in the field.

Toward restoration biopolitics for the Anthropocene

The case study of island marble conservation and restoration, then, provides insight into two related, but somewhat distinct, shifts in the politics of belonging of nonhuman living beings. The first, which I have described as a discursive shift from an idea of restoration rooted in historical fidelity to one heavily influenced by the discourses of biodiversity and endangerment, could arguably be described as a shift from one collection of human values regarding nonhuman life to another, both cloaked under the guise of scientific objectivity through different disciplinary approaches. The second, however, comes closer to the call for "confronting what we *want* as scientists and citizens" through the recognition of the landscapes, plants and animals to be restored as always relationally co-constructed with the human. This contemporary form of ecological restoration rejects idealized or static conditions of nature, whether past, present, or future, instead recognizing that natural ecosystems are places being continually made and

remade by assemblages of both human and non-human actors, and which can be intentionally remade in the image of particular collections of human values.

Such a shift allows practitioners of restoration to come to terms with the production and interpretation of restoration science as situated knowledge, from which values – and politics – cannot be excluded. This contemporary form of ecological restoration therefore exhibits self-consciousness and humility about the role of *knowledge*, and scientific knowledge-production, in guiding restoration actions. As the case study of island marble makes abundantly clear, the common refrain of "further scientific research is needed" is not a panacea for all the dilemmas of contemporary post-Natural conservation and restoration. Science will likely never be able to tell us about the historic conditions of the island marble butterfly, such as where it lived, what host plants it used, and whether or how its genetic makeup or behaviors were the same or different than they are today – nor can it tell us how such conditions *should* be in the future. This is certainly not to say that science is not a useful or necessary tool for contemporary conservation in practice, nor that we should not attempt to make meaningful, science-based interventions – far from it – but simply to observe that a degree of comfort with the unknown, and the *unknowable*, is necessary for such practice as well.

Humility, with regard to the capacity to know the world through science, also extends to the human capability to intervene in and manage the places that we call "nature." The material world of lively animals is often resistant to attempts to shape it through human intervention. Weeds hybridize with one another, deer break through electric fences, and butterflies appear in disturbed road beds and farm fields, not to mention distant islands, far from where they were expected. The

kinds of places that restorationists seek to make, regardless of the specific spatial-temporal reference points that shape their ecological imaginary, are challenged by the messy material realities of nonhuman life that defies human control and expectations. Whether they are imagined as habitat for particular animal species, in terms of historical reference ecosystems, or anything else, the *places* intentionally made by the practice of ecological restoration are simultaneously unmade and remade through more-than-human processes. Scientific efforts to envision, plan for, and materialize a very particular kind of place (whether for butterflies, or for humans) through the practice of restoration often fail, or at least turn out differently than intended, and the place that is ultimately produced is the result of both human and nonhuman agencies and actions. The insight, then, of a biopolitical approach to ecological restoration is that it not only represents a human effort to administer and manage nature (hardly a novel point) but also a process through which humans, animals and plants, and places act to co-construct one another. Human understandings of the natural world are constructed in relation to nonhuman life forms and places even as those nonhuman lives are disciplined, managed, and made to live and die. The scientific discourses of conservation, I argue, work to normalize the idea that complete *knowledge* about nature is ultimately discoverable, and should and will guide all future management practices. An alternative approach might be an environmentalist subjectivity of "not knowing" (Gibson-Graham, 2006), accepting – even taking comfort in – the impossibility of knowing and managing everything about nature, and thereby relinquishing control and granting agency to the more-than-human elements of the socio-ecological system.

The emergent discourse of contemporary restoration, which simultaneously seeks to intervene in, and recognizes the impossibility of control over, natural ecologies, might be described as a process of learning how to go about "living with" the more-than-human in the places that we call natural. I use this phrase not merely in the sense of "accepting" or "putting up with," as in Head et al.'s (2015) discussion of how land managers are already "living with weeds," but in the context of the multi-species flourishing suggested by Donna Haraway (2008) – or what Lorimer and Driessen also have called a "shift from a biopolitics as a control over life to a biopolitics of living with" (2013, p. 250). As Haraway notes, living with animals might be better theorized as "becoming-with" them, as both species are continually in process of remaking themselves and each other. Yet as Haraway also recognizes, and others have further argued (e.g. Hodgetts, 2017; Srinivasan, 2016) the tendency toward celebration of flourishing multi-species communities may be overly idealistic, since death is also part of life, and the flourishing of certain species continues to require the deaths of others.

The biopolitics of "becoming with" the more-than-human does not, therefore, eliminate the central question of "what belongs," but it does, perhaps, allow for an alternative approach to answering it. As I discussed in Chapter 5, the value of living things in the eyes of humans is typically drawn either from intrinsic sources, such as the argument that "a butterfly is important just being a butterfly," or human uses, such as the idea that the butterfly might one day be a cure for cancer, or provide some important economic "ecosystem service." By contrast, living and becoming with the more-than-human suggests that value is derived relationally, in the act of encounter between human and nonhuman being. What Haraway calls "encounter value" is thus

central to the construction of "companion species," animals that are co-constituted by and with human beings. Lorimer (2010) suggests that wild animals might also be companions: "shedding Deleuze's romantic preoccupation with wild wolves, might we find more fluid companion species in urban seagulls, razorback pigs, or even certain invasive species combinations like the inventive ruddy/white-tailed duck hybrids, while disagreeing with the fascist, homogenizing influences of mink or knotweed?" (p. 41). I find troubling the implicit suggestion that "we" might universally agree on such values, since this characterization of certain combinations of species as "inventive" while others are "fascist" is itself relationally derived from, and thus very much dependent on the context of, particular ecological relations and places. Nonetheless, this comment offers a key insight into how conservation, particularly of endangered species, amounts to the construction of a type of companion species that is quite different from Haraway's dogs.

The island marble butterfly certainly has charismatic "encounter value," which works to change the perceptions, practices and indeed the very beings of the humans who cross its path. Indeed, one restoration ecologist working on the island marble project uses the word "love" to describe her relationship with the butterfly to me, and tells me she would deeply mourn its loss in the event of extinction (observation, 2016). As Lorimer (2015) suggests, practitioners of restoration and conservation working in the field know these types of encounters and relations well, and are deeply affected by the animals they work with. Yet the concept of "encounter" with a particular individual animal, I suggest, does not fully describe the affective bonds that are also formed with the *places*, such as restoration sites, in which such encounters take (and make) place, and with the collective assemblages of nonhuman life that constitute socioecological systems. In

ecological restoration, companions are made not only in the acts of individual encounters with charismatic animals, but also in the repeated practices through which humans engage with nonhuman forms of life – including at the level of the population rather than the individual. Practices such as the counting of butterfly eggs on the flowers of Brassica host plants, or the careful transfer of chrysalides from plant stems in the wild to wooden dowels in the lab, constitute the creation of biosocial collectivities (Holloway, 2007) in which people, butterflies and host plants are bound together through relations of interspecies life-making.

As I have argued in this thesis, the identities and subjectivities of restorationists themselves are also made through these practices, in relation to the more-than-human living beings they work with and the places in which they live. Restorationists therefore remake themselves as companions to butterflies, even as the deeply interwoven relations between butterflies and their host plants constitute a different layer of companionship. This perspective reframes the question of "what belongs" away from categorical distinctions (such as nativeness) at the level of the species and toward what might be described as an "ecology of companionship," in which self-conscious and humble value-driven human actions work alongside animal activities to make lives, and places, together. I suggest that the place of the San Juan Island prairie, complete with an assemblage of living things that includes butterflies, host plants, and human activities, could be considered as an example of what might be called a "companion ecosystem," a term that emphasizes the relationships between ecology and human agency exemplified by these systems. Some – perhaps even many – of the socio-ecological places that have sometimes been described as "novel" ecosystems might be reconsidered in such a way. Such an approach does not, of

course, resolve ongoing debates over the choices being made about which types of nature to preserve, conserve and restore, but reframes them as questions of developing particular human companionships with the nonhuman world. The act of ecological restoration, then, amounts to taking an active role in facilitating the co-evolution of flourishing socio-ecological systems, as well as taking responsibility for the social, political and ethical responsibility for our choices: an ambitious but fitting goal for ecological restoration in the Anthropocene.

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