CLIMATE CHANGE & LAND CONSERVATION
EVALUATING THE MITIGATION & ADAPTATION STRATEGIES
OF WASHINGTON STATE LAND TRUSTS

by

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ABSTRACT

Climate Change & Land Conservation
Evaluating the mitigation and adaptation strategies of Washington State land trusts

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Conservation is dynamic, often changing with societal priorities. During the 21st century, conservation efforts managed by private conservation organizations have played a critical role in preserving, sustaining, and restoring landscapes to ensure perpetuity of biodiversity and species protection – features inherent within the contemporary notion of conservation. Today, conservation organizations continue to fulfill an increasing role in land conservation, often surpassing government agencies in their action-based strategies. The growing land trust movement is essential in proliferating current conservation efforts, with local and regional land trusts supporting much of the work. In fact, land trusts are collectively responsible for managing over fifty-six million acres of land in the United States, providing ecological, social, and economic benefits to surrounding communities. However, the increasing and detrimental impacts of climate change will have significant consequences for land conservation. Action-based response strategies utilized by land trusts are essential in mitigating and adapting landscapes in the era of climate change; yet, many of the contemporary strategies currently utilized generally include little consideration of climate change, raising questions about these organizations' effectiveness and adaptability to facilitate conservation within dynamic landscapes. The following thesis examines this conundrum, asking whether land trusts in Washington State are adapting their land management strategies as landscapes respond to climate induced environmental pressures. In addition, the research attempts to reveal whether Washington State land trusts are adapting the concept of conservation as climate change presents new challenges to meeting conservation goals. Replicating aspects of a 2018 study conducted by Dr. Jessica Owley and colleagues, this thesis utilizes a qualitative study design approach with content analysis and interviews. Results from the analyses reveal that examined land trusts are acknowledging climate change, yet many of the response strategies to account for climate impacts are implemented out of necessity, such as increased irrigation methods to mitigate drought impacts and changes in vegetative plantings on restoration sites. However, the results also indicate that many of the examined land trusts are beginning to incorporate climate change in their strategic planning, findings congruent with conversations with thirteen land trust personnel. A synthesis of the Washington State study, together with the examined literature, support five recommendations to aid land trusts in adapting their management strategies to better account for climate-induced environmental stressors, collectively providing a robust management plan that incorporates diverse adaptation and mitigation strategies that support climate resiliency.

STATEMENT OF POSITIONALITY

I currently view land trusts as essential and very important for ongoing conservation efforts across communities. I believe strongly that private, often not for profit, organizations have more autonomy in conservation planning and project implementation than local, state, or federal agencies. I felt that it was necessary to devote my attention and thesis research to studying the varying effects nonprofit conservation organizations have on landscapes across Washington State – a state inundated with progressive governmental and tribal entities who frequently allocate resources towards conservation initiatives. My interest in evaluating conservation work within the nonprofit sector parallels my interest in securing a career with a nonprofit conservation organization. Although the following research was conducted according to standards set forth as best practices in qualitative research, my positive perspective with land trusts may bias aspects of my research to varying degrees. My professional experiences are rooted in the service industry, environmental education, and nonprofit administration. In addition, I currently serve as the Student Board Fellow on Capitol Land Trust's Board of Trustees. These experiences may have affected written components of my interview analysis in addition to my interview delivery and follow-up. Furthermore, I currently serve as an environmental educator within Washington State federal prisons; this experience has altered my views on justice, equity and equality issues. I find myself more inclined to work alongside under-served communities to serve in a helpful capacity that can uplift marginalized voices. This may have impacted how I view land trust decision making in regard to communities and areas served.

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PREFACE

When explaining the importance of conservation, Paul Shepard (conservation activist and author) offers an anecdotal account of the importance of the California condor; Paul writes, “After all, what has the California condor ever done for me? It has given me, and continues to give me, a sense of the diverse forms creation can take and of my own limited place in an enormously complex other world that was not created for me. The condor, along with the frogs and salamanders that are vanishing, is a constant reminder that I am not the center of it all.” (Jensen, 2004, p. 251). Shepard precedes his thoughts on the California condor with the idea that life in a degraded environment presupposes an abhorrence to sustainable action (Jensen, 2004). Shepard also concludes that ecological disaster is erroneously understood by human societies through a Hollywood lens that presupposes itself to catastrophic imagery depicted as disasters, somewhat akin to Armageddon (Jensen, 2004). Ecological disaster, rather, is “a creeping thing that we identify as something else – inflation, poverty, recession, levels of mental ill-health, suicide, crop failure, political upheaval, famine, social discontent – anything except its true disintegration of natural systems” (Jensen, 2004, pp. 250-256). A lingering disconnect, therefore, exists in understanding environmental degradation and the anthropogenic role in its demise. Furthermore, the exacerbation of anthropogenic-induced climate change will only increase the degradation characteristic of the Holocene epoch. Disaster and degradation is not a presumption of the future; it is, and has been, a reality of the past and present. As humans continue to carry the torch lighting the environmental wildfire, it is our responsibility to take full accountability of our endeavors and remedy

our impacts in order to support the perpetuity of diversity on Earth – allowing for a prosperous continuity of life after humankind.

The following manuscript offers an account of contemporary conservation in Western civilization, examining theories that denote our anthropogenic construct of conservation in the face of environmental change. The central focus of this thesis rests on the notion of land management and conservation practices, examining impacts to conservation and the flexibility inherent within the notion of conservation to adapt to environmental change. The role of non-governmental conservation organizations continues to grow in regard to land management, warranting examination of their perception(s) and action(s) toward conservation. To help illuminate this examination, climate change will supply the environmental proxy for change. Through the distillation of a national study on conservation organizations conducted by Dr. Jessica Owley and colleagues (2018), land trusts of Washington State are examined in regard to their role in land management, climate change resiliency, and conservation perpetuity. By examining the role of land management in conservation practices and how such practices shift in an era of environmental change, Western societies (including Washingtonians) may gain a better understanding of the future they are creating.

INTRODUCTION

Conservation efforts managed by private conservation organizations play a critical role in preserving, sustaining, and restoring landscapes to ensure perpetuity of biodiversity, species protection, and ecological services (Donaldson, Wilson, & Maclean, 2016). Conservation organizations continue to fulfill an increasing role in land conservation, surpassing federal and state agencies in their action-based response strategies (Fairfax, Gwin, King, Raymond, & Watt, 2005). Strategies include regional coordination and collaboration in project implementation (e.g. restoration projects), active monitoring and stewardship of protected landscapes, and intermittent acquisition of diverse landscapes in support of community values (Hannah, Midgley & Millar, 2002). The growing land trust movement is essential in proliferating current conservation efforts, with local and regional land trusts supporting much of this work (Fishburn, Kareiva, Gaston, Evans, & Armsworth, 2009). However, the increasing and detrimental impacts of climate change will have significant consequences for land conservation (Owley et al., 2018). Action-based response strategies utilized by land trusts are essential in mitigating and adapting landscapes in the era of climate change; yet, many of the contemporary strategies rely on outdated tactics for maintaining conservation aspects, raising questions of effectiveness and adaptability within these changing landscapes (Owley et al., 2018).

Private, often not-for-profit land trusts utilize both public and private funding to conserve landscapes through acquisition and regulation (Gerber, 2012; Middleton, 2011). Land trusts resemble public land management agencies in that they are subject to laws and regulations binding their accreditation and qualification to manage lands as property

holders for conservation purposes (Middleton, 2011). However, land trusts exist under the private sector of land management because they are not recognized as federal or state governing agencies (Middleton, 2011). In line with general nonprofit management style, board of trustees govern land trusts. The boards oversee land-use decisions and negotiations with private landowners and funders, often at the landscape-scale (Middleton, 2011). By 2015, over 1,363 land trusts operated in the United States, conserving more than fifty-six million acres of land (Land Trust Alliance, 2018). Conserved lands include terrestrial landscapes - forests, farms, prairies, and wetlands - as well as aquatic landscapes - watersheds, shorelines, estuaries, and marine areas (Land Trust Alliance, 2018). Today, approximately seventy-two percent of land held in trust allows public access while conserving natural areas and wildlife habitats, ultimately enhancing ecosystem services and protecting working farms and ranchlands – drawing on the social, economic, and ecological benefits of nature (Land Trust Alliance, 2018). The remaining eighteen-percent remain as restricted-access lands, serving to reduce anthropogenic disturbance and protect fragile habitat.

To understand the role land trusts play in climate change resiliency, a closer examination of conservation is required. Conservation, as a Western societal construct, embodies both the characteristics of a thing (i.e. noun) and action (i.e. verb). Conservation describes both a fascination with waste prevention and active protection of natural resources. Drawing on three primary theoretical frameworks, this thesis evaluates conservation to provide context for the contemporary notion under which land trusts, and akin organizations, understand, promote, and use conservation in their endeavors. Conservation of resources theory provides a discussion with regard to the history and

contemporary use of conservation in the United States, exemplifying its dynamic and complex essence. Erich Fromm's 1941 theory of biophilia (BET), later popularized by E.O. Wilson, suggests that humans possess an innate tendency to seek connections with nature and other forms of life; however, a growing disconnect in biophilic activities is believed to further ecosystem degradation and species loss. An examination of BET offers context to the importance of conservation efforts in reestablishing human connection with nature, suggesting that a reconnection with nature will support ongoing conservation efforts. In addition, BET provides context and authenticity to the growing land trust movement as it shifts to promote a community-oriented conservation practice. Ecological resilience theory, a second practical framework, offers insight to the ability for a complex system to recover from internal and external perturbations while maintaining its main features and/or identity within a set of given parameters (Cumming & Allen, 2017). As such, ecological resilience theory supports the incorporation of landscape-scale conservation in 21st century efforts. In addition, the discourse of climate change under ecological resilience theory supports the revolution of management strategies as a viable response to impacts and threats.

With a conceptual foundation laid for conservation, the reader may better examine the increasing environmental pressures of the Pacific Northwest, including the antipathy to mitigate anthropogenic induced climate change. Past and present impacts set the precedence for lasting catastrophe in the natural systems characteristic of the Holocene epoch. The acceleration of anthropogenic environmental degradation has caused many to believe that the Earth, and its natural systems, are entering a new epoch – one characterized by exploited natural resources and monospecie environments. However,

understanding the dynamic underpinnings of climate change and its impacts on contemporary ecosystems allows for opportunity to conserve and manage critical landscapes that support natural processes through adaptation and mitigation. Direct effects of climate change, including increased global temperature, altered precipitation patterns, and sea level rise require avenues of adaptation. Landscapes conserved in perpetuity have the potential to allow for ongoing adaptation, supporting myriad species with the flexibility to migrate or utilize available resources. Indirect effects, including climate refugees, changing demographics, and landscape-alteration require avenues of mitigation. Landscapes actively managed to protect and restore the functioning of natural processes alleviates risk of rapid change, allowing for species to sustain fitness and viability. Although we are far past remedial antidotes to restore the natural systems present only 100 years ago, our intellectual capacity allows for innovative strategies that conserve the interworking of efficacious systems; systems that include the preservation of biodiversity, wildlands and appreciation for interconnection.

Land managers are laden with strategies that ultimately reduce human presence on varying landscapes – whether literally or figuratively. Conservation initiatives practiced by organizations, such as land trusts, often promote values extending beyond social-ecological benefits. Values may include habitat for wildlife and protection of endangered, threatened, or rare species. However, conservation values teeter on the idea of what we, as a society, deem as significant; with perpetual reckoning of what to conserve, how to conserve it, and, to what extent are we conserving something to? Climate change will add another dimension to the reckoning, quickly surpassing circumstantial strategies as the most prominent and imminent impact affecting

conservation. Many conservation organizations are reorienting their work to meet the challenges of climate change and are enhancing strategies to meet their goals that promote worthy values. Land trusts, in particular, have the opportunity to work alongside landowners, albeit private or public, to facilitate conservation. Therefore, the decisions land trusts make in consideration of climate change will set the precedence of future conservation action.

In 2011, Dr. Jessica Owley and colleagues set out to examine the role conservation organizations, including land trusts, play in climate change resiliency across the contiguous United States (Owley et al., 2018). In their six-state study, Owley and colleagues examined 260 conservation easements and conducted interviews with organization staff to learn how organizations are addressing climate change, if at all, and to assess the effectiveness of conservation easements in the face of a changing climate (Owley et al., 2018, p. 731). Through an examination of the legal strategies utilized in land conservation, Owley et al. found that "an overly prescriptive use of perpetual property tools could actually thwart efforts to meet adaptation needs over the long term" (Owley et al., 2018, p. 730). This suggests that the effectiveness and adaptability of legal instruments, such as permanent conservation easements, may not be apt in facilitating conservation values and goals under a changing climate due to the restrictive agreements in place. In fact, Owley and colleagues found that many of the examined conservation groups have been largely unsuccessful in creating agreements that enable changing land uses, even if such changes are necessary for meeting conservation goals (p. 731). For example, development rights of the landowner are ceded through negotiations of a conservation easement, but that landowner may continue to manage their land in a way

that degrades the natural systems in place. Furthermore, Owley and colleagues found that very few of the examined organizations consider mitigation of, or adaptation to, climate change as an organizational goal (p. 732).

The research component of this thesis asks whether land trusts in Washington State are adapting their land management strategies as landscapes respond to climate induced environmental pressures. In addition, the research attempts to reveal whether Washington State land trusts are adapting the concept of conservation as climate change presents new challenges to meeting conservation goals. Replicating aspects of the Owley at al. 2018 study, the following research analyzes the strategic planning documents and mission statements held by accredited land trusts in Washington State, as well as interview transcripts from thirteen semi-structured interviews with land trust professionals. Information examined from each document discerns regional conservation values and priorities, differences in management strategies to meet regional conservation goals, and general climate change awareness. A cross-examination between land trust regions of operation and the ecoregions defined by Washington Department of Fish & Wildlife (WDFW) will help to inform differences in species composition and diversity, which may suggest why strategies are prioritized over others (e.g. conservation of salmon habitat in western Washington Northwest Coast and Puget Trough ecoregions versus conservation of sagebrush steppe habitat in the Columbia Plateau ecoregion). Information gathered from mission statements reveals organizational priorities and broad conservation values among and between land trusts; information necessary to understand the state's sense of conservation values. In addition, analysis of interviews with land trust

professionals provide further insight into the breadth of the evaluated documents as well as the conservation strategies land trusts are using, if any, in climate change resiliency.

Conservation organizations will likely need to rethink their conservation strategies to recognize that both present and future on-the-ground implications of climate change require the need for robust resiliency programs. Currently, land trusts in Washington State own 126,165 acres of land and are collectively responsible for protecting over 866,467 acres of land, or roughly two percent of Washington's landscape (WALT, 2018). However, many of these conserved lands have been impacted by climate-induced environmental stressors, which may have ramifications for the agreements and conservation strategies in place (IPCC, 2018; Owley et al., 2018). In addition, ecological communities and environmental resources may face unprecedented challenges in response to climate change (Donaldson et al., 2017). Therefore, Washington State land trusts will need to adapt their strategies to mitigate climate impacts so that they may support ongoing conservation efforts and meet attainable conservation goals. However, an important question remains – are they? This thesis attempts to answer that question, providing background information necessary to understand the contemporary notion of conservation and the importance private land management plays in climate resiliency.

CHAPTER ONE

LITERATURE REVIEW

"Wild species enrich the soil, cleanse the water, and pollinate most of the flowering plants. They create the very air we breathe. Without these amenities, the remainder of human history would be nasty and brief." – E. O. Wilson, The Creation

Conservation: Historical underpinnings examined through theory

An introduction. Three primary theoretical frameworks inform this research in order to more thoroughly understand the role land trusts play in conservation efforts through climate change resiliency: 1) conservation of resources theory, 2) biophilia theory, and 3) ecological resilience theory. Collectively, these theories evaluate conservation to provide context for the contemporary notion under which land trusts understand, facilitate, and use conservation in their endeavors. Conservation of resources (COR) theory provides a discussion with regard to the history and contemporary use of conservation in the United States, exemplifying its dynamic and complex essence. Erich Fromm's biophilia theory (BET), later reiterated by E.O. Wilson, suggests that humans possess an innate tendency to seek connections with nature and other forms of life. An examination of BET offers context to the importance of conservation efforts in reestablishing human connection with nature, suggesting that a reconnection with nature supports ongoing land conservation and protection efforts. Ecological resilience theory (ER) offers insight to the ability for a complex system to recover from internal and external perturbations while maintaining its main features and/or identity within a set of given parameters (Cumming & Allen, 2017). As such, ecological resilience theory supports the incorporation of landscape-scale conservation in 21st century efforts. In addition, the discourse of climate change under ER theory supports the revolution of

management strategies as a viable response to impacts and threats. Together, these theories provide context to the ways in which Washington State land trusts, and akin organizations, implement management strategies for climate change adaptation and mitigation.

Conservation of resources theory. Conservation of resources theory is primarily utilized within the discipline of psychology to describe organizational behavior. The foundation of COR theory rests on the idea that "individuals strive to obtain, retain, foster, and protect those things they centrally value" (Hobfoll, Halbesleben, Neveu, & Westman, 2018). Although conservation is readily perceived as a mechanism to protect ecological systems, the underpinnings of conservation are largely social, with societal values driving conservation values. In fact, conservation and its associated values are determined by what society deems as significant, with perpetual reckoning of what to conserve, how to conserve it, and, to what extent should something be conserved to. Therefore, COR theory offers insight to the evolving practice of conservation, serving both as a historical and contemporary framework for doing so.

COR theory serves as a motivational theory that posits resource access as a driver for human behavior (Hobfoll et al., 2018). The theory suggests that human behavior is based on the evolutionary need to acquire and conserve resources for survival; and that stress occurs when central resources are threatened, lost, or unattainable (Hobfoll et al., 2018). In response to stress, under COR theory, humans employ tools to build and sustain valued resources for current and future use. The acquisition of and ability to retain personal, social, and material-valued resources fosters a sense of success and capability among individuals, groups and societies (Hobfoll et al., 2018). Commonly valued

resources under COR theory include health, well-being, family, self-esteem, and a sense of purpose and meaning in life; albeit the expression of such resources may differ culturally (Hobfoll et al., 2018).

Access to valued resources under COR theory is critical when considering the evolution of conservation in the United States. The founding principle of COR theory suggests that resource loss is disproportionately more salient to communities than resource gain (Hobfoll et al., 2018); serving as a harbinger for the establishment of governmental and nongovernmental resource protection organizations, including land trusts. For example, early conservation efforts were primarily executed to protect landscapes of cultural significance threatened by development and urban expansion (Fairfax et al., 2005). In addition, valued landscapes characteristic of pleasing aesthetics served as the main focus of early conservation work for wealthy constituents (Fairfax et al., 2005). The idea of resource loss also provides context to the evolution and enactment of federal and state policies related to wildlife and landscape protection. For example, many conservation agendas were advanced in response to threatened resources, such as clean water, or threatened wildlife, as seen in the Clean Water Act and Endangered Species Act, respectively (Middleton, 2011; Fairfax et al., 2005).

Criteria for governmental land conservation and ownership typically represented the notion of maximizing protection while minimizing costs (Mir & Dick, 2012, p. 191). DeFries et al. (2007) suggest this is a reason why many nature reserves were originally established on less productive lands (Mir & Dick, 2012). As a result, valued resources, such as clean water and wildlife, became increasingly threatened by the expansion and acquisition of private lands. In response, conservation-minded NGO's evolved to increase

resource protection within and among private landscapes. This phenomenon is congruent with the second principle of COR theory, which suggests that "people must invest resources in order to protect against resource loss, recover from losses, or gain resources" (Hobfoll et al., 2018, p. 105).

The third principle of COR theory suggests that resource gain increases in significance as resources are lost, or more simply, resources gain value when they are threatened (Hobfoll et al., 2018). Urban and rural expansion, in conjunction with increased development pressures, for example, have increased the value of natural resources. Because natural resources, such as land and water, are often threatened with expansion and development, communities have recognized a growing need for landscape protection. This idea supports the enormous growth of, and support for conservation organizations, including land trusts. Today, conservation efforts focused on habitat protection primarily include the permanent removal of development rights and land-use regulation. "Private conservation organizations, and especially land trusts, have taken a leading role in identifying critical habitat and encouraging private land conservation" (Mir & Dick, 2012, p. 192). The growing land trust movement parallels the growing interest in conservation as communities fear ongoing resource loss. In addition, support for conservation organizations will only become more prevalent as climate change impacts threaten community resources.

The application of COR theory sets a foundation for understanding the intersection between societal and ecological values; essentially framing the context of conservation practiced by land trusts, along with their associated conservation values. The first principle of COR theory suggests that resource loss is disproportionately more

salient to a community than resource gain; through behavioral organization, communities tend to respond to loss more frequently than gain due to stress and fear (Hobfoll et al., 2018). Land trusts, for example, are continually established by concerned community members who see threatened landscapes as a primary loss for the community, albeit for cultural, ecological or economic values (Fairfax et al., 2005). The second principle of COR theory presumes that people and their communities must invest resources in order to protect against resource loss, recover from loss, and/or to gain valued resources (Hobfoll et al., 2018). Land trusts are an investment largely supported by their communities through philanthropy and membership; financial and personnel support systems are largely maintained by community members who establish governance in decision making strategies to mitigate resource loss while enhancing community relevancy. The third principle of COR theory suggests that when resource loss circumstances are high, resource gains become more important (i.e. they gain value) (Hobfoll et al., 2018). The growing awareness surrounding conservation continues to enlighten the work that land trusts contribute to protecting valued resources and landscapes for communities across the world. In Washington State alone, more than twenty land trusts have been established since the 1980s, a rate consistent with the growth of land trusts across the United States in response to natural resource protection and conservation of vulnerable species (WALT, 2018; Land Trust Alliance, 2018). Together, the three principles of COR theory support the evolution of conservation, providing insight to its history as a social construct that has evolved to include ecological and economic values that benefit entire ecosystems. Furthermore, as climate change threats continue to inundate the landscape, the application of COR theory will help

inform management decisions that account for resource loss and the corresponding community's response.

Biophilia theory. Biophilia theory (BET) serves as a relatively novel theory that introduces the concept of biophilia to simply describe one's innate love for life. Conservation psychology readily utilizes biophilia theory in order to help design the most effective conservation procedures for natural environments and species, establishing itself as an important component to conservation ethics and endeavors (Wilson, 2006). Although the biophilia concept was first introduced academically in 1941 by Erich Fromm [1] to describe humanity's nondestructive unity with nature, the concept has gained popularity over the last several decades, especially within environmental scholarship introduced by E.O. Wilson in the 1980's (Gunderson, 2014). Both Fromm and Wilson utilize biophilia to provide context for understanding human relations with the biophysical environment (i.e. nature). Fromm introduces biophilia as a necessary process for harmonizing society's relations with nature, arguing that social dynamics, rather than biological dynamics, encapsulate "the passionate love of life and of all that is alive" (Gunderson, 2014, p. 188). For Wilson, biophilia is a natural human force that can be utilized to combat environmental degradation and biodiversity loss, which supports Wilson's description of the ideal conservation ethic (Gunderson, 2014, p. 188). Wilson's use of biophilia theory places emphasis on humanity's emotional ties to nature, which helps to explain both the degradation and protection of nature. In his 2006 book, *The*

[1] Erich Fromm: a German-born American social psychologist, psychoanalyst, sociologist, and philosopher. Fromm is best known for his work in developing the concept of freedom as a fundamental part of human nature and for challenging the theories of Sigmund Freud (www.erichfromm.net).

Creation, Wilson writes of biophilia as "the innate tendency to affiliate with life and lifelike processes" in which people everywhere are attracted to other species, giving credence to the novelty and diversity of life (p. 63). Both Fromm's and Wilson's conceptualizations of biophila illuminate the social and biological underpinnings of humanity's relationship to ecological conservation, providing context to the growth of the environmental movement of the late 1960's and the human need to reconcile its separation from nature.

Frommian BET emphasizes the social dynamics of biophila, suggesting that biophilia as a potentiality (i.e. an actualization if proper conditions are present) would continue to develop in a society if social conditions exist that are conducive to the growth of human needs and capacities (e.g. hunger, thirst, and sleep) (Gunderson, 2014). Fromm outlined three social conditions that must precede the development of biophilia: 1) security, 2) justice, and 3) freedom. Security, for Fromm, meant that a society must develop a socioeconomic system capable of meeting basic needs and if left unmet, an individual or group would not develop a biophilous orientation. Justice, according to Fromm, represented a society free of exploitation and hierarchy. Freedom, according to Fromm, represents the capability for any individual to participate in society through a meaningful, non-alienating, and productive way. If all three conditions are met, an individual is capable of developing a biophilous orientation, or a way of relating to the world. Fromm believed that a biophilous person "is attracted to ideas that promote the defense and growth of living structures, [including nature], performs actions conducive to the defense and growth of living structures, and whom loves life" (Gunderson, 2014, p. 191). Furthermore, Fromm describes love as an action encapsulating four components: 1)

care, described as an active concern for nature's growth and prosperity, 2) responsibility, described as responding to and meeting nature's needs, 3) respect, described as respecting nature's independence from human interests, and 4) knowledge, described as knowing nature without dominating it (Gunderson, 2014, p. 192).

E.O. Wilson defines biophilia as the phenomenon of "the innate tendency [for humans] to focus upon life and lifelike forms, and in some instances to affiliate with them emotionally" (Wilson, 2002, p. 134). Wilson argues that the capacity, or even the proneness to do so, represents humanity's innate "need to emotionally affiliate with the biophysical environment in various ways: from attraction to aversion, from awe to indifference, from peacefulness to fear-driven anxiety" (Gunderson, 2014, p. 187). For Wilson, humanity's fascination with the discovery of organisms and exploration of land posits humankind's affinity for nature. Furthermore, Wilson theorizes that "a prominent component of biophilia is habitat selection, [in which]…people prefer to be in natural environments, especially those characteristic of open savanna and parklike habitats" (2002, p. 134). Although genetic evidence for habitat selection is lacking, Wilson points out that "its presence is suggested by a consistency in its manifestations across cultures" (2002, p. 135). Wilson's use of BET further supports case studies representing the healing power of nature, affirming the World Health Organization's general definition of health - a state of complete physical, mental and social well-being - in which nature provides the antidote for many medicinal and social ailments (2002, pp. 139-140).

Both Wilson and Fromm believe that a reconnection with the natural world is essential for the human experience; that a reconnection with the natural environment confirms humanity's existence by establishing meaning and purpose for human

endeavors. However, both Fromm and Wilson speculate that humankind's separation from the biophysical environment has engendered anthropogenic environmental degradation. Fromm theorized that current social conditions prevalent within industrial societies encourage an antagonistic alternative to biophilia, which he characterized as "necrophilous" (Gunderson, 2014, p. 193). Necrophilous orientation, according to Fromm, develops through socioeconomic systems that compromise security, justice, and freedom. Therefore, societies that exploit security, justice, and freedom are more likely to behave in ways that promote degradation as individuals, or groups, seek resources without limitation to sustain their basic needs. Wilson utilizes BET to reconcile humanity's ability to "wreak havoc on the natural world" (Wilson, 2002, p. 143). For Wilson, the abhorrence to biophilia (i.e. biophobia), which is acquired and maintained through fear, has set the precedence for environmental degradation without intention of remedial action. Wilson theorized that modernization, such as the industrial revolution and technological advances, continue to separate humans from the biophysical world. Without direct connection to the discovery or exploration of organisms and landscapes, humans, according to Wilson, will continue to behave in ways that exploit natural resources and ecosystems.

Yet, both Fromm and Wilson theorize that biophilia has the potential to reconcile humanity's separation from the natural environment and remedy anthropogenic degradation. For example, Fromm declared that humanity's fear of aloneness demands the fulfillment of the existential need to restore unity with the natural and human world (Fromm, 1973). For Fromm, this unity represents the driving force for all of humanity's character-rooted passions and forces of psychical motivation through the quest to "find

ever-higher forms of unity with nature" (Gunderson, 2014). The modern environmental movement garnished a sense of hope for Fromm, who wrote that "there is hope in the rising protest against pollution and war, in those who protest against the deadening of life" (Gunderson, 2014, p. 193; Fromm, 1973, p. 397).

For Wilson, biophobia has contributed to the growth of environmental degradation, in which degradation surmounts any effort in remedial action. However, Wilson believes that a reconnection with, or discovery of, macro-environments can valorize one's experience to the natural world and reignite biophilic activity. This idea is supported by Wilson's discussion of humanity's innate attraction to habitat-selection; our affinity for open and scenic landscapes encourages our exploration of natural environments in a safe and relaxing manner.

The application of BET from both the perspectives of Fromm and Wilson is useful when understanding the context and history of land conservation. Application of the theory illuminates components of nature that have been so thoroughly sought after by both early and contemporary conservationists. For example, the innate selection of savanna and parklike habitat is reminiscent of early land conservation focused on open and scenic landscapes (Fairfax et al., 2005). In addition, humanity's biophilic tendencies have led to the enactment of myriad policies for species protection, often transcending local, state, and federal jurisdictions. Furthermore, application of BET establishes context for the evolution of disciplines related to nature (e.g. biology; ecology; forestry; wildlife studies; geography; environmental studies; etc.), all of which contribute to a monumental workforce across the world.

Components of BET across scientific literature also establish context for the climate crisis. Biophobia, better understood as a separation from nature, and biophobic activities first emerged as cultures shifted toward agrarian societies, removing the need to understand and engage with certain landscapes (e.g. heavily wooded or forested lands). "With the furthering emergence of human society away from nature, the norms and cultural patterns that tied human beings to nature changed as well" (Gunderson, 2014, p. 187). This is particularly representative with the emergence of industrial societies, where "humankind's relatedness to the natural world altered into a destructive one" (p. 187). Climate studies reveal that the industrial revolution, for example, represents the turning point of greenhouse gas emissions; an indication for shifting climatic regimes and processes.

Biophobic activity continues to play an influential role in the capacity for humanity to act forthright in climate resiliency; this is particularly well represented with the United States federal government. Several administrations, including the Reagan, Bush Jr., and Trump administrations, have expressed aversion from environmental sentiment and in some cases, have reversed federal policy supporting environmental initiatives related to renewable energy, land protection, and climate change. However, biophilia and humanity's affinity for biophilic benefits has shown to "have the effect of buffering climate change" (Essl & Mauerhofer, 2017, p. 905). For example, the importance of greenspaces (i.e. natural areas) have been shown to enhance conservation as the level of climate change awareness and its threats to ecosystem services are prioritized within communities and among land mangers (Essl & Mauerhofer, 2017). Furthermore, as communities continue to recognize the importance of their landscapes,

along with the associated values that they hold, climate-adaptation strategies and policies grow in importance (Essl & Mauerhofer, 2017).

Biophilia theory and the sustained growth of biophilia-orientation will play an important role in how communities will respond to conservation, especially as landscapes succumb to climate-induced environmental pressures. Many land trusts, for example, have implemented components of biophilia to enhance human-nature relationships (Land Trust Alliance, 2019). This practice, known as community conservation, directly involves community members with protected landscapes to instill a growing appreciation for natural habitats and their associated values. The result is two-fold: 1) a growing membership and supporter base, and 2) a growing appreciation for natural protection for generations to come. Land trusts, therefore, more frequently offer educational and recreational opportunities to help reconnect and sustain an affinity for the natural world – connections that compel individuals and communities to engage in landscape-scale protection initiatives.

Ecological resilience theory. Ecological resilience theory (ER) refers to the "resilience and sustainability of protected areas, including analyses of their internal dynamics, their effectiveness, and the resilience of the landscapes within which they occur" (Cumming & Allen, 2017, p. 1709). ER theory is grounded in an emerging framework known as social-ecological systems (SES), which incorporates the human component in affecting ecological systems. Because people depend on ecosystems for a wide variety of reasons, they often demand modification of, or management over, ecosystems to enhance the delivery of ecological goods and services (Cumming & Allen, 2017, p. 1710). However, these modifications and/or management strategies have

consequences for system function, stability, and resilience (p. 1710). ER theory under the SES framework addresses such perturbations by asking systems-related questions of stability and dynamics, with particular attention on resilience, vulnerability, risk, and adaptation (p. 1710). Such analyses recognize the inevitability of change and also the need for it, allowing for an application of conservation to favor ecosystem-scale functions and services (pp. 1710-1711).

Under ER theory, the goal of conservation is to create and enable the facilitation of conditions in which species persist and evolutionary processes flourish (Cumming & Allen, 2017). In order to achieve such conditions, conservation efforts must ensure "that system elements that are critical for coping with perturbations are retained," and that systems are steered away from potentially catastrophic regimes shifts that have consequences for both ecosystems and people (p. 1711). Collectively, this is known as resilience.

Resilience, under ER theory, is defined as the ability of a system to absorb disturbance while remaining within the same domain of attraction (Cumming & Allen, 2017, p. 1711). Resilience is further defined as the degree to which the system in question is: 1) capable of self-organization and, 2) capable to adapt (p. 1711). A focus on the system's identity (i.e. its perceived uniqueness and value) is often used to link tangible management goals with empirical data to support resiliency within the system, ultimately in hopes to retain the same controls on structure and function without changing state (Cumming & Allen, 2017; Stobbelaar & Pedroli, 2011). Understanding a system's identity threshold, or the point at which the identity of the system is lost (e.g. from woodland to desert), often informs novel management strategies and conservation goals

(Cumming & Allen, 2017). Such strategies and goals are rooted in supporting the resiliency of the ecological functions, ultimately with the intention to sustain the "likelihood that a system retains its identity indefinitely" (p. 1711).

Regime shifts that alter the resilience of a system may thwart various forms of natural, social, and economic services (Cumming & Allen, 2017). When the resiliency of a system has been compromised, the consequences are often dire and irreversible. Anthropogenic disturbances often compromise the resiliency of a natural system due to both their swift, acute interjection and chronic presence. For example, habitat loss and fragmentation, resulting from population growth and increased development pressure, compromise the integrity of natural systems by removing components from the system and disrupting interconnection. The effects of habitat loss and fragmentation impact species fecundity and viability in addition to natural resource quality and quantity. Furthermore, "as systems respond to intervention and use by people, they often do unexpected things; for example, pest outbreaks and unusually large fires occur, forests are lost, or shallow lakes become dominated by toxic algae" (Cumming & Allen, 2017, p. 1710). Historic and contemporary response strategies from managers, therefore, are often sporadic, inconsistent, and uncertain.

Anthropogenic disturbances on natural systems are often at the landscape-scale and are triggered by events in societies and economies outside of the local ecosystem (Cumming et al., 2015). Because of this, ecosystem management strategies tend to focus on the preservation of biodiversity, maintenance of target species population(s), catastrophe response policies (e.g. fire policies and management plans), access rights, and control of invasive species (Cumming & Allen, 2017). In many cases, these strategies are

social constructs that are often created and debated in political arenas without real consideration of system processes that enable resiliency (p. 1709). However, Cumming & Allen (2017) suggest that periods of rapid transformation can offer opportunity for the introduction of new system elements and dynamics, ultimately shifting management response strategies to incorporate systems-thinking for enhanced resiliency (p. 1711).

Climate change impacts will have dire consequences for the resiliency of natural and built systems, especially as anthropogenic-induced pressures continue to increase. The recognition and application of ER theory connects social systems with ecological systems to better understand perturbations, both external and internal, and a systems response. Understanding the dynamics and complexities of a socio-ecological system will better inform land managers of the ecological services and conservation values of a given landscape. Furthermore, this understanding will inform the landscape's identity and identity threshold, allowing for flexibility in habitat adaptation and change while maintaining ecological services and conservation values. Management strategies informed by ER theory and systems thinking may better prepare landscapes for climate change impacts as these impacts will inevitably affect the services and values rendered; serving as an important component for land trusts to consider when developing and implementing management strategies that account for climate-induced environmental pressures for conservation in perpetuity.

Synthesis. The incorporation and application of COR theory, BET theory, and ER theory have the potential to transform management and policy approaches for conserved landscapes. In addition, they have important implications for conservation, in both theory and practice. As conserved landscapes continue to offer a fundamental approach to

ecosystem protection, it is essential to understand the social and ecological underpinnings that drive management decisions. The aforementioned theories were selected to guide the context of this thesis as it pertains to private conservation efforts led by land trusts in Washington State. COR theory guides further discussion related to the concept of conservation and how social values have determined the context of conservation throughout time. BET theory offers insight to the social drivers that influence human activity in regard to the environment; offering an account for the existence of environmental degradation and how humanity, if given the proper social needs, is driven to remedy its environmental impact. ER theory introduces the notion of socio-ecological systems and how system resiliency is impacted by anthropogenic perturbations and regime shifts. The application of ER theory is essential to landscape-scale conservation in the 21st century and offers an important approach to land conservation in the face of climate change. Collectively, these theories help to establish the framework for understanding conservation as a social construct and how that is reflected through the management decisions supported by land trusts.

Land Trusts: What are they?

An Introduction. Private, often not-for-profit land trusts utilize both public and private funding to conserve landscapes through acquisition and regulation (Gerber, 2012; Middleton, 2011). Land trusts resemble public land management agencies in that they are subject to laws and regulations binding their accreditation[2] and qualification to manage

[2] Accreditation overseen by Land Trust Alliance Accreditation Commission, which ensures that a land trust has successfully implemented standards and practices outlined by the Land Trust Standards and Practices document. Accreditation offers the assurance that a land trust can keep the promise of perpetuity and that it is worthy of the public trust (Land Trust Alliance, 2018).

lands as property holders and for conservation purposes (Middleton, 2011). However, land trusts exist under the private sector of land management because they are not recognized as federal or state governing agencies (Middleton, 2011). In line with general nonprofit management style, board of trustees govern land trusts. The boards oversee land-use decisions, and negotiations with private landowners and funders, often at the landscape-scale (Middleton, 2011). By 2015, over 1,650 accredited land trusts operated in the United States, conserving more than fifty-six million acres of land (Land Trust Alliance, 2018). Conserved lands include terrestrial landscapes (e.g. forests, farms, prairies and wetlands), as well as aquatic landscapes (e.g. watersheds, shorelines, estuaries, and marine areas) (Land Trust Alliance, 2018). Today, approximately seventy-two percent of land held in trust allows public access while conserving natural areas and wildlife habitats, ultimately enhancing ecosystem services and protecting working farms and ranchlands – drawing on the social, economic, and ecological benefits of nature (Land Trust Alliance, 2018).

Gerber and Rissman (2012), Middleton (2011), and Fishburn et al. (2009) suggest that land trusts stand out among land managing entities in the United States because they are well organized and nonpolitical, appealing to both public and private constituencies. Furthermore, land trusts have inundated the national conservation platform through an emerging land trust movement[3], rapidly growing alongside cultural and natural conservation priorities (Middleton, 2011; Fishburn et al., 2009; Fairfax et al., 2005). Less subject to the political winds of government administrations, land trusts contribute to

[3] Land Trust Movement: a growing phenomenon in land protection, restoration, and conservation by land trusts through direct action (Land Trust Alliance, 2018).

increased conservation, providing critical habitat for myriad species and preserving ecosystem services that human communities so heavily rely on (Owley et al., 2018; Fishburn et al., 2009; Fairfax et al., 2005).

A brief history of land management in the United States. Though land trusts currently play an integral role in land management and conservation within the United States alone, "private actors have played a vital role in acquisition and conservation efforts for more than 180 years" (Fairfax et al., 2005, p. 5). In fact, the concept of purchasing and setting aside land for conservation within the United States dates back to the 18th century, just as territories became established (Middleton, 2011; Fairfax et al., 2005). Wealthy constituents lobbying for preservation of historic sites, famous battlefields, and homesteads of revolutionary leaders lobbied for these early land purchases (Fairfax et al., 2005).

The idea of purchasing and setting aside land in trusts parallels the early conservation-minded programs, which utilized acquisition as their primary management strategy (Fairfax et al., 2005). During the 19th century, "acquisition programs, both public and private, emphasized nation building and civic pride in historic and spectacular natural sites" (Fairfax et al., 2005, p. 7). Early in the 19th century, recognition of statehood ordained authority in land conservation; however, in 1817, Congress granted presidential authority to reserve landscapes, mostly forests, for naval purposes (p. 21). This increase in federal power marked a growing movement in land protection, yielding three primary types of land protection during the century: 1) federal acquisitions; 2) private conservation efforts; and 3) public domain reservations (p. 22). However, the concept of

land protection had yet to incorporate the ecological aspects, except for pleasant views, so deeply ingrained within the conservation movement today (Fairfax et al., 2005).

The "enclave clause" in Article I of the Constitution of the early 19th century outlined four primary elements of the federal land acquisition process: 1) federal acquisition of land required state consent; 2) federal authority permitted exclusive jurisdiction over acquired lands; 3) the host state had to cede both the acquired land and the jurisdiction over it; and 4) the federal government had to accept both the acquired land and its jurisdiction (Fairfax et al., 2005). Following adoption of the enclave clause, the states of Maryland and Virginia both ceded land to the federal government to support the establishment of the District of Columbia, marking the first major transaction under the clause (p. 24). However, the Constitution also granted states control over federal land acquisitions, expressed through "blanket cessions" (p. 24). As the United States entered the 20th century, blanket cessions became a common practice with states imposing conditions alongside the clause; states retained some authority over lands, including the power to tax, but would saddle the federal government with the costs of land ownership and management (p. 24). "This trend is fundamental to the mosaics of control[4] that became a part of twentieth-century land acquisition programs" (p. 24).

Throughout the 19th and early 20th centuries, public land managers primarily focused on preserving national heritage, providing security, and utilitarian objectives, such as overseeing timber reserves for the development of national security programs

[4] Mosaics of control: refers to the combinations of different agents, targets, and tools of acquisition; partnerships of public and private actors, different types of land purchases by different acquirers, varying terms and conditions of acquisition, and differing management goals for acquired land serve as examples of mosaics and their complexity (Farifax et al., 2005).

(Fairfax et al., 2005). Alternatively, private interests in the preservation of historic relics[5] re-emerged, leveraging the establishment of private conservation organizations, such as the Washington National Monument Society and Mount Vernon Ladies' Association (p. 29). However, the concept of conservation at the time focused on its economic and social benefits (e.g. tourism and national pride); conservation of ecological functions resulted as a byproduct of land acquisition (p. 41). However, interests in ecological conservation emerged in parallel with the growing concern over water resources, resulting in management strategies supporting habitat protection and quality (p. 41).

The consequences of industrialization promoted a growing awareness of new and diverse conservation goals (Fairfax et al., 2005). Land acquisition efforts and a growing industrial-driven economy began to exploit and impact the services rendered from natural sources (p. 41). Public and private conservationists worked to enhance and expand federal programs to protect natural resources (p. 41). Escalating pressure for resource protection and public domain reserves led to the establishment of three reserve statutes: 1) the establishment of Yellowstone National Park in 1872; 2) the Forest Reserve Act of 1891; and 3) the Antiquities Act of 1906. These three statutes characterized the growing public attention to conservation and the preference for the federal government to act as "protector over land" (p. 58).

By 1911, Congress succumbed to ongoing pressure and passed the Weeks Act, an act that expanded the commerce clause of Article I in the Constitution, giving the federal government authority to acquire private forest land for conservation purposes (p. 42).

[5] Historic relics: historic battlegrounds, memorialization of victories from the Revolutionary War & Civil War, and noteworthy buildings (e.g. Mount Vernon).

Driven by the economic value of watersheds and timber, federal protection over landscapes grew under the establishment of the Weeks Act, pleasing forest advocates. Alternatively, federal acquisition authority for wildlife purposes remained adjourned, stifling wildlife advocacy efforts. However, wildlife advocates persisted both within the public and private conservation sectors, often partnering with international programs to protect wildlife populations, such as migratory birds (p. 42).

The 1911 Weeks Act also expanded acquisition strategies by commissioning the development of the National Forest Reservation Commission (NFRC), a committee of governmental officials responsible for identifying purchase areas of conservation concern for acquisition (p. 70). The NFRC aimed to identify and suggest lands for purchase to the United States Forest Service (USFS); some would argue that the dynamic between the USFS and the NFRC resembles many functions that land trusts perform today in regard to pre-acquisition strategies (p. 71). Furthermore, the Weeks Act continues to be the principal authority under which the USFS purchases lands today (p. 68).

In addition to its contemporary role, the establishment of the 1911 Weeks Act notoriously marked the shifting paradigm of land management within the United States. The notions of land management and of conservation intersected early on in the 20th century, highlighting four major transitions in who acquires land, for what purpose and under what term(s) (Fairfax et al., 2005). The first transition encapsulated a changing view of ownership (i.e. the role government plays in land ownership and a new understanding of what was considered to be purchasable land). The second transition followed a shift in the understanding of property; “property rights evolved from a focus

on the physical thing to its market value" (p. 44), giving rise to the bundle of sticks[6] metaphor in which each stick represents an individual right associated with that property. The third transition in land management dealt with the Property Clause, illuminating the growing authority Congress had in regulating and protecting property belonging to the United States. The fourth transition captured a changing idea about land and conservation goals. In his 1878 letter to Congress, John Wesley Powell suggested a system of land classification that defined policy for land in accordance with its specific characteristics and needs; a system that acknowledged the landscape and its natural resources (p. 46). "As the federal government moved more to the center of American political and economic life [during the 20th century], Congress responded to requests from increasingly well-organized interest groups to protect watersheds, scenic and archeological resources, and wildlife" (p. 73). With increased participation by public agencies and private organizations in land acquisition, new priorities in conservation emerged, and with them a growing concern for ecological entities.

By the middle of the 20th century, landscapes in the United States had undergone a major transition. After World War II, population increased in association with 'baby boomers,' adding pressure on the development of rural lands and exacerbating the use of natural resources (Fairfax et al., 2005). The expansion of the national highway system in conjunction with federal housing policies (i.e. tax incentives and grant allocations for housing infrastructure) impacted the accessibility and use of land; urban population

[6] Bundle of Sticks: Also known as "Bundle of Rights" theory refers to the complexities of property ownership in which each stick represents an individual right as part of the set of legal rights afforded to the real estate title holder. Rights may include: right of possession, right of control, right of exclusion, right of development, etc.

centers sprang up in once remote landscapes (p. 133). As the countryside succumbed to increasing populations and development, valleys, watersheds, scenic vistas, and wildlife habitat were directly or indirectly destroyed, impacting rural communities and people's traditional livelihoods (p. 133).

Rapid urbanization and expansion across the U.S. landscape increased ecological and social pressures. Change associated with the increased pressure left many individuals and communities distraught over ecosystem health and pollution (Fairfax et al., 2005). Rachel Carson, for example, expressed grave concern for the environmental impacts associated with urban expansion and centralized decision making of state and federal agencies. Carson's editorial and scientific work helped give context to the birth of the modern environmental movement (p. 133). The modern environmental movement is inundated with contested federal regulations, policies, and state mandates, in addition to a growing fervor associated with outdoor recreation and wilderness preservation (p. 134). Land acquisition goals expanded during the early tenure of the environmental movement, with increased public demand for the preservation and conservation of natural landscapes[7]

Federal and state agencies did respond to the growing fervor of environmental concerns, expanding the national park system and enacting environmentally-minded legislation, including the 1964 Wilderness Act and the 1973 Endangered Species Act. Advocates for the protection, expansion and conservation of natural areas and resources (i.e. environmentalists) sought to protect entire ecosystems as a remedy for ecological

[7] Natural landscapes in this context refers to landscapes void of anthropogenic development.

degradation and as an antidote for urban blight (p. 134). The growing awareness on the importance of preserving and conserving natural landscapes helped revitalize private conservation groups; those cognate of the early 19th and 20th century conservation groups. However, these organizations focused attention on the ecological aspects of conservation, mostly barren of the economic and social implications of land preservation inherently characteristic of the early conservation groups founded in the 19th and early 20th centuries (Fairfax et al., 2005).

The growth of private nonprofit organization groups paralleled the growth in federal authorities and programs for land acquisition (Fairfax et al., 2005). However, public acquisition programs stifled the historic growth of the land acquisition strategies common during the 19th and early 20th centuries. In fact, "the focus on recreation and habitat significantly altered the kind of land that the federal government acquired" (p. 135), shifting acquisition priorities towards recreational use with increased state authority and management (pp. 137-138). This shift is seen in the enactment of the 1964 Wilderness Act, where wilderness areas designated by Congress are areas where the "earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain" (Wilderness Act, 1964). This shift is also seen in the 1968 Wild and Scenic Rivers Act, where rivers designated by Congress as wild, scenic, or recreational are protected through the regulation and programs of federal, state, local and/or tribal governments (Wild and Scenic Rivers Act, 1968), and the 1968 National Trails System Act, where recreation and scenic trails were designated and protected "in order to provide for the ever-increasing outdoor recreation needs of an expanding

population and in order to promote public access to…outdoor areas" (National Trails System Act, 1968).

During this time, growing discontent with the land management and policy strategies of the federal government mirrored the growing support for nonprofit conservation organizations. This discontent was especially prevalent after the enactment of the 1970 Uniform Relocation Assistance and Land Acquisition Policies Act, which, some argue, displaced landowners and disrupted livelihoods despite nominal compensation packages (Fairfax et al., 2005, p. 139; p. 151). "Rather than leading the conservation movement as they had in the early 20th century, federal agencies found themselves being pushed by increasingly aggressive conservation groups [hell-bent on…] suing the government to pursue a desired policy" (pp. 151-152).

Although political upheaval and litigation endured during the rise of private conservation groups, the emergence of The Nature Conservancy (TNC) capitalized on the complexities associated with the real estate market (Fairfax et al., 2005). With focus on landscape-scale conservation initiatives, TNC enticed and assisted landowners in selling their lands at a maximum economic advantage, guiding land acquisition through built relationships and trust, a practice aloof from federal agencies (p. 152). Several more emerging conservation groups followed the TNC acquisition model, including the Trust for Public Land, Maine Coast Heritage Trust, and the Brandywine Conservancy, gaining landowner trust while protecting critical habitat; a trend that would supersede private land management efforts throughout the rest of the 20th century (Land Trust Alliance, 2018). As these organizations proliferated, many of them began to self-identify as "land trusts" (Fairfax et al., 2005).

U.S. History of Land Acquisition & Management Timeline

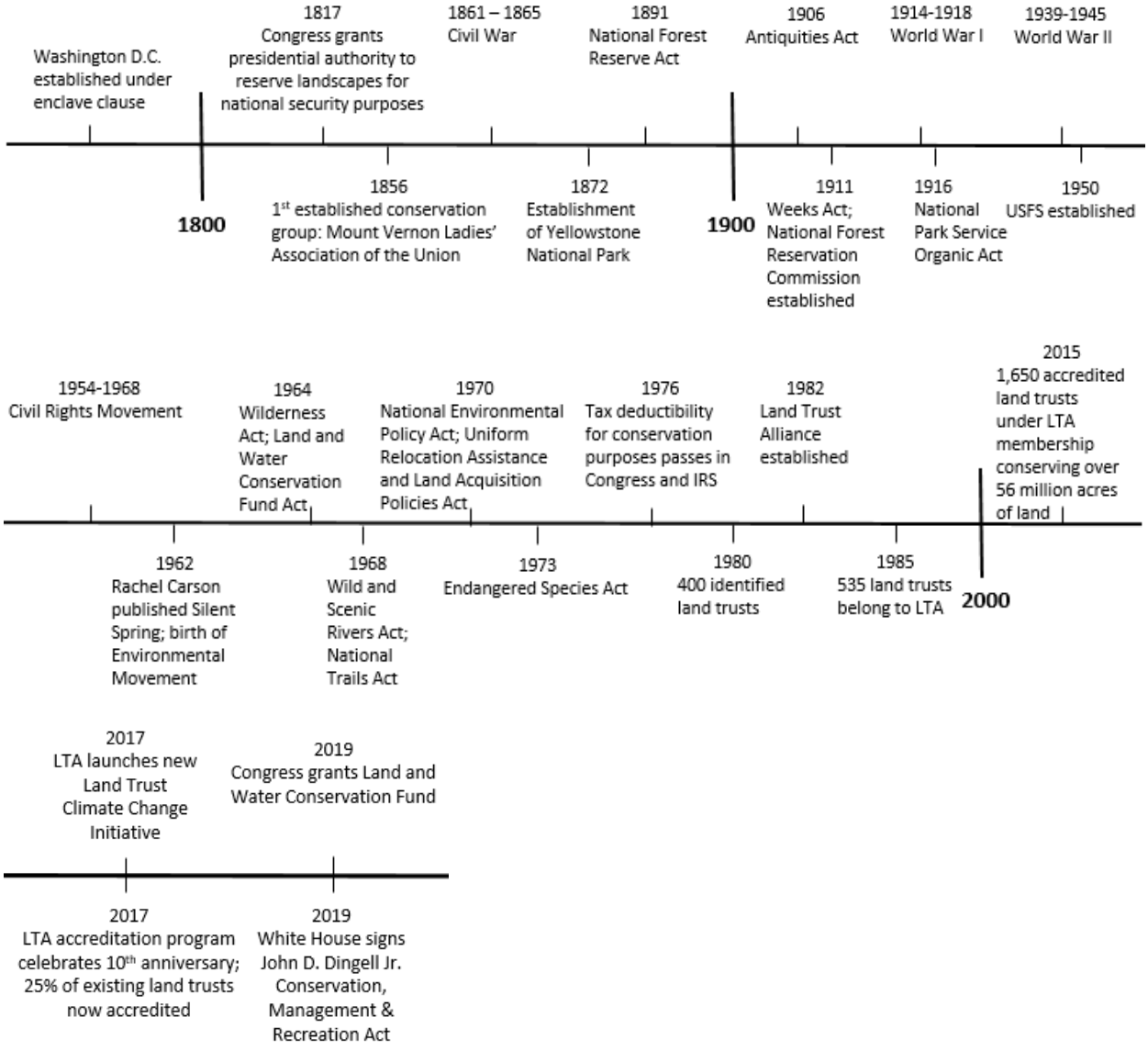

Figure 1. U.S. History of Land Acquisition & Management Timeline (compiled by author).

The Land Trust Movement

The Land Trust Alliance & accreditation. The United States encountered a pivotal culture shock during the 1970's. The Nixon, Ford, and Carter administrations enacted a plethora of legislation influenced by the societal viewpoints expressed through several movements characterizing the decade, including the civil rights movement, the environmental movement and anti-war sentiment. With growing concern for human and environmental rights, and opposition to federal regulation, conservation organizations took advantage of federal tax breaks for conservation efforts (Land Trust Alliance, 2018; Fairfax et al., 2005). In 1976, Ben Emory, director of the Maine Coast Heritage Trust, recruited members of like-minded organizations to lobby Congress for new legislation related to tax deductibility for acquisition strategies, including easements, that would help promote legal efforts outlined under various acts, including the Endangered Species Act (Land Trust Alliance, 2018). By 1979, several environmental organizations had convened over easements directed by the Brandywine Conservancy (Land Trust Alliance, 2018). Bill Sellers, director of the Brandywine Conservancy, then led coordinated efforts to influence members of the U.S. Treasury and IRS to enact federal tax policies in support of land acquisition for conservation purposes (Land Trust Alliance, 2018). Soon after, acquisition strategies, including easements, were formally recognized as tax deductible, thus promoting the utilization of the nonprofit model among these conservation organizations. A nonprofit tax status allows for a land trust to qualify for income, estate or gift tax savings through the acquisition of donations, conservation easements or currency (WALT, 2019). In addition, properly structured land trusts, such as those accredited by the Land Trust Alliance (Alliance), are often exempt from federal and state

income taxes as well as local property and real estate transfer taxes (WALT, 2019). By 1980, more than 400 local and regional conservation organizations existed under nonprofit status, with most adopting nomenclature related to the terms *land trust* or *land conservancy*, giving rise to the land trust movement (Land Trust Alliance, 2018).

The geographic spread of the emerging land trusts, along with increased recognition of the difficulty in influencing vital conservation-minded legislation, led to the establishment of the Land Trust Alliance in 1982 (Land Trust Alliance, 2018). The Alliance became a national land conservation organization based in Washington D.C. and took responsibility for overseeing policy, legislation, and regulation affecting all recognized land trusts (Land Trust Alliance, 2018). In 1983, the Alliance encouraged land trusts across the nation to comment on IRS draft regulations on easement tax deductibility, promoting a sense of unity and collaboration among the organizations (Land Trust Alliance, 2018). Soon after, land trusts across the nation became members of the Alliance and, by 1985, the Alliance had 535 land trust members protecting over 500,000 acres of land (Land Trust Alliance, 2018). By 1990, the Alliance had published the Federal Tax Law of Conservation Easements, The Conservation Easement Handbook (1st edition), and the Land Trust Standards and Practices - documents guiding policy regulations and best practices for land conservation for landscapes in trust (Land Trust Alliance, 2018). During the 1990's, the Alliance supported its members through policy initiatives, standards, practices, education and training with the goal that land trusts could save and secure more lands for conservation and stewardship (Land Trust Alliance, 2018).

Today, the Alliance serves as the voice of the land trust community, overseeing 1,650 local and state land trust organizations and setting accreditation standards (Land Trust Alliance, 2018; Fishburn et al., 2009). A 2015 census revealed that land trust members had conserved over fifty-six million acres of land, including watersheds, estuaries, and marine areas (Land Trust Alliance, 2018). Those numbers do not include conserved lands held by some of the largest conservation organizations, such as TNC, further revealing that land conservation by private organizations continues to play a monumental role in land management efforts across the United States (Fishburn et al., 2009).

With support from the Alliance, membered land trusts are well equipped to serve their communities through conservation initiatives. Many of the investments, core programs, and services supported by the Alliance increase the rate of land conservation through enhanced land trust performance (Land Trust Alliance, 2018). In conjunction with a nonprofit model, many land trusts require approval for land transactions from an elected board of trustees, ensuring the "opportunity for governance to shape the distribution of resources and investment among different states" (Fishburn et al., 2009, p. 75). With increased rates of land conservation and a distribution of resources and investment, the Alliance has helped to establish regional groups to aid in the leadership and coordination role most appropriate for the area. For example, regional groups, including the Washington Association of Land Trusts (WALT), act as a collective voice for state-level land conservation organizations (WALT, 2018; Fairfax et al., 2005). Regional groups like WALT often translate goals, standards, and practices supported at the national level to projects appropriate for the region of concern.

Washington Association of Land Trusts. The Washington Association of Land Trusts (WALT) was formed in 2007 as a result of collective action between land trusts across the state (WALT, 2019). Existing land trusts throughout Washington joined together to strengthen their collective ability to protect myriad landscapes and promote social, ecological, and economic conservation initiatives (WALT, 2019). Today, WALT unites twenty-five nonprofit land conservation organizations, a mixture between national organizations, such as The Nature Conservancy, Trust for Public Land, and The Conservation Fund, and local organizations (WALT, 2019). WALT maintains organizational membership through educational programming and advocacy efforts to aid in the ongoing protection efforts of critical landscapes, which are identified for their socio-ecological benefits to the surrounding community. In addition, WALT members are required to abide by the Land Trust Alliance's standards and practices, ensuring that best practices for nonprofit land management are implemented consistently across the state (WALT, 2019).

The Washington Association of Land Trusts' programs serve to strengthen the land trust community across the state to aid in the conservation of myriad ecosystems and landscapes for the benefit of current and future generations (WALT, 2019). WALT connects and leverages the work of its members and partners through public funding initiatives and effective tools to ensure that community-valued resources related to ecological systems are protected. Currently, the 2019 policy priorities outlined by WALT were designed to ensure the continuity of conservation efforts across the land trust community that ultimately contribute to the state's economy, culture and landscape (WALT, 2019). The 2019 policy priorities are: 1) To ensure robust funding of state

Capital Budget conservation programs; 2) To advance community-based forestry and working forest protection; and 3) To enhance funding for shorelines and salmon recovery.

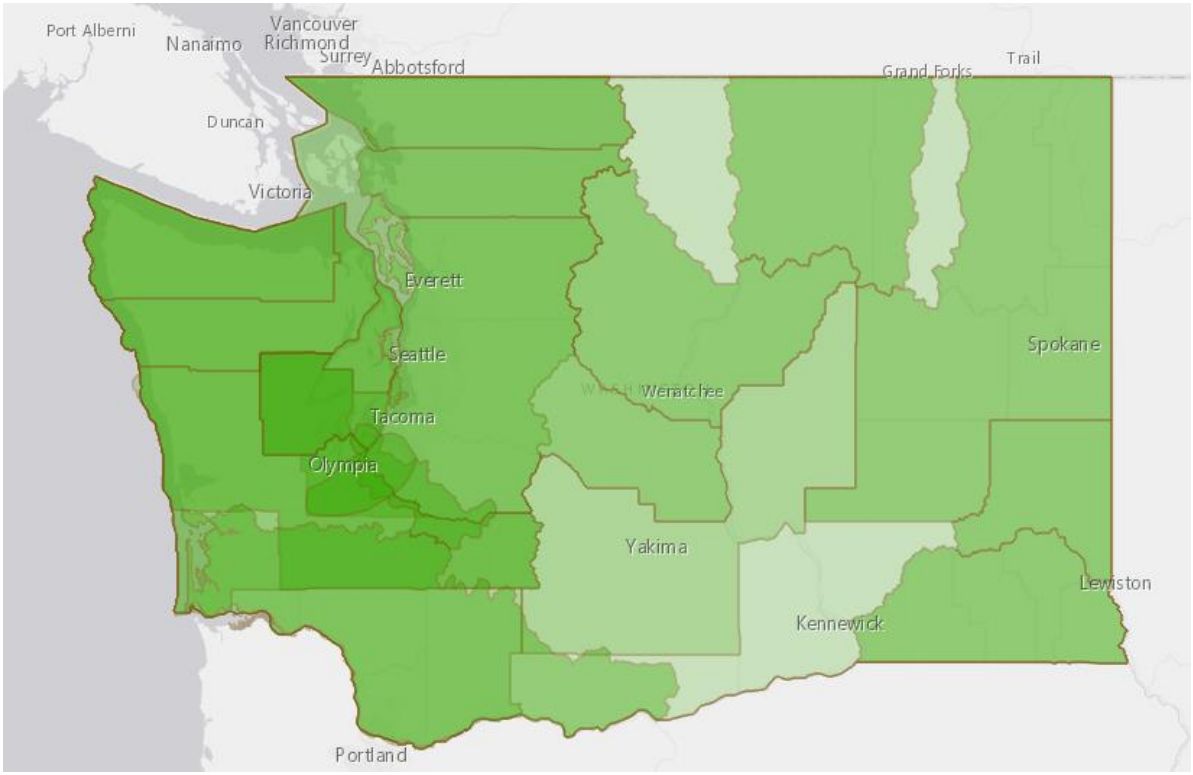

Figure 2. Boundaries of WALT membered land trusts. This figure, adopted from the Washington Association of Land Trusts website, illustrates the boundary lines of the twenty-five land trusts with WALT membership. Four land trusts operate state-wide and many land trusts operate across shared regions. Citation: Washington Association of Land Trusts (WALT). (2019). Retrieved from https.//walandtrusts.org/our-work/find-land-trust/

In conjunction with their policy priorities, WALT connects funding sources (e.g. grant programs) with membered land trusts to meet regional conservation goals. For example, WALT leverages state funding sources from Washington Department of Natural Resources, Department of Ecology, and the Washington Recreation and Conservation Office to support conservation efforts related to the protection of coastal shorelines, estuaries and riparian areas critical for salmonids, protection of threatened species, and habitat restoration. Similarly, WALT leverages federal funding sources from

the U.S. Department of the Interior, U.S. Fish & Wildlife Services, National Oceanic and Atmospheric Administration, Natural Resources Conservation Service, U.S. Forest Service, U.S. Department of Defense, and the U.S. Department of Transportation to support conservation efforts related to endangered species protection, wildlife and sport fish habitat restoration, coastal and estuarine protection for salmon recovery efforts, maintenance of working lands, and maintenance of public access lands. In fact, leveraged sources support a majority of land trust financials, providing funding for project implementation and oversight.

The work carried out by WALT is primarily driven by the organization's recognition of impacts related to increased development, population growth, and climate change (WALT, 2019). Policy initiatives and programs supported and implemented by WALT account for both the social and ecological benefits of conserved landscapes as remedial actions to mitigate and/or adapt to changing demographics, urban expansion and climate change (WALT, 2019). Furthermore, WALT advocates for the inclusion of community representation in the development, governance, management and use of conserved landscapes, especially those reminiscent of working lands that can bring substantial benefits to the health and wellbeing of communities in addition to enhancing landscape resiliency (WALT, 2019). Currently, WALT has advocated for the enactment of HB 1946 and SB 5873, for example, to support the continued improvement of programs that protect private working forest lands for their ability to provide multiple benefits related to job creation, improved water supply, resilient wildlife habitat, and carbon storage and sequestration (WALT, 2019). WALT also continues to support enhanced funding for acquisition and restoration programs that benefit shorelines and

salmon population recovery statewide. Much of this work occurs in partnership with the Shoreline Conservation Collaborative and various agencies and organizations dedicated to preserving shoreline for salmon and orca, illuminating WALT's ability to collaborate strategically to meet statewide conservation initiatives (WALT, 2019).

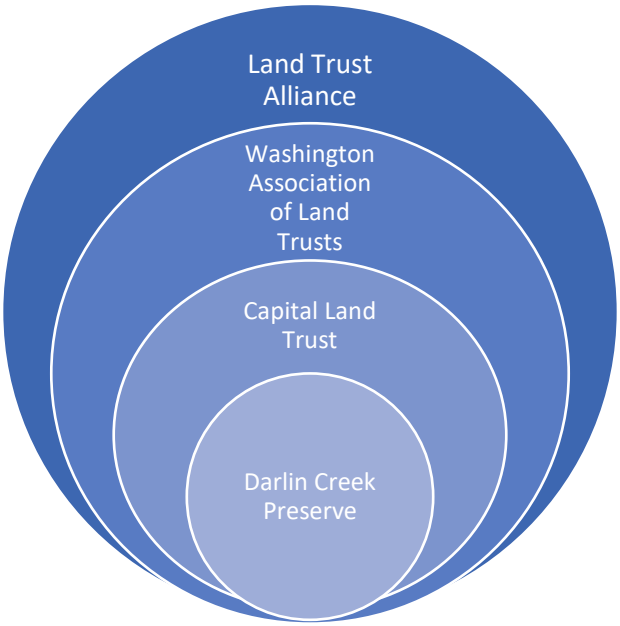

Figure 3. Hierarchical structure of land trust management. This figure provides an example of the hierarchical structure of land trust management; the LTA oversee WALT, which oversees Capitol Land Trust who actively manages Darlin Creek Preserve.

Conservation at the core: a social construct with shifting priorities. The concept of conservation within the United States has primarily rested upon the notion of preservation (Owley et al., 2018; Fairfax et al., 2005). As previously detailed, conservation via land acquisition has shifted along with American priorities related to preservation and land use (Fairfax et al., 2005). Late 19th century conservation goals, for example, drew on the notion of both cession of anthropogenic development and the preservation of historical treasures (p. 9). Land conservation during this time predominately relied on the retention of public lands for tourism, resource management

and protection of scenic wonders (p. 9). Pressure from conservation advocates ultimately expanded this notion of conservation into the 20th century (p. 10). As Americans endured the Great Depression and both World Wars, however, concerns characterizing the modern environmental movement reshaped the notion of conservation to include new recreation and ecological priorities; priorities that became integral within conservation organizations (p. 10). In conjunction with these environmental priorities, changing economic conditions and cultural identity affected the notion of 20th century conservation. For example, the shifting economic conditions of the time prompted a change in the real estate market to include a more robust seller/buyer relationship; a shift in cultural identity, such as those expressed during the civil rights movement, heightened awareness around human rights issues, bridging disparities between communities and coalescing the support for equality and equity-minded policies (Fairfax et al., 2005). Together, these shifts in national priorities influenced the notion of conservation as Americans entered the 21st century and supported the conservation platform from which many conservation organizations, including land trusts, operated.

Contemporary approach of 21st century conservation. The last fifty years have seen a fundamental shift in conservation (Cumming & Allen, 2017). In general, the scope of conservation has broadened from a focus on single landscape attributes to the recognition that conservation problems encompass a wide variety of disciplines, systems, and solutions (p. 1709). For example, early conservation work focused on protecting game species and their habitats for recreational and scenic purposes, while current conservation efforts have since expanded to protecting critical habitat and at-risk plant and animal species within the context of a functioning ecosystem (Mir & Dick, 2012).

Furthermore, the contemporary notion of conservation recognizes that ecosystems and social systems are inextricably linked, calling for robust strategic conservation planning that accounts for the interconnection of various system components. Conservation, therefore, extends beyond the ecological aspects inherent within a landscape and requires the incorporation of social influences from internal and nearby human communities. With the recognition of conservation as a socio-ecological mechanism, the increased establishment of protected lands has become the most fundamental tool available for facilitating conservation that is ecologically, economically, and politically sustainable (Cumming & Allen, 2017).

Approximately four-thousand acres of farms, forests, and open spaces are lost daily to development and land-use change; a loss equivalent to 800,000 hectares annually across the United States (Land Trust Alliance, 2018; Mir & Dick, 2012). These areas are vital for wildlife survival and the maintenance of ecological services. Wetlands alone account for forty-thousand hectares of lost habitat annually, which are imperative for the survival of several threatened and endangered species, flood control, and maintenance of water quality (Mir & Dick, 2012). Moreover, seventy-five percent of remaining wetlands are situated on private lands; a finding congruent with other types of habitat (Mir & Dick, 2012; Fishburn et al., 2009). In fact, "at least two-thirds of species listed under the U.S. Endangered Species Act have more than sixty percent of their range on nonfederal lands" (Fishburn et al., 2009, p. 74). As such, habitat conservation efforts, aligned with ecosystem conservation efforts, are imperative for landscapes outside of the public-protected area network (Fishburn et al., 2009). An important contribution to conservation,

therefore, has shifted to include a growing network of private NGO and nonprofit organizations dedicated to carrying out conservation efforts on private landscapes.

Many approaches to conservation supported by NGO and nonprofit organizations relate to the idea of protecting, preserving, and sustaining functioning ecosystems, based on the idea that a healthy functioning ecosystem supports a functioning society (Owley et al., 2018). Functioning ecosystems often include a diverse array of features pertaining to species biodiversity and fecundity (e.g. species richness, abundance, and viability) and landscape attributes (e.g. habitat connectivity, geography, and climate) (Hannah, Midgley, & Miller, 2002). However, the ecological services derived from functioning ecosystems often govern the societal values attributed to the ecosystem in question, furthering the socio-ecological paradigm of systems thinking. In most cases, conservation organizations rely on legal and legislative channels to facilitate conservation through protected landscapes that recognize social commitments and values. A combination of management decisions and regulations derived from policy are typically implemented to limit anthropogenic impacts and to conserve space that is reflective of community values (Owley et al., 2018). Acquisition of land continues to play the domineering role in achieving conservation, with community stewardship and restoration supplying the avenues in which conservation goals are met (Land Trust Alliance, 2018).

Land trusts have become a keystone institution facilitating socio-ecological conservation. As of 2015, over 1,650 local and state land trusts across the United States had contributed to the conservation and protection of important landscapes, important for both their ecological and social values. Between 2005 and 2015 alone, land trusts conserved over twenty million additional acres of land, a number unparalleled in the

history of private land conservation. A key component contributing to their success particularly resonates with their ability to work at the local level, serving communities and working alongside private landowners to meet achievable conservation goals reflective of the region.

Overall, land trusts have popularized the implementation of community conservation, a strategy designed to protect and sustain natural resources while providing outdoor recreation and access for community members. The Land Trust Alliance defines community conservation as an approach to land conservation that simply includes more people (Land Trust Alliance, 2019). “Community conservation begins by listening to many different voices in the community – then responding” (Land Trust Alliance, 2019). In short, land trusts utilize community conservation to meet the needs on and for conserved properties as expressed by the people in the community; doing so ultimately contributes to a growing membership and enhanced ability to work within and across disparate communities (Land Trust Alliance, 2019).

Many conservation projects implemented by land trusts now include a community component, bringing into fruition sustained conservation through the recognition and inclusion of community values (Land Trust Alliance, 2019). Community conservation offers the most practical way to save land because it connects people and their communities directly to the land. This connection fosters a growing awareness and appreciation for myriad ecosystems and their various components, ultimately broadening the support for conservation, which is most readily reflected through political support (Land Trust Alliance, 2019).

A recent example reflective of the power of community conservation is seen through the enactment of the John D. Dingell, Jr. Conservation, Management, and Recreation Act of 2019. Community advocacy efforts curtailed opposing lobbyist and held elected officials responsible for upholding the federal government's commitment to supporting ongoing conservation and recreational opportunities (Land Trust Alliance, 2019). The bill breached bipartisan politics and passed through Congress with unreserved support in February, 2019. The bill was signed into law on March 12, 2019, bringing with it an estimated nine billion dollars in direct spending efforts over ten years for conservation purposes (Land Trust Alliance, 2019). The bill most notably includes a provision for sustaining the Land and Water Conservation Fund (LWCF) in perpetuity (LWCF, 2019). Funding from the LWCF directly supports conservation efforts led by land trusts throughout the country and has significant implications for climate change adaptation and mitigation strategies.

Climate & environmental pressures of the PNW: Historical, present & future

An introduction. When discussing the implications of climate and climate change, it is important to first understand the difference between weather and climate. Weather describes conditions of the atmosphere such as temperature, air pressure, humidity, cloud cover, precipitation, and wind for a given area over a short period of time (i.e. minutes to months) (Kump, Kasting, & Crane , 2010; USFS, n.d.). Climate describes the long-term prevailing weather patterns for a given region (NSIDC, 2019; Kump et al., 2010; USFS, n.d.). More readily understood, weather describes the day-to-day state of the atmosphere, and its short-term variation whereas climate describes the weather of a region averaged over a period of time, often extending from thirty years and beyond

(NSIDC, 2019). Climate is typically discussed in terms of years, decades, and centuries to describe patterns, cycles, and trends of weather variability (NSIDC, 2019).

To understand climate, climate variability, and climate change, scientists commonly rely on core samples and computer modeling. Evidence from past climates has primarily come from core samples retrieved from sediment in the ocean floor or gaseous measurements from ice samples in glacial fields (Kump et al., 2010). Computer models of climate systems, such as general circulation models (GCMs), synthesize historical climate conditions to describe regional and global trends, and to predict future climate scenarios (p. 348). In recent years, the Intergovernmental Panel on Climate Change (IPCC) has performed much of the computer modeling work using a combination of natural and anthropogenic forcings (p. 348). Natural components that are taken into account include both solar and volcanic forcings, which have been shown to affect global temperatures and other weather-related systems. Anthropogenic components that are taken into account include the release of carbon dioxide (CO_2) by fossil-fuel burning and deforestation, and the release of methane (CH_4) and nitrous oxide (N_2O) from agriculture (Kump et al., p. 341; p. 348).

Data retrieved from both core samples and computer modeling indicate that Earth's climate has varied on a number of different timescales and will continue to do so for ages to come (Kump et al., 2010). In fact, paleoclimate (i.e. past climate) data indicates that Earth has endured long periods of warmth separated by shorter periods of intense cooling with episodes of global freezing events, suggesting that Earth's climate is complex and dynamic (p. 282). Furthermore, data records indicate that Earth is currently

in the midst of a short interglacial period[8] destined to slip slowly into the next Ice Age within a few thousand years (p.12). However, the current rate of increase in atmospheric CO_2 and other greenhouse gases due to human activity, is faster than any historical rate of increase measured for inter-glacial to glacial climate change (Kump et al., 2010, p. 12). Such increases in atmospheric gases have the potential to severely alter natural climate trends, shifting Earth's climate trajectory toward an era of significant warming instead, resulting in significant biodiversity loss (Kump et al., 2010).

Understanding how and why climate has changed in the past can help set the precedence for how climate may change in the future (Kump et al., 2010). Frameworks for understanding climate change identify the importance of incorporating a summary of historical, current, and projected climates with both natural and anthropogenic forcings (Kump et al., 2010; Hansen, Monahan, Theobold, & Olliff, 2016). A summary of the PNW's historical, current, and projected climatic regimes are discussed in further detail to better understand the climate context of the region under study for this thesis. The historical summary introduces the region's geographic context to better describe climate trends over the centuries. Figures included illustrate the average climate patterns for both temperature and precipitation over the last century to help represent the degree of change modeled for current and future climate scenarios. A brief overview of current climate regimes illustrates the increasing frequency of extreme and altering weather events, which lays the foundation for an overview of future climate scenarios for the region.

[8] Interglacial period: a geological interval of warmer global average temperatures that separates consecutive glacial periods within an ice age. The Holocene epoch is characterized as an interglacial period of the Pleistocene (Kump et al., 2010; NOAA, n.d.).

Implications for understanding the scientific modeling of climate change are essential in aiding both land managers and the public to anticipate possible future scenarios and their effects to the ecological, social and economic systems in place (Hansen et al., 2016).

Historical trends of the PNW. Historical models used to describe the climate of the PNW region indicate that the area has been subject to highly diverse climate regimes with large spatial variations, findings congruent with contemporary IPCC global models (Kump et al., 2010; Kunkel et al., 2013). In their 2013 Technical Report, The National Oceanic and Atmospheric Administration (NOAA) recognized that climate variability is largely due in part to the interactions of the large-scale atmospheric circulation with the region's coastal- and Cascade mountain ranges (Kunkel et al., 2013, p. 11). Because of the PNW mid-latitude global position, the area is subject to the mid-latitude westerlies, giving context to the region's climate characteristics (p. 11). For example, historical weather patterns have largely been influenced by the west-to-east progression of extra-tropical cyclones, and, in conjunction with the north-to-south oriented mountain ranges, precipitation from the cyclone regimes has largely fallen in the landscapes west of the mountain ranges (p. 11). These precipitation events have resulted in creating one of the wettest landscapes of the coterminous United States (p. 11). In addition, the Cascade Range itself has experienced some of the largest snowfall totals due to the continuous bombardment of oceanic weather surges (p. 11). Landscapes east of the Cascades, however, have experienced much less on-average precipitation than the western landscapes due to the weather-shielding power of the Cascade Mountain Range (p. 11) (see Figure 4).

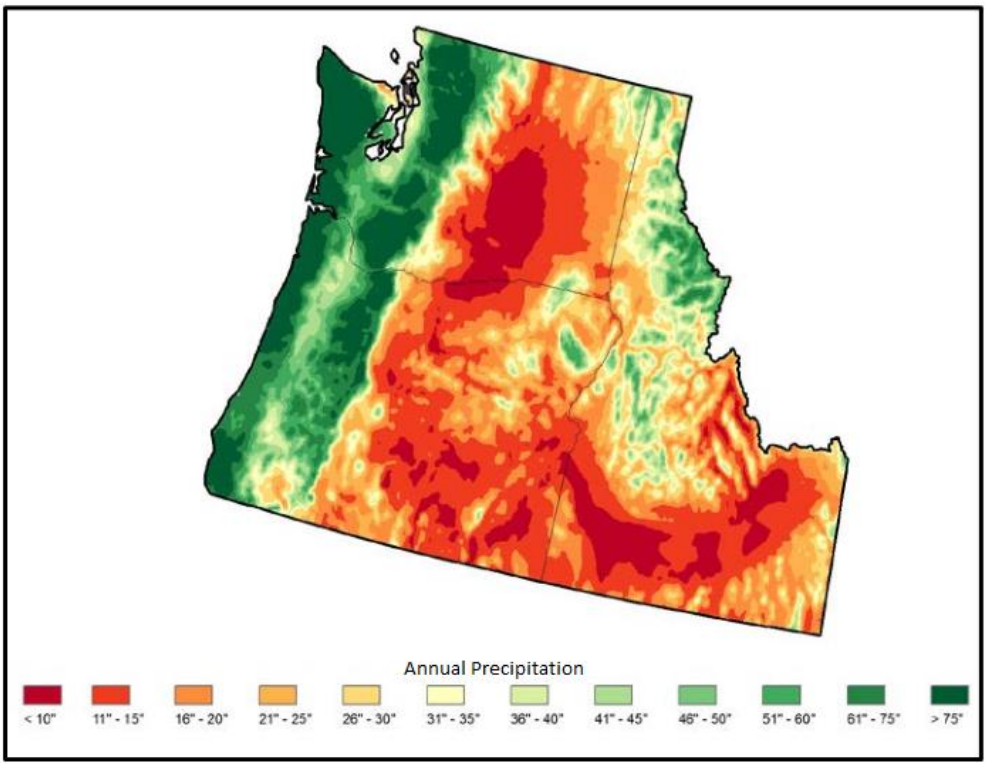

Figure 4. Average annual precipitation for the PNW region (1981-2010). This figure, adopted from Kunkel et al., 2013, p. 13, illustrates the average annual precipitation in inches based on the gridded COOP-CDDv2 data from the National Climatic Data Center. Citation: Kunkel et al. (2013). *Regional Climate Trends and Scenarios for the U.S. National Climate Assessment*: Part 9 (NOAA Technical Report NESDIS 142-9). NOAA National Environmental Satellite, Data, and Information Service, Washington, D.C.

Historical trends in climate characteristics related to temperature have largely been influenced by the north-to-south jet stream, Pacific Ocean, and regional mountain ranges (Kunkel et al., 2013). In general, temperatures of the PNW have been moderate, with annual temperatures decreasing from the coast and upward from sea level (p. 12) (see Figure 5). Cooler maritime temperatures from the Pacific Ocean's surface waters, for example, have moderated the seasonal temperatures for landscapes west of the Cascades. Summer temperatures east of the Cascades tend to be much warmer on-average without the maritime influence. Therefore, winter temperatures in eastern Washington (i.e. east of the Cascades) tend to be much cooler also in response to the lack of maritime influence

(p. 11). Overall, annual temperature values average between 30-50°F, from higher mountain areas to lowland areas, respectively (p. 12).

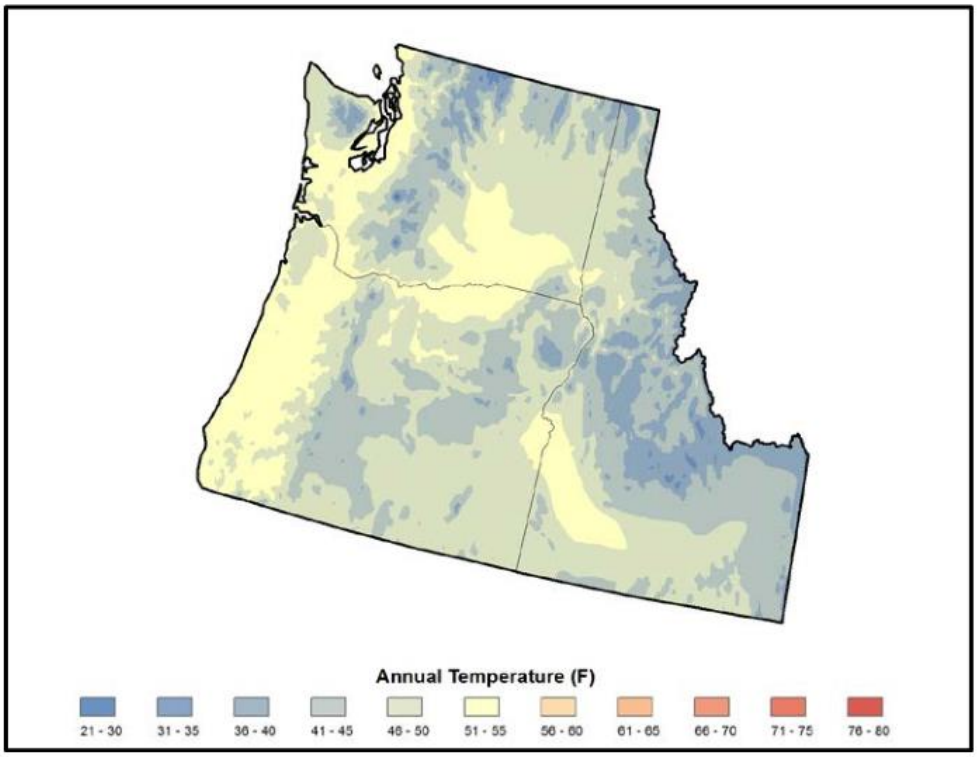

Figure 5. Average annual temperature for the PNW region (1981-2010). This figure, adopted from Kunkel et al., 2013, p. 13, illustrates the average annual temperature in degrees Fahrenheit based on the gridded COOP-CDDv2 data from the National Climatic Data Center. Citation: Kunkel et al. (2013). *Regional Climate Trends and Scenarios for the U.S. National Climate Assessment*: Part 9 (NOAA Technical Report NESDIS 142-9). NOAA National Environmental Satellite, Data, and Information Service, Washington, D.C.

Historical overview of ecoregion climate. Historical trends throughout the nine ecoregions of Washington State reflect a subset of regional climate trends (see Figure 6). For example, ecoregions west of the Cascades, including both the Northwest Coast and the Puget Trough ecoregions, have both exhibited climate trends representative of higher-than average precipitation events, fog, and mild to cool temperatures (WDFW, 2005). High precipitation accumulation in the form of both rain and snow, in addition to high yields of annual snowpack in upper elevations have historically characterized the North

Cascades ecoregion (p. 347). The climate of the West Cascades ecoregion has historically been described as wet and relatively mild with most precipitation accumulation occurring from October through April (p. 373). High elevation areas have seen snow year-round, which have fed small-stream tributaries for major river systems throughout the region (p. 373).

Climate trends rapidly shift with increased variability in precipitation and temperature east of the Cascades. East of the Cascade crest, for example, temperatures have historically increased and precipitation events have historically decreased (WDFW, 2005). Most precipitation accumulation has occurred from November through April (p. 404). The Okanogan ecoregion sits between the rain shadow of the Cascade Mountains to the west and the Rocky Mountains to the east. The geographic context of the region, therefore, has largely influenced the variability in temperature and precipitation; the region has experienced some of the coldest and hottest on-average temperatures throughout the state in addition to high variability in precipitation gradients from the mountains to the valleys (p. 435).

Climate trends have continued to vary in the Rocky Mountains ecoregion; the northern portion has been characterized by cool, boreal weather, with mid to high precipitation resulting in significant winter snowpack, while the remaining region has experienced more moderate climate conditions influenced by the lingering maritime weather patterns (p. 468). The Columbia Plateau ecoregion has had the hottest and driest climate trends in Washington State (p. 522). The region lies in the rain shadow of the Cascade Mountains, which has resulted in periodic drought and natural wildfires (p. 522). Similarly, the Blue Mountain ecoregion has historically experienced warmer

temperatures and decreased precipitation events; although fall and spring rain events are common and have resulted in seasonal flooding (p. 496).

Figure 6. Washington State's ecoregions. This figure, adopted from WDFW, 2005, p. 17, illustrates the nine ecoregions defined by Washington Department of Fish and Wildlife. Climate characteristics for each ecoregion are influenced by geography and landscape attributes. Citation: Washington Department of Fish and Wildlife (WDFW). (2005). Washington's Ecoregional Conservation Strategy. In *Washington's Comprehensive Wildlife Conservation Strategy* (pp. 257-555). Retrieved from https://wdfw.wa.gov/publications/00727.

Present trends of the PNW. Throughout Earth's more recent history, climate has been largely determined by the balance between increasing solar luminosity and decreasing atmospheric CO_2 (Kump et al., 2010, p. 295). Episodic variability linked to solar luminosity is more recently represented by the Little Ice Age[9], a period between 1600 and1850. During this time, solar activity actually decreased, as evidenced by

[9] Little Ice Age: a period in which Europe, North America, and Asia were subjected to much colder temperatures. This period is marked by the rapid expansion of glaciers with three prominent cold intervals occurring in 1650, 1770, and 1850.

decreases in solar sunspots[10], accounting for the cooler temperatures felt at Earth's surface (p. 364). Natural consequences of a negative feedback loop in the carbonate-silicate cycle in conjunction with shifting plate tectonics account for the overall decrease in atmospheric CO_2. However, recent surges in human populations and technological advances are now exerting a significant influence on Earth's systems, including local climate systems (p. 11). The effects of human activity are readily seen in both the atmosphere and at Earth's surface, which are altering natural systems at coarse- and fine-scales. Furthermore, these alterations are occurring at a faster rate today than they have at any previous time in Earth's history (IPCC, 2014; Kump et al., 2010).

The PNW continues to experience variability in its climatic regimes. Natural variability events, such as El Niño (El Niño-Southern Oscillation)[11] and La Niña[12], along with the Pacific Decadal Oscillation (PDO)[13], continue to play an important role in influencing the region's climate. For example, El Niño/La Niña and PDO events can tilt weather patterns towards warmer and drier winters or cooler and wetter winters even as rising greenhouse gas emissions influence long-term regional temperature trends (Climate Impacts Group, 2018). "Natural variability has generally favored cooler and

[10] Sunspot: a dark area of lower-than-normal temperature on the surface of the sun due to a kink in the magnetic field that inhibits convection (Kump et al., 2010, p. 346).

[11] El Niño -Southern Oscillation: a climatic event in the tropical Pacific Ocean in which the main area of surface convection moves from the western to the central Pacific. This event is associated with large-scale changes in the ocean circulation, the atmospheric circulation, and tropical precipitation patterns. The effects of an ENSO event may also spread beyond the tropics, causing anomalous weather conditions in many mid-latitude locations (Kump et al., 2010, p. 3).

[12] La Niña: The opposite phase of the Southern Oscillation from El Niño conditions. It represents a stronger or more extreme version of the normal circulation in the tropical Pacific (Kump et al., 2010, p. 5).

[13] PDO: a long-lived El Niño-like pattern of Pacific climate variability; extremes in the PDO pattern are marked by widespread variations in the Pacific Basin and the North American climate (NOAA, n.d.).

wetter conditions in the PNW over the last fifteen years," with eight La Niña winters and 111 months of cool phase PDO (Climate Impacts Group, 2018). Therefore, annual temperature trends over this time show cooling, with fine-scale regional variation (Climate Impacts Group, 2018).

Ongoing natural variation will continue to influence periodic local and regional cooling events throughout the PNW despite an overall global and regional temperature rise over the long-term in response to rising greenhouse gas emissions (Climate Impacts Group, 2018). In fact, natural variability is predicted to have a larger influence on the PNW temperatures than anthropogenic-induced climate change for the next twenty to thirty years (Climate Impacts Group, 2018). However, this prediction does not displace the urgency in reducing greenhouse gas emissions, nor does it dismiss climate impacts on PNW landscapes. "It simply means that the year-to-year and decade-to-decade variations that are a natural part of our climate have recently diminished the influence of greenhouse warming on regional temperatures," or in other words, natural variability has the potential to mute larger impacts driven by shifting global regimes related to temperature (Climate Impacts Group, 2018).

Understanding the consistent influence of natural variability serves as an important component in climate projections and our ability to prepare for future conditions. Many land management strategies related to restoration and habitat protection already account for natural climate variability, which may support flexibility in future adaptation and mitigation strategies as climate trends continue to change. However, climate trends in the PNW over the last century have shown a general increase in the frequency of extreme weather events and warming (Climate Impacts Group, 2018;

Kunkel et al., 2013). The PNW has warmed by an average of 1.3°F between 1895 and 2011, with statistically significant warming occurring in summer, fall, and winter seasons (Climate Impacts Group, 2018; Kunkel et al., 2013; Mote, 2003). Furthermore, data indicates that all but five years between 1980 and 2011 were warmer than the average temperatures from 1901-1960, increasing the frequency of warmer extremes and mitigating cooler averages (see Figures 7 & 8) (Climate Impacts Group, 2018; Mote, 2003). Effects have resulted in the increased frequency of heat events west of the Cascades, along with an average increase in the frost-free season of about thirty-five days (Climate Impacts Group, 2018; Kunkel et al., 2013). Recent studies suggest that anthropogenic-induced pressures serve as the main predictor in climate models accounting for the rapid warming trend due to exacerbated levels of CO_2 and other greenhouse gases (see Figure 9); natural factors alone failed to explain the observed warming (Abatzoglou, Rupp, & Mote, 2014).

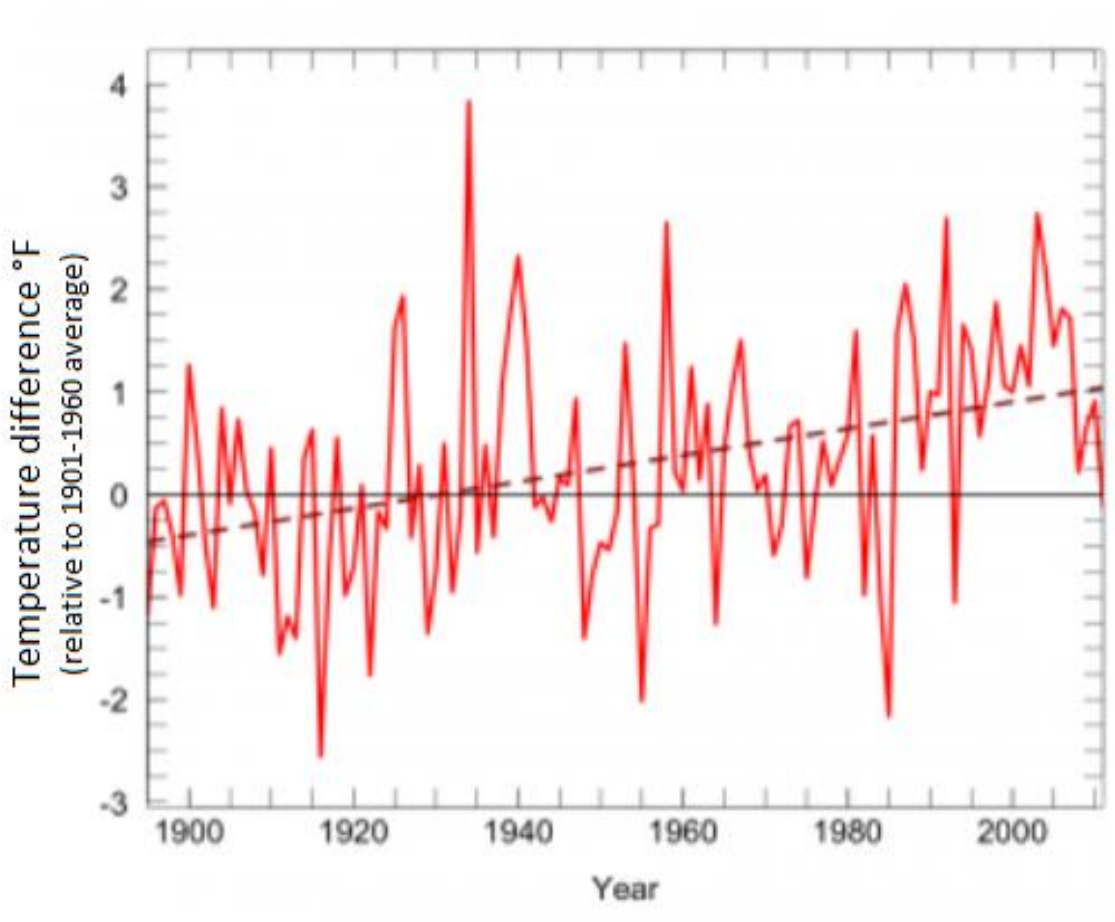

Figure 7. Rising temperatures in the Pacific Northwest. This figure, adopted from University of Washington's Climate Impacts Group, illustrates the average annual temperature (red line) shown relative to the 1901-1960 average (solid line). The dashed line is the fitted trend, indicating the +0.13°F per decade warming for 1895-2011. Citation: Climate Impacts Group. (2018). Climate Change: Observed Changes in the Climate. Retrieved from https://cig.uw.edu/learn/climate-change.

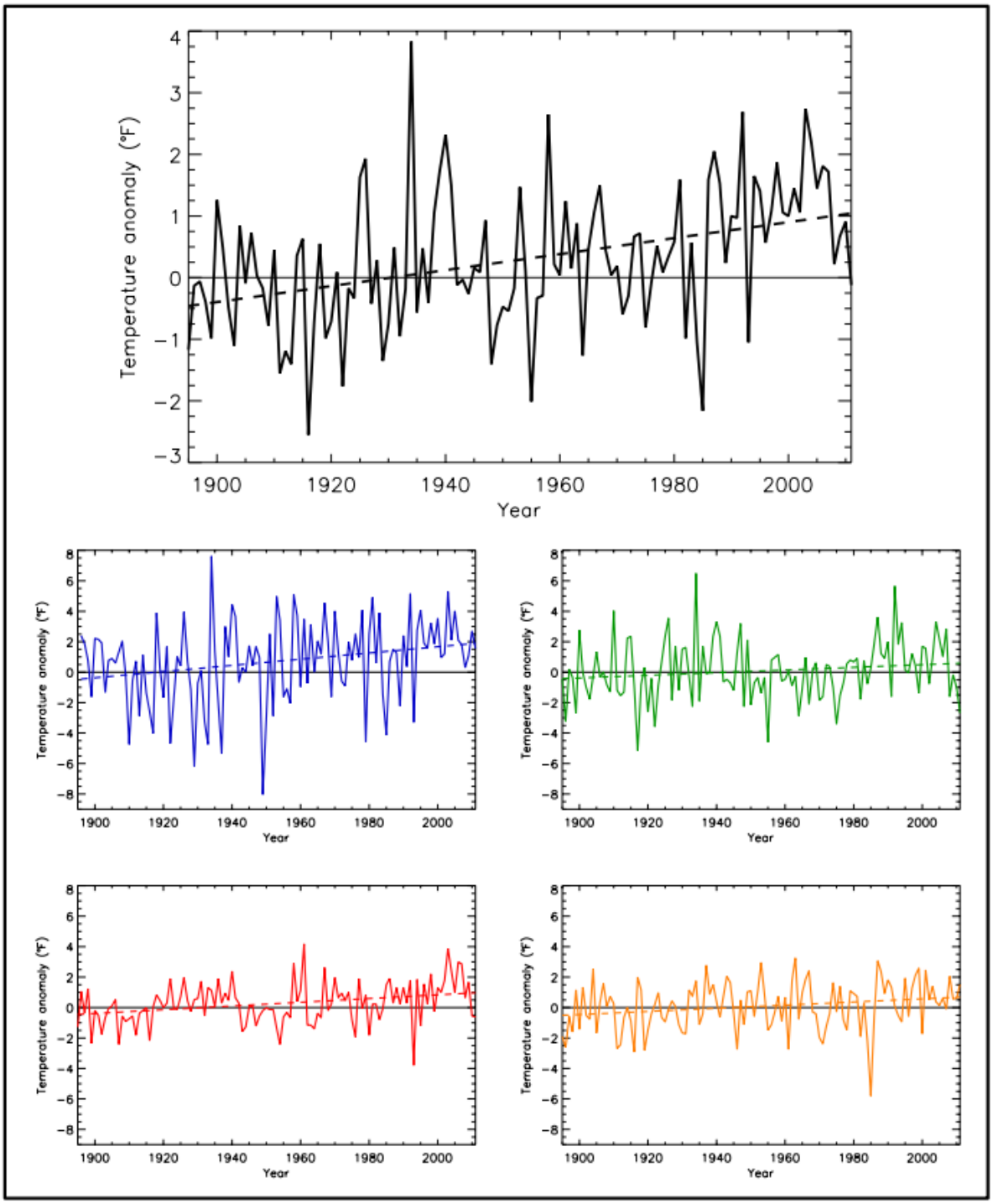

Figure 8. Temperature deviations from the 1901-1960 average. This figure, adopted from Kunkel et al., 2013, p. 19, illustrates temperature anomalies for annual (black), winter (blue), spring (green), summer (red), and fall (orange) seasons in degree Fahrenheit for the PNW based on gridded data from the National Climatic Data Center. Dashed lines indicate the best fit line. Trends are upward and statistically significant annually and for winter, summer, and fall. Citation: Kunkel et al. (2013). *Regional Climate Trends and Scenarios for the U.S. National Climate Assessment*: Part 9 (NOAA Technical Report NESDIS 142-9). NOAA National Environmental Satellite, Data, and Information Service, Washington, D.C.

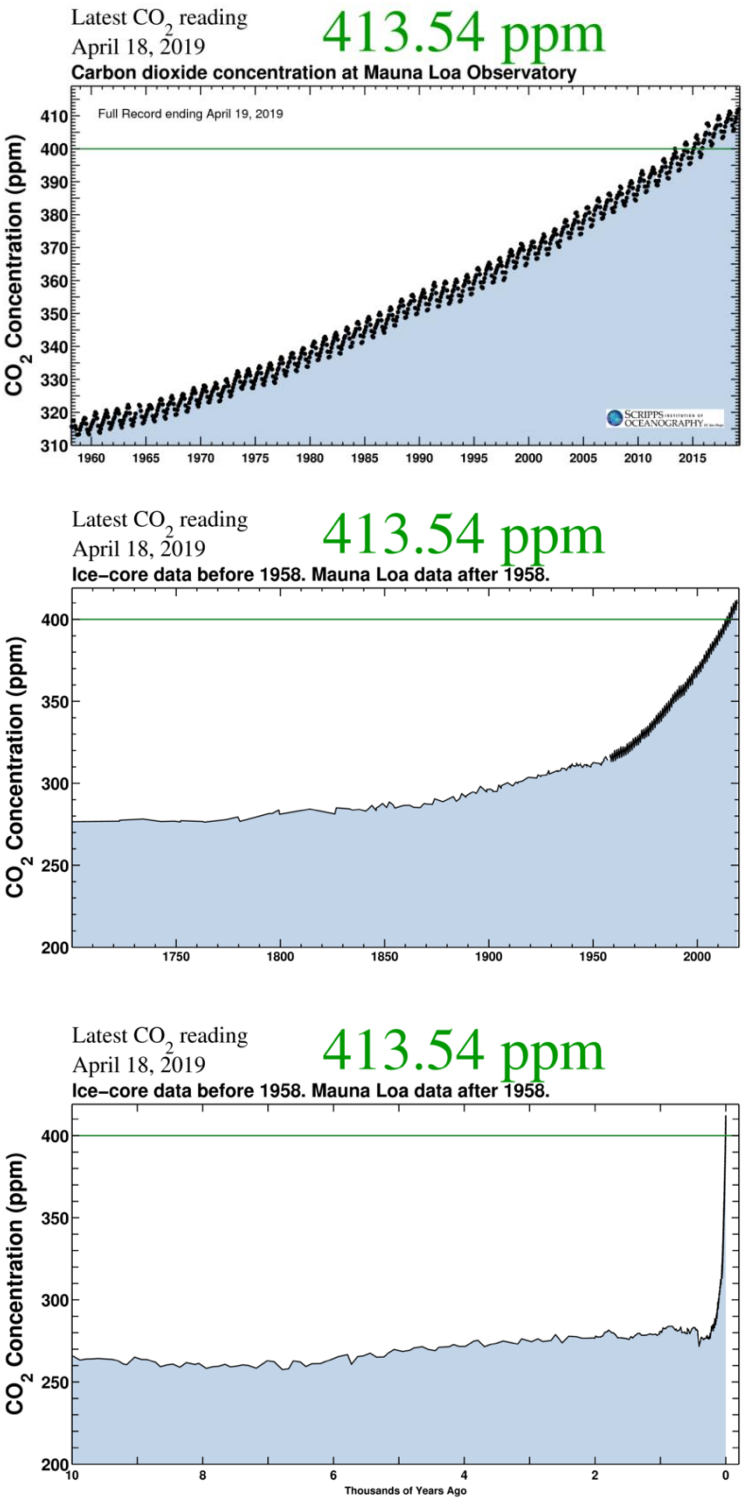

Figure 9. The Keeling Curve. This figure, adopted from Scripps Institution of Oceanography, April 18, 2019, illustrates the Scripps CO_2 measurements taken at Mauna Loa. The graphs show the accumulation of CO_2 in the Earth's atmosphere over various timeframes. Pre-industrial (i.e. pre fossil-fuel burning) CO2 levels ranged between 200-280 ppm. Citation: Scripps Institution of Oceanography. (2019). The Keeling Curve: Latest CO2 reading. Retrieved from https://scripps.ucsd.edu/programs/keelingcurve/

Regional impacts of increased average temperatures extend well beyond episodic warming events. Spring snowpack, for example, has continued to decline in Washington's Cascades since the mid-twentieth century (Abatzoglou et al., 2014). Most of Washington's glaciers have also experienced a seven to forty-nine percent decline since the early 1900's (Climate Impacts Group, 2018). Alterations in regional snowpack and glacial declines have affected streamflow patterns, resulting in earlier spring peak streamflow (Climate Impacts Group, 2018; Abatzoglou et al., 2014; Stewart, Cayan, & Dettinger, 2005). Scientific observations also indicate a long-term increase in spring precipitation, accompanied by decreased summer and autumn precipitation, which have resulted in ongoing climatic water deficits over the past four decades (Abatzoglou et al., 2014). Declining snowpack and changes in soil moisture have affected the establishment, growth, and distribution of tree species in forested landscapes, affecting the spatial distribution and overall productivity of many ecologically and economically important landscapes (Climate Impacts Group, 2018). In addition, alterations in temperatures and precipitation events have started to impact species and fine-scale habitats; areas once suitable for many plants and animals are rapidly shifting, displacing populations that are unable to move or adapt fast enough to keep up (Climate Impacts Group, 2018).

Future trends of the PNW. All climate model projections for the PNW indicate that warming has occurred in the 21st century (Climate Impacts Group, 2018). Despite natural climate variation, greenhouse gas emissions continue to rise at an unprecedented rate, resulting in more severe global, regional, and local impacts (IPCC, 2018). Anthropogenic-induced climate change through fossil fuel burning and agricultural practices will continue to alter climate regimes at each of the aforementioned levels

(IPCC, 2014). “The combined effects of [anthropogenic-induced] climate change and climate variability in the Pacific Northwest are expected to result in a wide range of impacts for the region’s communities, economy, and natural systems. These include projected changes in water resources, forests, species and ecosystems, oceans and coasts, infrastructure, agriculture, and human health” (Climate Impacts Group, 2018; Wuebbles et al., 2017; IPCC, 2014). Such impacts have ramifications for the landscapes across Washington State, requiring a multifaceted approach to land management and conservation strategies.

The Climate Change Impacts Assessment conducted by the University of Washington Climate Impacts Group predicts that the PNW will foremost experience warmer average annual temperatures and altered hydrologic regimes during all four seasons (Climate Impacts Group, 2018). Predictions suggest increased winter precipitation in the form of rain instead of snow, increased summer drought, decreased snowpack, sea level rise, increased coastal ocean temperatures, and increased ocean acidification, in addition to increased extreme weathering events (Climate Impacts Group, 2018). Localized impacts include increased stream temperatures, decreased summer stream flows, changes in streamflow timing and flood risk, shifts in species distribution and abundance, and changes in species community composition (Climate Impacts Group, 2018).

Historically, the PNW has operated under a Mediterranean-like climate, where average annual precipitation falls between 125mm to 600mm in the form of winter snow-rain, spring rain, and summer rain events (Schillinger et al., 2010). However, due to the impacts of climate change, the PNW will become noticeably drier, with up to 25%

reductions in summertime precipitation within the next forty years (Walthall et al., 2013). With substantial increases in atmospheric GHGs, the emerging summer precipitation patterns will continue to decline (p. 31), resulting in an agricultural crisis for dryland farmers in the east who rely on summer rain to subsidize the decline in winter soil moisture reserves (Williams et al., 2014). Although many models indicate that the winter precipitation will increase by 10-30% within the coming century due to natural variability, the proportion of precipitation coming in the form of heavy, very heavy, and extreme daily precipitation events will increase by 1.7%, 2.5%, and 3.3% per decade, respectively, thus altering the historic snow-rain winter regime to a heavy rain-fed regime (Walthall et al., 2013, p. 23). As a result, winter precipitation events will become rain-dominant, with increases in rainfall intensity and frequency, which evince a substantial increase in soil erosion rates.

Warmer temperatures projected for the PNW result in later snowfall and earlier snowmelt, both critical factors that impact entire ecosystems as well as water resource management decisions (IPCC, 2014). Gould and colleagues (2016) demonstrated that the Salmon River Basin, an important water resource in the Palouse bioregion, for example, will experience an earlier seasonal peak flow by one to two months under future climate scenarios. A reduction in winter snowpack and warmer annual temperatures result in the earlier peak. With increased snowmelt and rain-dominant precipitation events, it can be inferred that critical water resources, such as the Salmon River Basin, will experience dramatic shifts in runoff and displaced sediment yields, which will impact natural and synthetic irrigation processes for Palouse croplands. In addition, Gould et al. (2016) found a direct link to sediment yield and wildfire, showing that an increase in sediment

yield corresponds to an increase in fire severity. This suggests that earlier snowmelt will result in an earlier displacement of sediment yield (i.e. soil) into valleys of the scabland-rich bioregion, which may encourage earlier and more severe wildfire in conjunction with predicted increased temperatures and drought regimes. This will have significant ramifications for Washington's economy, which yields well over $500 million annually from cereal crops grown in the region alone (Eigenbrode, 2014).

Although considered at the ecological scale, many of these climate change impact predictions will bare significant consequences on the social and economic aspects of Washington State communities. For example, most climate change impacts are likely to increase the potential for damage and service disruptions on the longevity and performance of built infrastructure (Climate Impacts Group, 2018). In addition, Washington crop and livestock agriculture will succumb to increased temperatures and water stress with declining water availability, rising CO_2 levels, and changes in pressures from insects, weeds, and pathogens (Climate Impacts Group, 2018). Furthermore, climate change is expected to affect both the physical and mental health of Washington citizens by altering the frequency, duration, and intensity of climate-related hazards (Climate Impacts Group, 2018). With many ramifications in place, the need for more robust conservation initiatives will be essential, yielding the potential to protect natural resources that sustain impacted communities. However, the notion of conservation itself is not immune to the impacts of climate change, especially as anthropogenic forcings continue to increase. Conservation values will shift, even displacing values altogether as species and lands disappear. Managers laden with climate challenges will have to rethink conservation priorities to ensure that lands and their services are well suited for coming

disturbances. Land trusts and akin organizations will need to account for potential climate impacts when targeting landscapes for conservation, especially when operating under the promise of perpetuity.

Environmental pressures on conservation & land trust response

An introduction. Owley and colleagues (2018) recognized that climate change has, and will continue to have, significant consequences for land conservation. Climate change will continue to alter ecosystem functions as systems respond to perturbations, affecting species vitality, distribution, and fecundity (Owley et al., 2018; Reside, Butt, & Adams, 2017; IPCC, 2014; Hannah et al., 2002). Changes associated with these perturbations may compromise the conservation values and goals for myriad landscapes – both for currently and future conserved lands (Owley et al., 2018; Owley, 2011; Rissman, 2011). In addition, climate change will continue to alter the methods and strategies utilized by conservation organizations, ultimately raising questions about the effectiveness and adaptability of acquisition tools and planning initiatives (Owley et al., 2018; Reside et al., 2017; Owley, 2011; Rissman, 2011). Furthermore, strategies in place may not account for future efforts of adaptability and flexibility needed to ensure conservation outcomes in dynamic landscapes over time, increasing the potential of exacerbated climate impacts (Owley et al., 2018; Hannah et al., 2002). Therefore, land managers have a responsibility for implementing strategies that account for regional climate impacts. However, many land managers, including land trusts, are limited in their capacity to do so. The following section details perceived challenges environmental pressures may have on land trust ability to conserve landscapes in perpetuity,

highlighting inconsistencies in response strategies that may, or may not, thwart climate resiliency efforts.

Perceived challenges. Over time, human activity has influenced wildland ecosystems in two major ways: 1) by changing climate through greenhouse gas emissions, and 2) by changing habitats through shifts in land-use and land-conversion (Hansen et al., 2016). Together, these impacts have significant ramifications for natural ecosystems and their associated services (Owley et al., 2018; IPCC, 2014; Kump, 2010; Hannah et al., 2002). Human activities, such as the burning of fossil-fuels and exploitation of natural resources, have altered many natural systems into a state of disarray (Owlet et al., 2018; IPCC, 2014). The composition of land, water, and seascapes, along with the natural communities that inhabit them, continue to feel effects from the rate of increasing climate change (IPCC, 2018; Owley et al., 2018; IPCC, 2014). As functioning ecosystems are compromised, both social and ecological communities are disturbed (Owley et al., 2018; Hannah et al., 2002).

Land trusts across Washington State deliver conservation initiatives in landscapes that have experienced and will continue to experience climate impacts (Land Trust Alliance, 2019). Such impacts will have ramifications for nearby communities, albeit positive or negative. Environmental pressures induced by climate change, such as sea level rise, loss of habitat, and altered species composition, will affect land trusts and their ability to facilitate conservation across the state under current practices (Owley et al., 2018). Because conservation priorities include ecological, social and economic components, impacts will disproportionately affect certain regions and their associated landscapes over others. Therefore, strategic planning initiatives will need to account for,

and consider, the socio-ecological and economic impacts of conservation priorities, goals, and strategies of implementation. Traditional tools utilized for conservation, for example, will need to be examined and adjusted in order to be effective in the face of climate change (Reside et al., 2017).

Acquisition currently serves as the primary strategy land trusts utilize to facilitate conservation and conservation initiatives. Common forms of acquisition include conservation easements, which can be described as legal agreements between a landowner and a land trust that limit certain property uses, and fee acquisition, which can be described as the out-right donation or sale of a property to a land trust for permanent stewardship and protection (WALT, 2019). However, Fairfax and colleagues (2005) distinguish four specific problems associated with acquisition as a conservation strategy: 1) acquisition is costly, 2) acquisition emphasizes the needs of sellers, 3) acquisition obscures public accountability, and 4) acquisition is not guarantee of control (pp. 11-18). Furthermore, research on climate change and land acquisition indicates that acquisition as a conservation strategy is further compromised by the impacts associated with climate change (Owley et al., 2018; Owley, 2011; Rissman, 201). For example, Owley et al. (2018) note that the purpose sections of conservation easements, which typically state conservation goals, will likely become obsolete as certain goals will no longer be achievable under climate change, ultimately acquitting the contract. In addition, Owley et al. (2018) also suggest that individual restrictions or obligations written into conservation easements may no longer be possible as landscapes, ecosystems, and habitats respond to perturbations, ensuing grounds for further acquittal. Restrictions written into conservation easements may also directly conflict with climate-change mitigation and adaption

strategies, reducing the usefulness and long-term viability of the tool (Owley et al., 2018).

Although fee acquisition properties generally avoid aforementioned legal challenges, many land trusts are limited in funding necessary to complete an out-right purchase of a property. Because land trusts operate under a nonprofit model, they are subject to evolving financial and funding sources, relying on grant revenue and philanthropic support from community members and foundations (Land Trust Alliance, 2019). Adequate funding, therefore, may not be readily available to support a property purchase (Reside et al., 2017). Furthermore, many land trusts generate a management plan to detail the conservation values and strategies associated with a conserved property under trust ownership. Climate change impacts may alter such values and strategies, requiring personnel to reevaluate and revise the plan in place.

Management strategies related to restoration and stewardship are also subject to climate change impacts. Traditional restoration practices, for example, focus on species' persistence by providing services that restore components of a system to ensure ideal functioning. In order for these restoration services to be effective, they need to account for adequate spatial understanding, such as habitat type, patch size and connectivity (Reside et al., 2017). Climate change impacts have the potential to alter such spatial aspects, resulting in unforeseeable challenges in restoration planning. Furthermore, land trusts have traditionally incorporated the use of stewardship in order to maintain conservation efforts on conserved lands in perpetuity (Land Trust Alliance, 2019). However, stewardship services require continual maintenance and management of conserved properties to ensure that conservation goals and agreements are being met;

thus requiring an increase in resources as more landscapes are conserved (Owley et al., 2018). Additionally, landscapes are dynamic, making conservation in perpetuity a challenge. As climate change impacts continue to exacerbate the rate of change on myriad landscapes, conservation values may be lost in entirety.

Land trust response & solutions. Research conducted by Reside, Butt, and Adams (2017) indicates that a consideration of climate change in conservation planning is widely acknowledged. However, the research went further on to indicate that major barriers exist within planning to properly account for and implement strategies related to climate change adaptation and mitigation (Reside et al., 2017). Many strategies lack an understanding of the impact climate change has on target species, natural processes and ecosystems (Reside et al., 2017). In addition, many strategies lack guidance on how to incorporate climate information into on-ground actions, which is further complicated by a lack of funding to support implementation of climate change adaptation and mitigation strategies (Reside et al., 2017).

Many conservation organizations, including land trusts, prioritize species as the most common conservation focus, followed by geophysical diversity and ecosystem protection (Reside et al., 2017). In order to achieve goals related to the conservation focus, organizations primarily implement strategies related to protection, restoration, reintroduction and translocation (Reside et al., 2017). In consideration of climate change adaptation strategies, organizations were found to likely prioritize acquisition of newly protected areas, followed by implementation of ongoing stewardship to adequately manage conserved lands (Reside et al., 2017). Newly protected areas were primarily targeted for their contribution to habitat connectivity, however, conservation planning for

targeted landscapes rarely accounted for uncertainty in achieving conservation goals in perpetuity (Reside et al., 2017).

In order to support conservation priorities related to species protection and vitality, many conservation organizations have expanded their habitat- and land-type focus to account for geophysical diversity (Reside et al., 2017). Accounting for geophysical diversity in conservation planning has been readily perceived as an effective tool to mitigate climate change impacts (Reside et al., 2017). However, an overly prescriptive focus on species range change under climate change may negate co-occurring adaptations, such as genetic adaptation, phenotypic plasticity, microhabitat adjustments, and changes in phenology (Reside et al., 2017). Therefore, practices related to the expansion of geophysical diversity through acquisition of more diverse landscapes, should account for natural changes in species range change in conjunction with climate change pressures.

With a high rate of both ecosystem change and associated climate impacts, effective systematic conservation planning will become increasingly important. The Land Trust Alliance has recognized this need and has responded through the development of climate change strategies and best practices (Land Trust Alliance, 2019). In January 2017, the Alliance launched a new program to help land trusts address climate change that will provide the organizations with the strategies, training and tools needed to both adapt and mitigate climate change in their conservation work (Land Trust Alliance, 2019). Goals of the program address needs through ongoing partnerships that deliver training and tools for incorporating climate science into acquisition and stewardship planning, promote carbon offset opportunities through enhanced soil and vegetation land

attributes, and empower land trusts to support the build-out of renewable energy facilities away from sensitive lands (Land Trust Alliance, 2019). The Land Trust Alliance recognizes that "the land trust community has a moral obligation to address the climate crisis" and are actively working on viable strategies and solutions to mitigate impacts through ongoing conservation work that prioritizes the conservation of more land and effective stewardship.

There has been an increase in the amount of research evaluating climate change impacts on conservation. Recent studies have also addressed how conservation organizations can include more flexibility in conservation planning to effectively account for climate change adaptation and mitigation strategies (Owley et al., 2018; Das, 2018; Reside et al., 2017; Owley, 2011; Rissman, 2011). Reside et al. (2017) suggest that organizations should explicitly state objectives related to climate change adaptation in strategic planning and management documents, in addition to implementing systems that quantify uncertainty, as well as expand conservation objectives to account for multiple goals on conserved lands, such as the protection of species, ecosystems, geophysical diversity and ecological processes" (p. 1). Owley et al. (2018) suggest that organizations think critically before implementing easements on properties, encouraging assessment and analysis for multiple conservation values that have the flexibility to change as landscapes change. Furthermore, Owley et al. (2018) suggest that conservationists spend more time focusing on the land, actively managing the landscape to prevent some of the ill effects of climate change and to keep the synchronicity between the conservation easement terms and evolving landscape (p. 200).

Synthesis. The reviewed literature indicates that environmental pressures associated with climate change are multifaceted and dynamic. Landscapes are subject to increased pressures resulting from altered hydrologic processes, increased temperatures, sea level rise, and ecosystem vitality. Collectively, these pressures have significant ramifications for the ecological, social and economic benefits derived, impacting community livelihood and well-being. Conservation efforts play an important role in sustaining natural resources and environmental benefits, however, climate change impacts will challenge many of the conservation strategies and tools in place. Thus, conservation planning will need to be re-envisioned to adequately ensure the continuity of natural resources and benefits in the era of heightened climate change through anthropogenic and natural forcings. Ongoing research examining the effects of climate change on conservation have proposed promising strategies to enhance climate resiliency. However, many conservation organizations lack the needed support and funding to implement such strategies. The following research component of this thesis examines the aforementioned complexities across Washington State land trusts, evaluating how they are responding to the climate crisis through conservation initiatives.

CHAPTER TWO

THE WASHINGTON STATE STUDY

"It is a wholesome and necessary thing for us to turn again to the earth and in the contemplation of her beauties to know the sense of wonder and humility."
– Rachel Carson, The Sense of Wonder

Methodology

Qualitative study design & purpose. The purpose of this study is to provide supplementary research to compliment the ongoing examination of climate change and conservation efforts proposed by land trusts across the contiguous United States. This study examines the extent to which Washington State land trusts are responding to climate change and climate-induced environmental pressures to meet conservation goals on conserved landscapes. Assessing if, how, and why land trusts are adapting their land management strategies to support conservation as these landscapes succumb to climate pressures will inform how private land management contributes to the state's climate resiliency. The study design uses two primary methodologies in a qualitative, social science tradition: 1) content analysis, and 2) interview analysis. Data collection incorporates both primary (i.e. collected) and secondary (i.e. existing) data to help establish a connection between working processes (i.e. documentation) and personnel recognition of climate change. The research was conducted in two stages beginning with content analysis of land trust missions statements and strategic planning documentation followed by land trust personnel interviews. Information collected revealed whether land trust management procedures address climate change and/or if management strategies allow for flexibility in climate mitigation and adaptation strategies (e.g. easement amendments).

Seventeen accredited land trusts in Washington State were selected to participate in this study. The Washington Association of Land Trusts (WALT) recognizes twenty-five nonprofit organizations across the state dedicated to land conservation (WALT, 2018). However, at the time this project was initiated, only seventeen of the twenty-five organizations held accreditation status through the Land Trust Alliance. Accreditation overseen by the LTA Commission ensures that a land trust has successfully implemented standards and practices outlined by the Land Trust Standards and Practices document. Accreditation through a third-party verification of the standards offers the assurance that a land trust can keep the promise of perpetuity and that it is worthy of the public trust (Land Trust Alliance, 2018). In addition, an impact evaluation completed in 2018 reveals that accreditation results in increased stakeholder confidence in land trusts and land conservation, and that accredited land trusts are more likely to make positive organizational improvements (Szabo, 2018). In recognition of the standards set-forth by the LTA Commission, the examination of Washington State accredited land trusts ensured that all subjects of this study successfully met legal requirements and are in compliance with national standards for land conservation management. Table 1 provides an overview of the seventeen accredited land trusts, including the year each land trust was founded, region of operation, mission statement, and title of strategic planning document examined, with year of plan implementation.

Table 1

Seventeen accredited land trusts of Washington State with year founded, ecoregion, county/ies of operation, mission statement, and strategic planning document examined with plan implementation year(s). Ecoregions defined by the Washington Department of Fish & Wildlife, 2005.

Land Trust	Year Founded	Ecoregion & County/ies of operation	Mission Statement	Strategic Planning Document Title	Plan Year
Bainbridge Island Land Trust	1989	Puget Trough; Kitsap County	"To preserve and steward the diverse natural environment of Bainbridge Island for the benefit of all"	Conservation Plan Update	2018-2028
Blue Mountain Land Trust	1999	Blue Mountains; Columbia Plateau Walla Walla County; Garfield County; Columbia County; Asotin County;	"To protect the scenic, natural, and working lands of the Blue Mountains region through collaboration with communities and landowners"	Strategic Plan	2019-2022
Capitol Land Trust	1987	Northwest Coast; Puget Trough; Mason County; Thurston Count; Grays Harbor County; Lewis County	"To further collaborative and strategic conservation of southwest Washington's essential natural areas and working lands"	Capitol Land Trust Strategic Plan	2016-2020
Chelan-Douglas Land Trust	1985	East Cascades; Chelan County; Douglas County	"We engage communities in conserving, caring for, and accessing the natural lands and waters that sustain North Central Washington"	Chelan-Douglas Land Trust Strategic Plan	2016-2020
Columbia Land Trust	1990	Northwest Coast; West Cascades; East Cascades; Columbia Plateau; Benton County; Kickitat County; Skamania County; Clark County	"Conserve and care for the vital lands, waters, and wildlife of the Columbia River region through sound science and strong relationship"	*Conservation Agenda	2017-2042
Forterra	1989	Northwest Coast; Puget Trough; North Cascades; West Cascades; East Cascades; Kittitas County; King County; Snohomish County; Pierce County; Lewis County; Pacific County; Grays Harbor County; Jefferson County; Clallam County; Mason County; Kitsap County; Thurston County; Skagit County	"Forterra secures land for a sustainable future"	Forterra 2015 Progress Report	2015-2025
Great Peninsula Conservancy	2000	Northwest Coast; Puget Trough; Kitsap County; Mason County	"Protecting forever the natural habitats, rural landscapes, and open spaces of the Great Peninsula of Washington's Puget Sound"	Strategic Plan	2016-2020
Jefferson Land Trust	1988	Puget Trough; Jefferson County	"We are working with the community to preserve open space, working lands and habitat forever"	Conservation Plan	2010-2110

Lummi Island Heritage Trust	1998	Puget Trough; Whatcom County	"To create a legacy of abundant open space, native habitat, and natural resources on Lummi Island by inspiring people to protect and care for the island's farms, forests, wetlands and shorelines forever"	Strategic Plan	2019-2023
Methow Conservancy	1996	Okanogan; Okanogan County	"To inspire people to care for and conserve the land of the Methow Valley, ensuring it will remain a place where future generations can enjoy the rural character and natural beauty we cherish today"	2018-19 Strategic Plan	2018-2019
Nisqually Land Trust	1989	Puget Trough; Lewis County; Pierce County; Thurston County	"To acquire and manage critical lands to permanently benefit the water, wildlife, and people of the Nisqually River Watershed"	Strategic Direction	2016-2020
North Olympic Land Trust	1989	Northwest Coast; Clallam County	"To conserve lands that sustain the communities of Clallam County"	*Conservation Plan	2018-2023
PCC Farmland Trust	1999	All – entire state	"To secure, preserve, and steward threatened farmland across Washington State"	PCC Farmland Trust Strategic Plan	2012-2015
San Juan Preservation Trust	1979	Puget Trough; San Juan County	"To preserve and protect open spaces, scenic views, forests, agricultural lands, habitats, watersheds, riparian corridors, wetlands and shorelines in the San Juan Archipelago"	Vision & Mission statements	N/A
Skagit Land Trust	1992	North Cascades; Puget Trough; Skagit County	"Conserving wildlife habitat, agricultural and forest lands, scenic open spaces, wetlands, and shorelines for the benefit of our community and as a legacy for future generations"	Conservation Strategy	2018
Whatcom Land Trust	1984	North Cascades; Puget Trough; Whatcom County	"To preserve and protect wildlife habitat, scenic, agricultural and open space lands in Whatcom County for future generations by securing interests in land and promoting land stewardship"	Cascades to Chuckanuts Conservation Plan with 2017 updates	2004 / 2016-2017
Whidbey Camano Land Trust	1984	Puget Trough; Island County	"To actively involve the community in protecting, restoring, and appreciating the important natural habitats and resource lands that support diversity of life on our islands and in the waters of Puget Sound"	Land Protection Plan	2018-2023
Notes: Asterisks (*) indicates that document was recommended by land trust staff					

Data collection procedures.

Content analysis: mission statements & strategic planning documents. The following research is supported through content analysis of two types of organizational documents: 1) mission statement, and 2) strategic planning document. A mission statement serves as a formal summary of the aims and values of an organization; therefore, I chose to evaluate mission statements to gain a sense of the general conservation aims and values across Washington State. Strategic planning documents, more formally known as a strategic plan or conservation plan, are also analyzed herein because they serve as the organization's guiding document in setting organizational priorities, goals, and strategies; often, a strategic plan serves as the organization's promise, or commitment, to the surrounding community. According to the National Council of Nonprofits:

> "A strategic planning process identifies strategies that will best enable a nonprofit to advance its mission [where] ideally, as staff and board engage in the process, they become committed to measurable goals, approve priorities for implementation, and also commit to revisiting the organization's strategies on an ongoing basis as the organization's internal and external environments change" (National Council of Nonprofits, 2019).

The Land Trust Alliance details resilience as a primary strategy in their strategic conservation goals for 2018-2022, stating their resilience objective as the ability to "defend the land trust community from threats that endanger specific conserved lands and the viability of the entire community" (Land Trust Alliance, 2018). One strategy to achieve this goal is to "increase the capacity of land trusts to address emerging threats to the landscape, such as…climate change" (Land Trust Alliance, 2018). Because of their membership to, and accreditation through the Land Trust Alliance, I was interested in assessing whether the strategic goals of the Alliance were reflected in the mission

statements and strategic plans of the seventeen examined land trusts in Washington State. In addition, I sought to examine the ways in which Washington State accredited land trusts discuss climate-related challenges, if at all, as reflected in their mission statements and strategic plans, then compared these findings with organizational interviews (see Comparative Analysis section).

Basic content analysis methods described by Drisko & Maschi (2015) supported the assessment of mission statements and strategic planning documents. According to Drisko & Maschi (2015) "basic content analysis is defined by its use of quantitative analytic methods and typical use of existing documents […where] results are used to empirically document a perceived social problem and as evidence from which to abductively[14] advocate for change." Basic content analysis draws heavily on both deductive and inductive coding systems. Deductive coding schemes and categories are designed to collect content that requires little or no interpretation by the coder (Drisko & Maschi, 2015; Baxter, 1991, p. 239). Data analysis, therefore, can be quantified through the use of descriptive[15] statistics or used in quantitative comparative analysis, such as word frequencies and counts of common themes (Drisko & Maschi, 2015). Deductive codes are generated a priori, where the "researcher's area of interest and preliminary codes are developed prior to data collection and analysis drawing on existing theoretical and empirical work" (Drisko & Maschi, 2015, p. 2). Inductive codes, on the other hand,

[14] Abductive arguments link an observation with a hypothesis that accounts for or explains the observation. In abductive reasoning the premises do not guarantee the validity of the conclusion; it is an inference only to a plausible explanation (Drisko & Maschi, 2015; Krippendorff, 2013; Reichertz, 2010).

[15] Descriptive research designs provide information that details the character and quality of a sample; they are used to build upon the new terminology, definitions, concepts, and preliminary theory previously developed (Drisko & Maschi, 2015).

emerge organically through ongoing analysis to reveal patterns, resemblances and regularities that support the formation of conclusions and theory. Grounded theory, an inductive approach developed by Glaser and Strauss (1967), requires the researcher to begin their inductive analysis without any preconceived idea(s) of what will be found. Grounded theory requires repeated observation and re-analysis in order to identify emerging themes, which may support the development of novel theory (Glaser & Strauss, 1967). Both deductive and inductive codes were generated for each mission statement and examined strategic planning document through an open coding process supported by Atlas.ti, a qualitative data analysis and research software. Developed codes represent categories, properties, or dimensions related to general conservation goals, values, priorities and strategies within and among Washington State land trusts that reveal a level of climate resiliency.

Mission statements. My examination of land trust mission statements aims to discern: 1) broad conservation priorities, 2) management strategy/ies of achieving conservation priority/ies, and 3) general acknowledgement of climate change. Because mission statements serve as the formal summary of the organization's main values, an assessment of such values explicitly encapsulates the expectations of the organization for conservation and to the community. An assessment of the explicit methods mentioned to achieve the conservation priority/ies provides insight into the management strategies utilized within and among land trusts. Because climate change has the potential to disrupt historical natural processes across Washington State, an assessment of climate change terminology within mission statements may reveal whether land trusts are utilizing strategies that address impacts or are concerned that climate change will influence their

operational region. Following similar protocol to the 2016 Dayer et al. study, which evaluated the discrepancy between land trust mission statements and their conservation priorities, I acquired mission statements verbatim from each land trust's website to examine the extent to which land trusts explicitly mention conservation priorities, management strategies, and climate change. To confirm the authenticity and contemporary use of the acquired mission statement, I compared each statement to the mission statement indicated for the observed strategic plan.

Measures & analysis. Both deductive and inductive codes were generated through an open-coding technique supported by Atlas.ti. Deductive codes were established prior to the analysis and were selected for their reference to management strategies utilized by conservation organizations, habitat and land types recognized by both private and public land management agencies, and climate-related terminology. Deductive coding variables for this study included terminology and frequency counts of: 1) management strategy utilized, 2) ideal duration of conservation effort/s, 3) habitat focus, 4) conserved land-type, and 5) climate-related terminology. Inductive coding variables emerged throughout the examination of mission statements to capture common themes. Inductive codes were analyzed for number of land trusts involved with theme (e.g. how many land trusts acknowledged an operational region in their mission statement) and the evidence used to support their involvement (e.g. explicitly mentioned terminology). Results from both deductive and inductive coding research were compared to common themes identified through the examination of strategic planning documents and to priorities identified by personnel interviews (see Comparative Analysis section).

Strategic planning documents. My examination of strategic planning documentation aims to discern: 1) regional conservation values and priorities, 2) types of management strategies utilized to meet regional conservation goals, and 3) general acknowledgment of climate change. Understanding regional conservation values and priorities reflects agency understanding of Washington landscapes; ultimately detailing the agency's understanding of land-type, -use, and -value to the surrounding community. In addition, an examination of conservation values may provide insight to the type of conservation practiced (e.g. ecological conservation versus community conservation) in correspondence with the current conservation goal(s) outlined by state and federal mandates who often provide primary funding sources for land trusts. An examination of types of management strategies utilized to meet conservation goals may provide insight to the varying threats or conditions impacting landscapes and an agency's response to environmental challenges. For example, use of fee acquisition as opposed to a conservation easement may suggest that an organization intentionally targets landscapes in order to conserve critical and/or threatened habitat to meet a conservation goal. Through direct ownership, a land trust is able to implement their preferred management method to conserve the landscape in perpetuity. On the other hand, land trusts that frequently utilize conservation easements often rely on opportunities to arise, sometimes without prior consensus on the conservation goal(s) supported within that landscape. Finally, an examination of climate change acknowledgement may suggest how Washington State land trusts are understanding and interpreting climate change impacts to regional lands and how this will affect conservation in perpetuity.

Strategic plans were selected using purposive (or relevance) sampling. Under purposive sampling, researchers purposefully select all textual units that contribute to answering a given research question (Krippendorff, 2004). Purposive sampling is used for its potential to yield valuable information regarding a specific topic, or for its potential to clarify the impact of contexts (Krippendorff, 2013; Center for Innovation in Research and Teaching). In addition, textual units selected under homogeneous purposive sampling are theoretically determined to offer depth and or breadth on a specific event, belief, or topic of interest where the sample units (e.g. strategic planning documents) share the same, or very similar, characteristics or traits (Krippendorff, 2013; Center for Innovation in Research and Teaching). I selected the use of strategic planning documents under homogeneous purposive sampling to understand the breadth of conservation values, agency management strategies, and climate change acknowledgment directly representative of accredited land trusts in Washington State.

I acquired the most recent strategic planning document from each of the seventeen land trusts to maximize the potential for the most recent and relevant priorities, goals, and strategies practiced. A majority of the documents comprising the final dataset were acquired via systemic searches of land trust websites. Remaining documents were acquired directly from land trust staff. All documents were selected for their reference to conservation strategic planning. For consistency, I chose to foremost examine documents with “strategic plan” or “strategic direction” in the title. In the event where a land trust did not have a developed “strategic plan,” I chose to examine any available document with “conservation plan,” “conservation strategy,” or “protection plan” in the title. For instances where a land trust had both a “strategic plan” and a “conservation plan,” I

contacted the organization to ask what document they felt more accurately described their current conservation priorities, goals, and strategies.

Measures & Analysis. To identify relevant passages within the strategic plans, documents were examined using four primary categories to capture the breadth of conservation values, agency strategies, and climate change acknowledgement. Categories included: 1) types of conservation priorities, 2) types of management strategies, 3) regional approaches to land conservation, and 4) climate change awareness. The four categories served as the basis of the content analysis with identified descriptive variables. Both deductive and inductive codes were generated through an open-coding technique supported by Atlas.ti. Prior to software use, documents were reviewed by hand to establish a basis of both deductive and inductive codes, which were later translated into software coding schemes for re-analysis. Deductive coding variables for this study included synthesis of: 1) regional scale of organization with regional parameters defined by ecoregion and county/ies of operation, 2) type of conservation focus defined as ecological- or community-oriented, 3) type of conservation goal and supporting strategy with supposed outcome; defined as ecological or community based, 4) terminology presence of climate-related strategies, and 5) terminology presence of conservation priorities examined by habitat- and land-type. Inductive coding variables emerged as documents were examined to capture common themes. Inductive codes were analyzed for number of land trusts involved with theme along with data attribution for basis of evidence used to support their involvement. All documents were reviewed three times to extract themes and categories that reinforced deductive and inductive coding variables related to conservation values, management strategies, regional conservation approaches,

and climate change awareness. Results were compared to common themes identified through the examination of mission statements and personnel interviews (see Comparative Analysis section).

Interview analysis: land trust personnel. As a third component of this research, I conducted a total of thirteen semi-structured qualitative interviews with land trust professionals. According to Tracy (2013), "qualitative interviews provide opportunities for mutual discovery, understanding, reflection, and explanation via a path that is organic, adaptive, and oftentimes energizing" (p. 132). For the purposes of this study, interviews were used to understand: 1) land trust responsibilities and procedures related to conservation land management, 2) acknowledgement of climate-induced environmental pressures, and 3) overall organizational response to climate change.

Information gathered from interviews helped to inform the examination of land trust responsibilities and procedures related to conservation land management across Washington State. The interview questionnaire was designed to gather detailed information about organizational priorities, goals, and strategies directly related to conservation. In addition, the interview questionnaire was designed to gather a sense of climate change awareness and response (see full protocol in Appendix A). Narrative responses from participants revealed whether there was an alignment between the organization's strategic planning (e.g. as described by the strategic planning documents) and strategy implementation (i.e. are land trusts executing management strategies according to their strategic plans); this served as a viable instrument to discern how land trusts are adapting to facilitate conservation on dynamic landscapes. Furthermore, information gathered from interviews informed whether discrepancies exist between land

trust mission statements and reported responsibilities and procedures. To examine the extent to which land trusts acknowledge climate change, interviews included questions about current response strategies to environmental pressures and the perceived impacts of climate change on landscapes held in trust.

Tracy (2013) recognized that the interviewer almost always has more control than the respondent in terms of dialogue direction and topical emphasis; therefore, the interviewer has an obligation to treat the respondent and the resulting data with ethical care (p. 132). To ensure that all ethical considerations were in place, the research design and interview questions were submitted to The Evergreen State College IRB Human Subjects Review Committee. Participants were provided full-project disclosure and consent was obtained (see full protocol in Appendix B and Appendix C).

Sampling & measures. Following similar protocol to the 2018 Owley study, I conducted 40-60 minute interviews with identified land trust professionals following a purposeful sampling[16] methodology with theoretical-construct population samples[17]. Following theoretical-construct sampling methods, participants were identified using job titles on a land trust's staff webpage and/or colleague recommendations. Staff with "conservation director/coordinator/manager," "acquisition director/coordinator/manager," and/or "stewardship director/coordinator/manager" were contacted for interview solicitation by email. Each solicitation included a brief overview of who I was, the general project scope, and participatory benefits. In addition, each solicitation was

[16] Purposeful sampling means that researchers purposefully choose data that fit the parameters of the project's research questions, goals, and purposes (Tracy 2013, p. 134).

[17] Theoretical-construct samples are those that recruit participants or collect data because they meet certain theoretical characteristics or conceptual frameworks (Tracy 2013, p. 136).

accompanied by an attached two-page informational letter that described the project in greater detail.

Eighteen personnel from the seventeen accredited land trusts were identified for interview solicitation. Two personnel at Blue Mountain Land Trust were contacted because each served as "Conservation Director" with one director overseeing conservation efforts in the "North Region" and the other overseeing conservation efforts in the "South Region." Fourteen of the eighteen solicitations were answered and three contacted personnel recommended their colleagues to participate in their place. Solicitations that went unanswered by email for over one week were contacted by phone. Four personnel were contacted by phone with three phone solicitations left unanswered. A total of fourteen interviews were scheduled and responses from thirteen interviews comprise the final dataset for analysis. Participants were provided informed consent documentation by email and the collection of consent documentation occurred prior to each scheduled interview. Interviews were conducted in-person at the land trust office or over-the-phone and were recorded using the Apple QuickTime Player application on a Macbook Pro laptop. Interviews were transcribed verbatim for analysis purposes.

Several interview questions were adapted from Owley et al. (2018) and Dayer et al. (2016) and revised for clarity to fit the Washington State context. Questions were organized thematically within two primary components. The first component included four sections totaling thirty-one questions. Section one asked general questions about job responsibilities, the organization, and conservation goals of the organization. The second section asked general questions about conservation strategies. The third section asked questions about monitoring and stewardship. The fourth section asked questions about

climate change. The second component was designed to ask any unanswered questions I had about the organization's mission statement and strategic planning document examined from the content analysis research. Questions were further revised for clarity throughout the interview process. All revisions were terminology based. For example, the terms "practices/goals" in question seven were revised as "purposes" and the term "promote" was revised as "facilitate" in question eight. Questions were designed to gather information on strategies utilized by the organization; personal perceptions about topics disclosed were not of interest, rather a general understanding of how the organization functions and staff knowledge of disclosed topics were of interest.

Analysis. Interview transcriptions were analyzed through an iterative analysis approach to determine inductive codes. Iterative analysis is a process through which etic (i.e. observer perspective) and emic (i.e. subject perspective) emergent readings of the data are practiced so that the researcher may incorporate the active interests, current literature, and various theories into data synthesis (Tracy, 2013). This process allows the researcher to connect data through emerging insights while refining their focus and understanding of the data (Tracy, 2013, p. 184; Krippendorff, 2004). Transcriptions were first reviewed by hand to establish a basis of emerging themes and were later imported into Atlast.ti software for re-analysis. Data were organized by question type to aid in comparison between land trusts. Inductive coding techniques were used to reveal emerging themes belonging to, or representing, a concept, belief, or action. A process described as primary-cycle coding encouraged the data to be re-read and coded several times to capture the breadth of emerging patterns and themes (Tracy, 2013, p. 189).

Results were compared to common themes identified through the examination of mission statements and strategic planning documents (see Comparative Analysis section).

Comparative analysis: mission statements, strategic plans, & interviews. As a final component of this research, I developed a comparative analysis to support the cross-contextual examination between mission statements, strategic planning documents and interviews. To gauge general involvement with climate change among land trusts, I compared word frequency data collected from both the mission statement and strategic planning analyses to information collected from interview questions 5, 22, 23, 24, 25, 26, and 31. To determine regional conservation values and priorities, data collected for land trusts within a shared ecoregion were compared to each other. The top values and priorities to emerge were compared to the top values of ecoregions across the state. Management strategies were similarly analyzed, with the most common management strategies compared both within and between ecoregions to determine the most common strategies used to meet regional conservation goals.

Results

Content analysis results.

Mission statements. The examination of seventeen Washington State land trust mission statements reveals a general connection to the broad conservation priorities identified by Washington State accredited land trusts and the general strategy used to achieve the identified conservation priority/ies. A summary of climate and management strategy terminology in relation to deductive categories reveals that, overall, the top conservation priority for conservation of habitat-type includes "*wildlife"* and "*water*" habitats and that the top conservation priority for conservation of land-type includes

"*natural"* and *"open."* The top management strategy utilized to achieve a conservation priority is "*stewardship.*" The emergence of two themes in relation to inductive categories reveals that, overall, Washington State land trusts associate with a regional identity and that they serve some purpose through their conservation work. However, the examined mission statements to do not acknowledge climate change or climate related concerns, nor do they reflect resilience related terminology, which may suggest a disparity between the Land Trust Alliance's resiliency strategy and strategies prioritized in Washington State.

Deductive coding results. Two categories of examination were utilized to discern the broad conservation priorities of Washington State land trusts and the general strategy used to achieve each priority: 1) management strategy and duration, and 2) conservation strategy. Management strategies are reflected through deductive codes explicit to management strategy terminology and attribution. The stewardship code, for example, includes data segments related to the following terms: steward; caring for; care for; promoting land stewardship; and appreciating. Eight of seventeen mission statements have data segments attributed to stewardship, therefore suggesting that stewardship is the most common management strategy used to achieve identified conservation priorities. Conservation strategies are reflected through deductive codes explicit to habitat-type and land-type terminology and attribution. The scenic code, for example, includes data segments related to the following terms: scenic, natural beauty, and scenic views; the water code includes data segments related to the following terms: waters, water, and watersheds. Six of seventeen mission statements have data segments attributed to "*natural*" land-type and six of seventeen mission statements have data segments

attributed to "*open*" land-type, suggesting that land trusts prioritize natural and open landscapes for conservation. Four of seventeen mission statements have data segments attributed to "*water*" habitat-type and four of seventeen mission statements have data segments attributed to "*wildlife*" habitat-type, suggesting that land trusts prioritize water-related and wildlife-related habitats for conservation. See Table 2 for a complete list of data segment attributions and Tables 3-6 for a complete tally of codes referenced.

Table 2

Mission statement deductive coding scheme. Grounded theory coding attribution for mission statement codes and data segments.

Code	**Data Segment Attributes**
Steward/stewardship	Steward; caring for; care for; promoting land stewardship; appreciating
Preserve	Preserve; preservation
Protect	Protect; protecting
Conserve	Conservation; conserving; conserve
Collaboration	Collaboration; collaborative; strong relationship; working with the community
Engagement	Engage; inspiring people; inspire people; actively involve the community
Secure/Acquire	Secure; secures; acquire
Sustain/sustainability	Sustain; sustainable
Management	Manage
Restoration	Restoring
Forever	Forever
Permanent	Permanently
Legacy	Legacy
Future	Future; future generation; generations to come
Natural	Natural
Open	Open
Scenic	Scenic; natural beauty; scenic views
Farm/Agricultural	Farms; farmland; agricultural lands; agricultural
Working	Working
Rural	Rural
Resource	Natural resources
Water	Waters; water; watersheds
Wildlife	Wildlife
Forest	Forest; forests
Wetland	Wetlands

Shoreline	Shorelines; riparian corridors
Habitat	Habitat; habitats
People/Social	People; communities
Native	Native

Table 3

Mission statement deductive coding results for "strategy" category. The number of references column refers to how many land trusts referenced a management strategy in their mission statement either through explicit terminology or through grounded theory attribution. The total percent column represents the percent of land trusts that referenced the code in their mission statement.

Code Category	Strategy	# of References	Total Percent
Variables	Stewardship	8	47
	Protect	6	35
	Conserve	6	35
	Preservation	5	29
	Collaboration	4	24
	Engagement	4	24
	Secure/Acquire	3	18
	Sustain/Sustainable	3	18
	Restoration	1	6
	Management	1	6

Table 4

Mission statement deductive coding results for "duration" category. The number of references column refers to how many land trusts referenced a duration timeframe for strategy implementation either through explicit terminology or through grounded theory attribution. The total percent column represents the percent of land trusts that referenced the code in their mission statement.

Code Category	Duration	# of References	Total Percent
Variables	Forever	3	18
	Future	3	18
	Permanent	1	6
	Legacy	0	0
	Perpetuity	0	0

Table 5

Mission statement deductive coding results for "habitat type" category. The number of references column refers to how many land trusts referenced a habitat type to reveal conservation strategy either through explicit terminology or through grounded theory attribution. The total percent column represents the percent of land trusts that referenced the code in their mission statement.

Code Category	Habitat Type	# of References	Total Percent
Variables	Wildlife	4	24
	Water	4	24
	Wetland	3	18
	Shoreline	3	18
	Forest	3	18
	Habitat	2	12
	People/Social	2	12
	Native	1	6

Table 6

Mission statement deductive coding results for "land type" category. The number of references column refers to how many land trusts referenced a land type to reveal conservation strategy either through explicit terminology or through grounded theory attribution. The total percent column represents the percent of land trusts that referenced the code in their mission statement.

Code Category	Land Type	# of References	Total Percent
Variables	Natural	6	35
	Open	6	35
	Farm/Agricultural	5	29
	Scenic	5	29
	Working	3	18
	Rural	2	12
	Resource	2	12

Results from a second analysis using deductive codes reveals that the examined mission statements do not acknowledge climate change, climate related concerns, or resiliency strategies. All mission statements lack terminology explicit to: "*climate;*" "*weather;"* "*environmental pressure/s;"* "*challenge/s;"* "*viability;"* "*resilience/resiliency;"* "*adaptation;"* "*mitigation;"* "*flexibility;"* "*transition."* See Table 7 for a complete list of terms and term frequency.

Table 7

Mission statement deductive coding results for climate change and resilience language. Explicit climate and climate-related terminology utilized within mission statements and associated term frequency among mission statements.

Terminology	**Number of mission statements with term**
Climate	0
Weather	0
Science	1
Environmental pressure/s	0
Challenge/s	0
Viability	0
Resilience/Resiliency	0
Adaptation	0
Mitigation	0
Flexibility	0
Transition	0

Inductive coding results. Two themes emerged inductively through the examination of each mission statement, represented in Table 8. The first, *regional identity*, reveals that Washington State land trusts have a strong affinity for regional identity, with fourteen of seventeen mission statements acknowledging a region in which they deliver conservation efforts. Eleven of the fourteen mission statements refer to a specific area in which they operate; for example, Bainbridge Island or Clallam County. Two of the fourteen mission statements refer to broad Washington State regions; for example, southwest Washington or north central Washington. The remaining mission statement refers to the entire state of Washington in which to deliver conservation efforts. The second theme to emerge, which I'm referring to as *purpose/reason*, reveals that twelve of the examined land trusts identify with a purpose, or reason, to deliver their work; albeit to the identified region, future generations, or to support biodiversity.

Table 8

Mission statement inductive coding scheme. Coding attribution utilized to evaluate common themes among mission statements.

Theme	Regional Identity	Purpose/Reason
Attribute codes	Data segments that referred to a specific location, region, and area within Washington State	Data segments that referred to some purpose or reason to carry out conservation work
Evidence	Bainbridge Island; Blue Mountains; southwest Washington; North Central Washington; Columbia River region; Great Peninsula of Washington's Puget Sound; Lummi Island; Methow Valley; Nisqually River Watershed; Clallam County; Washington State; San Juan Archipelago; Whatcom County; on our islands and in the waters of Puget Sound	Benefit of all; future; create a legacy; remain a place; future generations; benefit; benefit of our community; legacy; securing interests; support diversity of life

Strategic planning documents. The examination of seventeen Washington State land trust strategic planning documentation provides general insight into organizational priorities, values, and goals, and how they relate to management strategies utilized that may address climate change. A summary of management strategy terminology in relation to deductive categories reveals that, overall, the top management strategy utilized to support conservation efforts across land trusts in Washington State is "*collaboration/partnership*" and "*engagement*." Under deductive analysis, the top conservation goal among land trusts is to protect or conserve a specific habitat- or land-type; or in some instances, to protect or conserve a myriad of natural landscapes and habitats. The top conservation priority for conservation of habitat-type is "*wildlife*" and the top conservation priority for conservation of land-type is "*farm/agricultural*." The examination of conservation focus revealed that a majority of land trusts practice a

conservation ethic that incorporates both ecological and community-oriented values, goals, and strategies. In addition, forty-one percent of land trusts explicitly mention climate change in their strategic planning documentation. The emergence of two themes in relation to inductive coding attribution reveals that, overall, Washington State land trusts associate with ecological, social, and economic benefits derived from conservation work and that conservation of diverse landscapes aids in achieving conservation goals.

Deductive coding results. Five categories of examination were utilized to discern the types of conservation values, types of management strategies, regional approaches to land conservation, and general climate change awareness: 1) regional scale of organization with regional parameters defined by ecoregion and county/ies of operation, 2) type of conservation focus defined as ecological- or community-oriented, 3) type of conservation goal and supporting strategy with supposed outcome; defined as ecological or community based, 4) terminology absence or presence of climate-related strategies, and 5) terminology absence or presence of conservation values.

Regional scales are reflected through deductive codes explicit to defined ecoregion and county, or counties, of operation. The largest land trust based on regional parameters is PCC Farmland Trust, which operates statewide; the smallest land trust based on regional parameters is Lummi Island Heritage Trust, which operates within Whatcom County in the Puget Sound ecoregion. Table 9 describes the regional parameters for each of the seventeen examined land trusts.

Table 9

Strategic planning document deductive coding results for "regional scale" category. Land trusts are organized from largest area of operation to smallest.

Land Trust	**Ecoregion(s)**	**County(ies)**
PCC Farmland Trust	All – statewide	All – statewide
Forterra	Northwest Coast; Puget Trough; North Cascades; West Cascades; East Cascades	Kittitas County; King County; Snohomish County; Pierce County; Lewis County; Pacific County; Grays Harbor County; Jefferson County; Clallam County; Mason County; Kitsap County; Thurston County; Skagit County
Blue Mountain Land Trust	Blue Mountains; Columbia Plateau	Walla Walla County; Garfield County; Columbia County; Asotin County
Columbia Land Trust	Northwest Coast; West Cascades; East Cascades; Columbia Plateau	Benton County; Kickitat County; Skamania County; Clark County
Capitol Land Trust	Northwest Coast; Puget Trough	Mason County; Thurston Count; Grays Harbor County; Lewis County
Chelan-Douglas Land Trust	East Cascades	Chelan County; Douglas County
Great Peninsula Conservancy	Northwest Coast; Puget Trough	Kitsap County; Mason County
North Olympic Land Trust	Northwest Coast	Clallam County
Whatcom Land Trust	North Cascades; Puget Trough	Whatcom County
Jefferson Land Trust	Puget Trough	Jefferson County
Skagit Land Trust	North Cascades; Puget Trough	Skagit County
Nisqually Land Trust	Puget Trough	Lewis County; Pierce County; Thurston County
Methow Conservancy	Okanogan	Okanogan County
San Juan Preservation Trust	Puget Trough	San Juan County
Whidbey Camano Land Trust	Puget Trough	Island County
Bainbridge Island Land Trust	Puget Trough	Kitsap County
Lummi Island Heritage Trust	Puget Trough	Whatcom County

Deductive coding variables utilized to discern the type of land trust conservation focus include ecological-oriented, community-oriented, or both. The examination of conservation focus revealed that eighty-eight percent of land trusts focus on both ecological and community-oriented (i.e. both) conservation values, goals, and strategies. Results were synthesized using grounded theory attribution when analyzing land trust conservation goals, supporting management strategies, and supposed outcome. Conservation goals, strategies, and outcomes that benefited the human community (i.e. social benefits such as natural resource protection or education) were coded as a community-oriented conservation focus. Conservation goals, strategies, and outcomes that benefited the ecological community (i.e. natural benefits such as wildlife protection and maintenance of a functioning ecosystem) were coded as an ecological-oriented conservation focus.

Although eighty-eight percent of land trusts practice both ecological- and community-oriented conservation, forty percent of those land trusts included coding in their strategic planning documentation that suggested they were more driven by either ecological or community components when establishing their conservation focus. For example, five land trusts included conservation goals, strategies, and outcomes that included both ecological and community benefits but that the benefits tended to support more community-oriented benefits, such as education or recreation. The remaining land trust expressed benefits that tended to support more ecological-oriented benefits, including enhanced wildlife habitat and connectivity corridors. Table 10 describes the overall type of conservation practiced, coded as either ecological, community, or both, for each of the seventeen evaluated land trusts.

Table 10

Strategic planning document deductive coding results for "type of conservation" category. Type of conservation is defined as ecological-oriented, community-oriented, or both. Conservation type was determined using grounded theory coding attribution for each examined conservation goal with the associated management strategy/ies and supposed outcome(s). See Table 12 for more detail.

Land Trust	**Conservation Type**
Bainbridge Island Land Trust	Both – more ecologically driven
Blue Mountain Land Trust	Both – more community driven
Capitol Land Trust	Both
Chelan-Douglas Land Trust	Both – more community driven
Columbia Land Trust	Both
Forterra	Both – more community driven
Great Peninsula Conservancy	Both – more community driven
Jefferson Land Trust	Both
Lummi Island Heritage Trust	Both
Methow Conservancy	Both – more community driven
Nisqually Land Trust	Both
North Olympic Land Trust	Community
PCC Farmland Trust	Community
San Juan Preservation Trust	Both
Skagit Land Trust	Both
Whatcom Land Trust	Both
Whidbey-Camano Land Trust	Both

A second analysis of deductive coding variables reveals that the most common type of conservation goal established by land trusts is the protection or conservation of a specific habitat- or land-type. Conservation goals were synthesized and coded for explicit terminology and data segment attribution. Conservation goals were coded under three categories: 1) to protect/conserve a habitat/land type; 2) community engagement; and 3) organizational growth & health. Forty-five percent of conservation goals were coded under the category "to protect/conserve a habitat/land type," thirty percent were coded under the category "community engagement," and twenty-five percent were coded under the category "organizational growth & health" (see Table 12). The analysis also reveals

that the most common management strategy utilized among land trusts to achieve their conservation goal(s) is *collaboration/partnership*" and "*engagement*." Fourteen of seventeen land trusts, or eighty-two percent, included terminology related to collaboration and/or partnership; fourteen of seventeen land trusts also included terminology related to engagement (see Table 11).

The analysis of sixty-nine conservation goals also revealed that sixty percent of goals are community-oriented, meaning that the overall goal, strategy and outcome would benefit the human community (i.e. social benefit). Thirty percent of goals included both a community and ecological benefit, while only ten percent of goals included an ecological-only benefit. Results were synthesized using grounded theory attribution when analyzing land trust conservation goals, supporting management strategies and supposed outcome akin to the preceding analysis. Table 11 describes the grounded theory attribution in more detail along with the type of management strategies utilized among land trusts in order from most popular to least popular. Table 12 describes the examined conservation values, management strategy utilized to meet conservation goal, desired outcome of the goal, and the type of conservation practiced to achieve the goal (i.e. community-oriented, ecological-oriented, or both).

Table 11

Strategic planning document deductive coding results for "strategy" category. The number of references column refers to how many land trusts referenced a management strategy in their strategic planning documentation either through explicit terminology or through grounded theory attribution. The total percent column represents the percent of land trusts that referenced the code in their strategic planning document.

Code	Data Segment Attributes	# of References	Total Percent
Collaboration/Partnership	Collaboration; collaborative; partner/s; partnership; relations; strong relationship; working with the community; facilitated conservation	14	82
Engagement	Engage; inspiring people; inspire people; actively involve the community;	14	82

Steward/Stewardship	Steward; caring for; care for; promoting land stewardship; appreciating; volunteers	13	76
Secure/Acquire	Secure; secures; acquire; acquisition; fee-simple; donation; donated; conservation easement; target areas; priority areas; connectivity	13	76
Education & Outreach	Education; educational opportunities; educational programming; outreach; community outreach; communication	11	65
Recreation	Recreation; recreational opportunity	10	59
Philanthropy	Philanthropy; increased revenue; membership; supporters	10	59
Conserve	Conservation; conserving; conserve	9	53
Active management	Manage; management; active management; adaptive management; re-evaluation/re-examination of strategies	9	53
Restoration	Restoring; restore	9	53
Public access	Public access; community access; areas for human connection; interconnection	8	47
Professional leadership	Staff performance; leadership; board leadership; quality work environment	8	47
Program development	Program development; program expansion; program strategies; new tools	7	41
Strategic planning	Develop/pursue strategies; strategic planning; strategic plan	7	41
Accreditation	Accreditation; maintain accreditation; LTA accreditation	6	35
Economic development	Economic development; economy; built infrastructure; economic sector; economic opportunities; financial incentives	6	35
Organizational health	Funds; financial; fiduciary; reserves	5	29
Political advocacy	Political advocacy; advocacy; policy; policy work; legislature; legislative work; ballot initiatives	5	29
Science	Science; research; data	3	18
Protect	Protect; protecting	3	18
Sustain/sustainability	Sustain; sustainable; sustainable development; sustainable infrastructure; sustainable practices	3	18
Geographic region	Region; geography; expansion	2	12
Technology	Technology; technological systems	2	12
Risk assessment	Safety; risk; risk assessment	1	6
Preserve	Preserve	0	0

Table 12

Strategic planning document deductive coding results for identified land trust conservation goals, supporting strategies, desired outcomes, and the type of conservation practiced to achieve each goal. Conservation goals are organized by coded categories. The coded categories are: to protect/conserve a habitat/land type; community engagement; and organizational growth & health.

Conservation goal	Management strategy	Desired Outcome	Conservation Type
Category 1: To protect/conserve a habitat/land type			
Agriculture	Collaboration/partnership; secure/acquire; restoration; program development; political advocacy; economic development	Conserve farmlands and invest in agricultural infrastructure so farm businesses can be successful as region develops	Community
Agriculture	Secure/acquire; education & outreach; political advocacy; collaboration/partnership; economic development; sustain/sustainability	A thriving, sustainable agricultural industry that supports the local economy, culture, and landscape	Community
Conserve natural areas & working lands that define and sustain our community	Stewardship; conserve	Maintain identity and sustain community	Community
Agricultural focus areas	Secure/acquire; program development	Preserve organic farmland with investments based on existing priorities and selection criteria	Community
Farms and farmers	Engagement; stewardship	Meet organic standards and best practices to support habitat restoration	Community
Expand and enhance land conservation and land improvement	Secure/acquire; active management; organizational health; collaboration/partnership	Expand capacity to conserve critical lands	Community
Protect Lake Whatcom Watershed	Secure/acquire	Improve water quality	Community
Maintain the critical mass of at least 10,000 acres to sustain a viable agricultural sector	Program development; collaboration/partnership	Permanently protect agricultural properties for local food and farmers; improve water quality and quantity	Community
Waters	Protect; restoration; conserve; sustain/sustainability; engagement; collaboration/partnership	Freshwater and marine ecosystems are protected, healthy and resilient	Ecological
Conservation	Strategic planning; secure/acquire; restoration; collaboration/partnership	Preserve in perpetuity open space, native habitat, and natural resources	Ecological
Lands and waters	Protect; public access; collaboration/partnership; active management	Provide a quality, connected, and sustainable system of protected lands and waters throughout area that prioritizes habitat conservation and provides benefits at a landscape-scale	Ecological
Protect the north and middle forks of the Nooksack River	Protect; restoration	Protection of priority area	Ecological

Protect South Fork Nooksack River Valley	Restoration; secure/acquire	Protect critical habitat for salmon and other species; sustain commercial forestry and farming livelihoods	Ecological
Protect Upper South Fork of Nooksack River	Restoration	Improve water quality; conserve critical habitat	Ecological
Wildlife networks; shorelines; recreation; agricultural lands; scenic vistas	Program development; secure/acquire; science; engagement; active management strategies	Systems of large ecologically functioning habitat blocks and wildlife connectors that support sustainable populations of diverse and abundant wildlife species and provide opportunities for wildlife to move between large habitat blocks	Both
Protect the lands, waters, and habitats that sustain us all	Secure/acquire; stewardship; collaboration/partnership; restoration; conserve; active management	Long-term conservation of essential natural areas and working lands	Both
Forests	Partnership/collaboration; economic development; program development; engagement; conserve; secure/acquire	Ensure community benefits related to forest conservation	Both
Conserve important and threatened lands on the Great Peninsula	Collaboration/partnership; conserve; program development; engagement; recreation; public access; restoration	Permanent protection of forestland, marine shoreline, freshwater streams, wetlands, and greenspaces	Both
Responsibly manage protected lands	Stewardship; active management; collaboration/partnership; restoration; education; public access	Conserved lands are vibrant ecosystems that support diversity of local plants and wildlife, and contribute to a high quality of life for people	Both
Identify the priority places which will support vibrant economies, functioning ecosystems, and healthy communities	Collaboration/partnership; engagement; secure/acquire	Permanently protect some of the most iconic, productive and ecologically significant land and water	Both
Habitat protection	Sustain/sustainability; engagement; education & outreach; restoration; protect; economic development; active management	Maintain biological diversity, interconnection, and support viable populations of keystone species	Both
Forestry conservation and sustainable practices	Program development; education & outreach; secure/acquire; economic development; collaboration/partnership	Permanent protection of large tracts of working forests that support stable and sustainable production, wildlife habitat, scenic viewsheds, ecosystem services and recreational uses	Both
Protect healthy land and water	Engagement; stewardship; active management; collaboration/partnership; political advocacy	Ensure a critical mass of permanently protected and well-stewarded wildlife habitat, agricultural land, and open space	Both
Protecting and stewarding resilient ecosystems for wildlife, plants and people	Science; conserve	Identity and save the most important places in Skagit County	Both

Conserve the natural areas and working lands that define and sustain communities of Clallam County	Secure/acquire; recreation; economic development; collaboration/partnership; stewardship	Maintain ecosystem health; maintain regional identity	Both
Permanently protect critical lands in the Nisqually Watershed	Strategic planning; geographic region; collaboration/partnership	Accelerate permanent protection of critical lands	Both
Actively manage land trust properties and conservation easements	Stewardship	Maintain and promote ecosystem health	Both
Nature in the Northwest is intact and functional	Science; engagement; active management; conserve; collaboration/partnership; stewardship; restoration; strategic planning	People understand and embrace their role in the health of the ecosystem	Both
Environmental sustainability, land protection, wildlife conservation, and ecosystem restoration	Economic development; stewardship; sustain/sustainability; recreation; restoration; secure/acquire; education & outreach	Pursue land conservation efforts at a regional landscape scale	Both
Protect coastal shorelines	Protect	Provide important habitat and recreational values	Both
Establish recreational use on Chuckanut Mountain	Protect; secure/acquire	Prized recreational area with rich habitat	Both
Category 2: Community engagement			
Increase community engagement in conservation efforts	Engagement; public access; education & outreach; recreation; restoration; collaboration/partnership	Increased community engagement in conservation work	Community
Natural heritage and stewardship	Restoration; stewardship; engagement	Communities remain deeply connected to the natural world that sustains and inspires them	Community
Parks and recreation	Secure/acquire; recreation; education; collaboration/partnership	Provide access to outdoor recreation to sustain quality of life and enhance physical and mental wellness	Community
Rural cities, towns and communities	Economic development; sustain/sustainability	Maintain quality of life features	Community
Cities & neighborhoods	sustain/sustainability; engagement; collaboration/partnership	Provide affordable, attractive and safe places to live, work and raise families	Community
Recreation & tourism	Secure/acquire; strategic planning; education & outreach; recreation; public access; collaboration/partnership	Preserve the wild and scenic area character and to provide abundant access to natural areas	Community
Community engagement and education	Education & outreach; stewardship	Encourage community involvement and support for land conservation and stewardship	Community
Connect people to the land	Engagement; education & outreach; public access; collaboration/partnership	Inspire people of all ages to learn about the varied landscapes so that they will want to make a difference on the ground	Community
Preserve a “Methow” way of life	Economic development; restoration	Ensure a vibrant, rural character and economy that supports agriculture, innovation, and conservation	Community

Connect people to the land	Engagement; education & outreach; public access; collaboration/partnership	Inspire people of all ages to learn about the varied landscapes so that they will want to make a difference on the ground	Community
Preserve a "Methow" way of life	Economic development; restoration	Ensure a vibrant, rural character and economy that supports agriculture, innovation, and conservation	Community
Connect people to the land	Engagement; education & outreach; public access; collaboration/partnership	Inspire people of all ages to learn about the varied landscapes so that they will want to make a difference on the ground	Community
Preserve a "Methow" way of life	Economic development; restoration	Ensure a vibrant, rural character and economy that supports agriculture, innovation, and conservation	Community
Access and engagement	Public access; recreation; engagement	People throughout our many different communities are connected to the land	Community
Collaborative planning	Engagement; economic development; political advocacy	Health of human and natural communities through land-use, open-space access, and natural resource decisions	Community
Increase and sustain inclusive engagement in the communities served	Collaboration/partnership; engagement; education & outreach; recreation; restoration; stewardship	Deepen engagement efforts and broaden work to more fully engage communities and leaders in key communities of service area	Community
Outdoor recreation	Public access; collaboration/partnership; secure/acquire; education & outreach	Provide for appropriate low-impact and passive outdoor recreation opportunities where appropriate and compatible with conservation values and biodiversity	Community
Community engagement	Stewardship; education & outreach	Engaged residents and visitors that care for preserved lands	Community
Stewardship & Land Management	Stewardship; active management; restoration; protect	Care for open space, native habitat, wildlife and natural resources on lands owned/managed	Ecological
Protected lands in perpetuity and engaged community	Conserve; engagement	Healthy, diverse and sustainable habitats for wildlife and human communities; engaged community; pristine natural areas	Both
Land protection and stewardship	Conserve; stewardship; philanthropy; collaboration/partnership	Support ecologically significant and socially-valued lands and waters to promote thriving communities of people, plants, and wildlife	Both
Stewardship	Stewardship; program development; active management; restoration	Cost-effective stewardship program that protects lands with an emphasis on sustainable methods, protection of habitat quality, conservation value and resources for current and future generations	Both
Category 3: Organizational growth & health			
Ensure organizational and financial sustainability	Philanthropy; organizational health; risk assessment; professional leadership; accreditation	Increased revenue; increased sponsorship; increased membership; growth of endowment, stewardship, and rapid response funds; safety and wellbeing of staff, volunteers, and contractors; maintain high quality work environment; ensure strong and function Board of Directors leadership; maintain LTA accreditation	Community
Build a strong organization capable of proactively protecting and responsibly managing lands in perpetuity	Professional leadership; stewardship; philanthropy; technology; secure/acquire	Organization has the human, financial and technological resources to tackle emerging and ongoing land conservation and stewardship priorities	Community
Financial management	Accreditation; organizational health	Assure the fiscal integrity and fiduciary responsibility	Community

Fund development	Philanthropy	Assure adequate funding support for the long-term sustainability of organization	Community
Organizational effectiveness and governance	Accreditation; professional leadership; engagement; stewardship; education & outreach	Provide continuous and capable leadership that assures sustainability and effectiveness	Community
A healthy organization	Engagement; professional leadership; organizational health; accreditation	A healthy organization that is able to support all the elements of its strategic plan	Community
A broader scope	Professional leadership; collaboration/partnership	Impact is elevated through work at the regional, state, and national levels	Community
Organizational strength	Professional leadership; philanthropy; technology; accreditation	Develop talent, leadership, and capacity within organization to achieve mission	Community
Promote and foster our community's land ethic	Engagement; collaboration/partnership; education & outreach	Responsible community and individual land-use actions	Community
Strengthen long-term organizational viability	Philanthropy; organizational health; collaboration/partnership; professional leadership; accreditation	Ensure commitment to landowner partners and future generations	Community
Grow the land trust's role as a community institution	Collaboration/partnership; public access; recreation	People become more involved in the permanent protection of critical lands	Community
Ensure the financial stability of the land trust	Philanthropy	Support mission over the long-term	Community
Ensure organizational effectiveness	Active management	Operations are effective, efficient and accountable	Community
Strategic partnership	Collaboration/partnership; education & outreach; stewardship	Strengthen and develop new associations to carry out conservation	Community
Organizational capability	Accreditation; philanthropy; strategic planning; education & outreach; conserve	Expand board and staff governance, management & operations to address goals of strategic plan	Community
Revenue growth and organizational structure	Engagement; professional leadership; recreation; public access; philanthropy	Efficient and effective implementation of conservation priorities	Community
Provide regional conservation leadership	Political advocacy; program development; organizational health; engagement	Develop greater expertise in disciplines that impact land conservation to provide leadership and advocacy to our peers and the public	Community
Enhance organizational effectiveness and sustainability	Philanthropy; professional leadership; stewardship; organizational health; education & outreach; collaboration/partnership	Develop key resources (i.e. people and money) to support conservation work	Community
Funding	Philanthropy; partnership	Identify, secure, and develop appropriate funding sources to acquire lands and conservation easements, restore properties to ecological health, and develop, operate, maintain, and sustain organization preserves and conservation easements	Community

Results from a third analysis using deductive codes reveals that the examined strategic documents do acknowledge climate change along with climate related concerns and resiliency strategies. In fact, seven of seventeen land trusts, or forty-one percent, explicitly mention "*climate change*" in their strategic planning documentation. In addition, seven documents, or forty-one percent, also mentioned terminology related to "*environmental pressures*" and "*resilience/resiliency*." See Table 13 for a complete list of climate related terms and term frequency. In addition to coding for terminology, the analysis included context of terminology used, which aided in code attribution. See Appendix D for a comprehensive data-set of climate-related terminology and context.

Table 13

Strategic planning document deductive coding results for climate change and resilience terms. Explicit climate and climate-related terminology utilized within strategic planning documentation and associated term frequency among documents.

Terms	**Number of strategic planning documents with term reference**
Climate change	7
Environmental pressure/s	7
Resilience/Resiliency	7
Changing conditions	4
Science	3
Viability	3
Adaptation	3
Mitigation	3
Climate	1
Weather	1
Carbon sequestration	1

A final analysis using term counts for deductive codes related to conservation priorities reveals that the examined strategic documents most frequently describe "*wildlife*" as the most valued habitat-type and "*farm/agricultural*" as the most valued land-type. Twelve of seventeen documents, or seventy-one percent, detail wildlife habitat

as central in their conservation work, followed by water (i.e. aquatic) habitat (35%) and shoreline habitat (35%). Nine of seventeen documents, or fifty-three percent, detail "*farm/agricultural*" lands as central to their conservation work, followed closely by recreation/public access lands (47%).

Table 14

Strategic planning document deductive coding results for "conservation priority" category. Value assessed by habitat type or land type prioritized. The number of references column refers to how many land trusts referenced a conservation value either through explicit terminology or through grounded theory attribution. The total percent column represents the percent of land trusts that referenced the code in their strategic planning document.

Variables	**# of References**	**Total Percent**
Habitat Type		
Wildlife	12	71
Water	6	35
Shoreline	6	35
People/Social	5	29
Wetland	4	24
Forest	4	24
Habitat	3	18
Native	3	18
Land Type		
Farm/Agricultural	9	53
Recreation/Public Access	8	47
Scenic	5	29
Natural	4	24
Working	3	18
Greenspace	2	12
Open	1	6
Resource	1	6
Rural	0	0

Inductive coding results. Four themes emerged inductively through the examination of each strategic document, represented in Table 15. The first, which I'm referring to as *socio-ecological-economic,* reveals that Washington State land trusts are dynamic in their conservation approach. Twelve of seventeen strategic documents

acknowledge the potential of conservation benefits for the ecological communities, social communities, and economic factors present within an area of operation. The second theme to emerge, which I'm referring to as *partnership*, reveals that eleven of the seventeen strategic plans strongly support collaboration, partnership, and relationship-building as a primary mode of furthering conservation initiatives. The third theme to emerge, referred to as *diverse landscapes*, reveals that land trusts conserve a broad range of landscape and habitat types. Ten of the seventeen strategic plans detail an array of landscapes, from shorelines or headwater habitats, as areas of conservation focus; the reasoning for this is to ensure that any opportunity to facilitate conservation is supported. The fourth theme to emerge, referred to as *organizational health*, reveals that eight of seventeen strategic plans include conservation goals directly related to the maintenance and sustainability of the organization in terms of financial resources, fiduciary responsibility, and staff/board performance and capability.

Table 15

Strategic planning document inductive coding results for emerging themes. Data segments from strategic planning documents were coded for references representative of common theme. The four themes include: socio-ecological-economic recognition; partnership; diverse landscapes; and organizational health. The number of land trusts with attributed theme is represented as both a quantitative number and percentage.

Theme	**Socio-ecological-economic recognition**	**Partnership**	**Diverse landscapes**	**Organizational health**
Attribute codes	Data segments that referred to any community (i.e. social) benefit, ecological benefit, and economic benefit; all three components were referenced per document	Data segments that referred to the importance and use of partnership, collaboration, and relationship-building as a primary mode for further conservation work	Data segments that referred to multiple habitat- or land-types of conservation interest	Data segments that referred to the maintenance and sustainability of organizational health; goals related to financial, fiduciary, and staff/board performance were coded for to this theme
Number of land trusts with theme	12 (71%)	11 (65%)	10 (59%)	8 (47%)

Results from the content analysis indicate that, overall, land trusts are responding to climate change pressures through strategic planning, but that they have yet to implement adaptation- and mitigation-specific strategies to guide their strategic planning work. In addition, the content analyses indicate that most of the organizations are utilizing modes of community conservation to facilitate their work, with stewardship, partnership/collaboration, and community engagement being the most commonly mentioned management strategies to achieve conservation goals. The top reported conservation goals include the protection and conservation of wildlife habitat, aquatic habitat, as well as open, natural, and agricultural lands. In consideration of their conservation goals, many of the strategic planning documentation alluded to the incorporation of flexibility to support resiliency in conserved landscapes.

Interview analysis results.

General procedures & shifts related to land management. Interviews were conducted for three primary purposes: 1) to understand land trust responsibilities and procedures related to conservation land management; 2) to understand general climate awareness among land trust personnel, including acknowledgement of climate change and its associated pressures/stressors; and 3) to understand organizational response to climate change. Interview participant job titles included Executive Director, Associate Director, Conservation Director and Stewardship Director; one title included Conservation & Stewardship Director. When asked about job responsibilities, all participants reported that they oversee conservation planning and stewardship activities. A majority of participants, including all conservation directors, mentioned that they are directly responsible for overseeing land acquisition and associated acquisition

programming, such as the drafting of conservation easements, title review, and property assessment. In addition, a majority of participants reported that they oversee their organization's restoration program and are responsible for supporting staff involved with restoration, stewardship and acquisition programming. Several participants also revealed that their job duties include grant writing, strategic planning, and philanthropy (e.g. community outreach and fundraising).

When asked whether their organization practiced ecological conservation (i.e. conservation focused on wildlife and ecosystem protection) or community conservation (i.e. conservation focused on natural resource protection and outdoor access), eighty-five percent of participants reported that their organization practices both. One interview participant shared that they did not think there was a separation between the two, stating that "you can't facilitate a conservation outcome anywhere without having it grounded in a community interest or movement or collaboration with partners" (personal communication, March 8, 2019). Similarly, two other participants reported that their organization's ecological focus is largely driven by community involvement and input. The remaining fifteen percent of participants reported that their organization is primarily focused on ecological conservation.

Interestingly, over sixty percent of participants reported that there has been a shift in the type of conservation practiced over time. About forty percent of participants reported that this shift has largely moved towards the incorporation of more community-focused conservation, primarily to include community access to conserved landscapes. Participants also reported that the type of conservation practiced has shifted to general programmatic expansion with increased funding and a shift away from opportunistic

property acquisition towards intentional property acquisition; one participant reported that their organization has actually shifted more towards ecological conservation and away from community-centered conservation. Two participants reported that the type of conservation practiced has not changed, but that they've noticed small changes, such as decreased property donations and increased program geographic reach, which may have future ramifications for their conservation goals.

All thirteen participants reported that their organization's conservation priorities in the region are designed to either "*protect*" and/or "*conserve*" land or habitat. Sixty-two percent of participants reported goals explicitly tied to community-focused benefits in addition to the protection/conservation of specific land or habitat-types. Community-focused benefits included: increased aesthetics; resource maintenance to sustain livelihood; increased outdoor access/recreational opportunities; and enhanced community relationships. Table 24 on page 129 under *Comparative Analysis* details the top reported conservation priorities for each ecoregion, along with the top reported management strategies for each ecoregion in further detail.

In order to facilitate their organization's conservation priorities, participants were asked to share their top three to five strategic management tools. The most frequently mentioned tool used across organizations included general acquisition, both fee acquisition and conservation easements. Participants also reported ten other management tools: partnerships; community outreach and engagement; restoration; philanthropy; volunteers; conservation advocacy; tax benefits; education; community forest work; and buy-protect-sell programs (see Figure 10). Interestingly, when asked what the most effective management strategy used to meet their organization's conservation priority/ies

is, sixty-two percent of participants reported stewardship, followed by restoration. In fact, only one participant mentioned general acquisition as the most effective management strategy; although four participants mentioned that intentional acquisition was effective (e.g. targeting landscapes with higher conservation values or targeting lands specifically for protection of critical habitat). Participants also reported eight other effective strategies: partnerships; community engagement; education; volunteers; philanthropy; learning organization; and flexibility in land management (see Figure 11). Five participants reported that they expect to see a change in their organization's conservation priorities, with four of the five participants reporting that they expect to see enhanced prioritization of stewardship and education programs in the future.

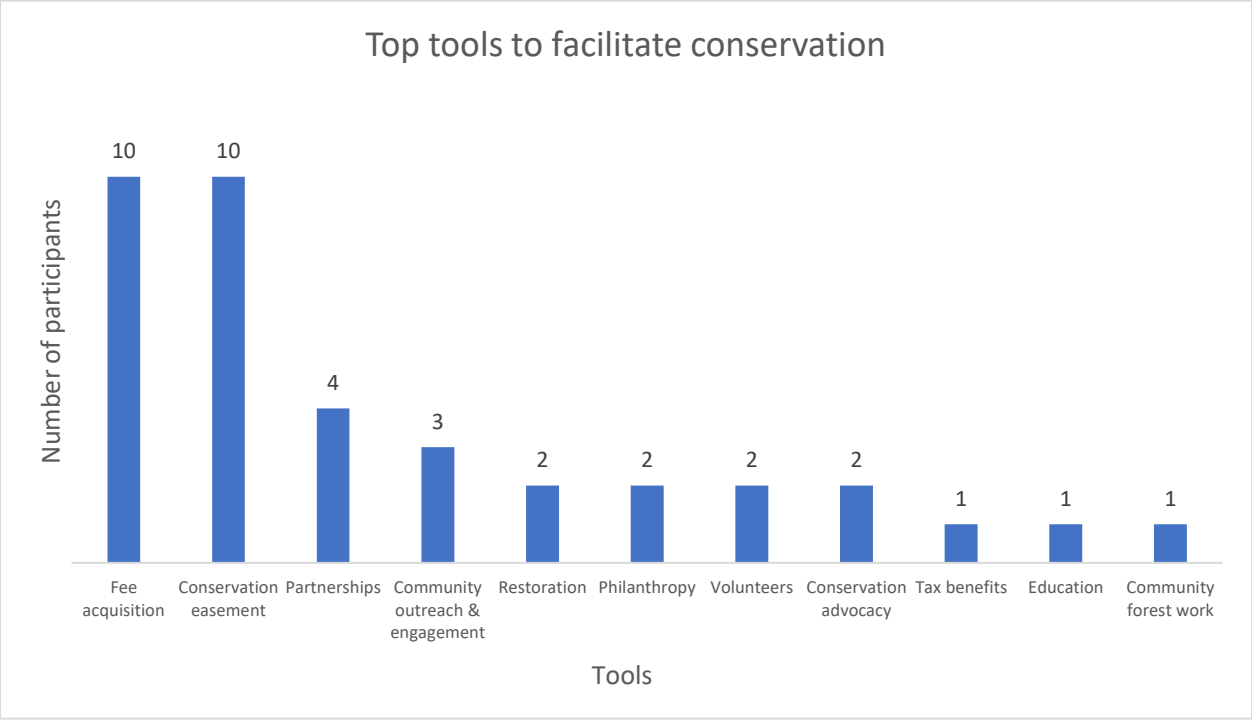

Figure 10: Top tools to facilitate conservation. This figure illustrates the most common management tools utilized by land trusts to facilitate conservation in their region of operation.

Figure 11: Most effective management strategies to meet conservation priorities. This figure illustrates what land trust perceive as the most effective management strategies for land trusts to utilize in order to meet conservation priority/ies in region of operation.

Awareness, acknowledgement & response to climate change. Conversations with land trust personnel revealed that, in general, climate change, and its associated impacts, is of great concern. All thirteen interview participants shared that their organization is concerned that climate change is likely to influence their region of operation. One interviewee reported that "the concern is two-fold; one is its direct impact on what is occurring on our properties and how we manage that…[and] then semi-indirectly…the impacts that are occurring in other places certainly affects the ecological functioning values of our properties also" (personal communication, February 28, 2019). In addition, participants expressed a wide variety of climate impacts that have great concern for their organization's conservation goals. The most frequently mentioned concern was sea level rise, followed by potential impacts to water availability, quality and supply. Participants also reported eight other major concerns: increases in wildfires; the risk of more frequent and extreme drought and flood periods; increased temperatures; more extreme weathering

events; the spread of invasive species; increases in shoreline erosion; the inability of current habitat to support native species; and the long-term viability of agricultural soils (see Figure 12).

In response to climate impacts, eighty-five percent of the participants said that their organization prepared (or plans to prepare) for climate change in their region of operation. However, these plans are not overall extensive, and many continue to idle merely as conversations in the meeting room or in early development phases. This finding is congruent with the Owley et al. (2018) study, suggesting that awareness has not yet led to extensive changes in management strategies directly related to climate change mitigation or adaptation. Some participants, while recognizing the impacts associated with climate change, reported other threats of greater concern that may impact the effectiveness in their ability to conserve landscapes. The most common threat reported was increased residential and commercial development. Other reported concerns included: invasive species; climate change; sea level rise; monetary costs of land; land-use change; drought; and shifting politics (see Figure 13).

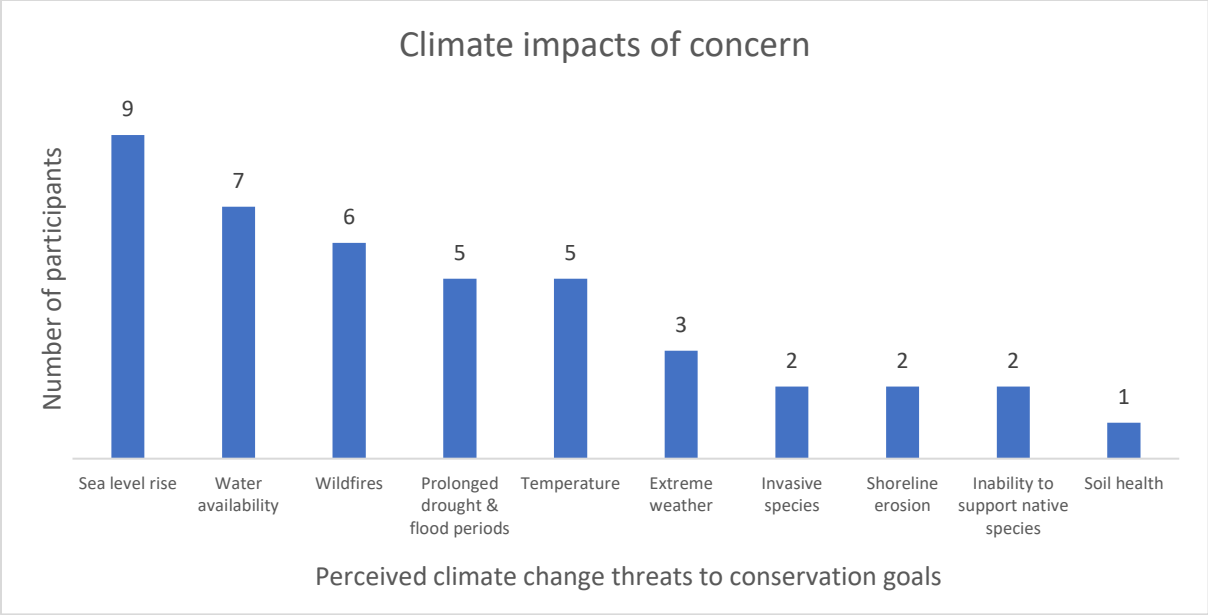

Figure 12: Climate impacts of concern. This figures represents the types of reported climate threats participants believed to be concerning for their land trust's conservation goals.

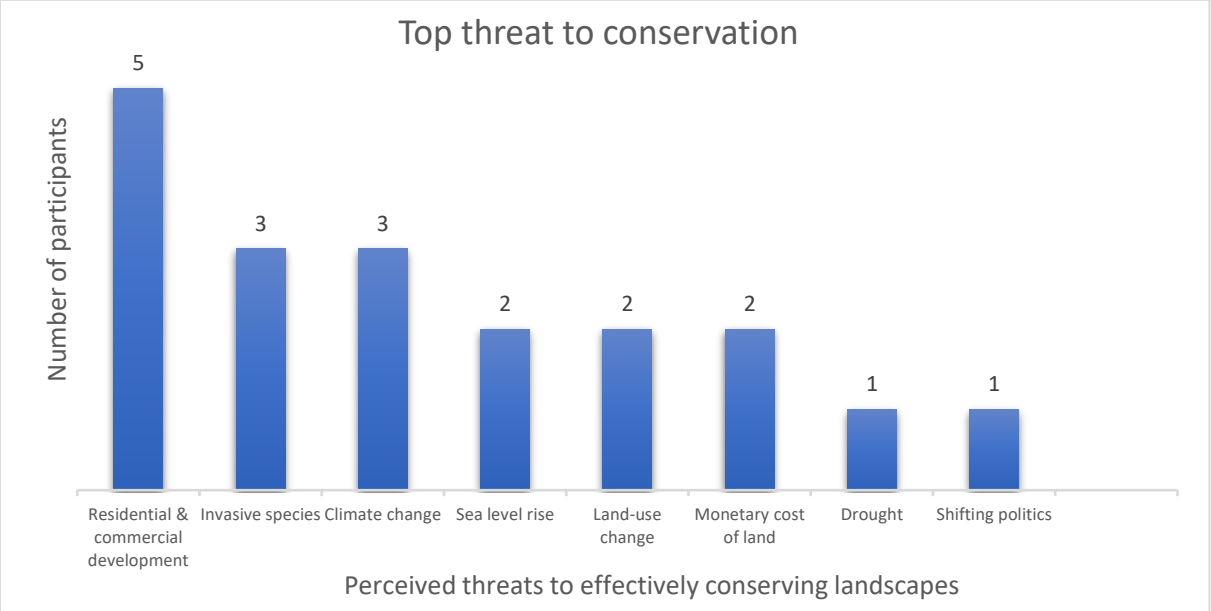

Figure 13: Top threat to conservation. This figure illustrates the top threats reported by land trust staff that are believed to hinder the effectiveness of conserving landscapes within a land trust's region of operation.

When asked whether their organization has changed any of their management strategies on conserved landscapes to account for climate-induced environmental stressors, sixty-two percent of participants reported yes. Increased temperatures and sea level rise were among the most influential stressors reported to affect change when responding to this question. Management strategies related to shifts in restoration tactics were among the most commonly reported change. For example, several participants expressed their motivations towards re-thinking their restoration tactics to include a wider variety of vegetative plantings more representative of predicted climates or changing conditions. One interviewee reported the utilization of *Pinus ponderosa* (ponderosa pine) and *Pinus contorta* (shore pine) sapling plantings to restore a riparian habitat in western Washington; an anomaly for restoration strategies typically utilized for such areas. Another interviewee revealed that they are factoring climate change impacts into decisions related to site re-vegetation, noting that they have changed the plant communities planted on properties to better achieve conservation goals. In addition, another interviewee reported that their organization had to purchase a water trailer six years ago to irrigate restoration sites due to "prolonged dry periods during the summer," a novel tactic for the organization to ensure that plantings would survive (personal communication, February 25, 2019). Participants reported eight other general categories of changes to management strategies, including: implementation of more efficient and sustainable water practices; changes to stewardship responsibilities (e.g. leniency in reducing fire fuel loads in forests and increased site visitation); incorporation of potential climate impacts in management plans; shifts toward managing lands for full ecological functioning; increased participation in policy work around climate change; accepting new

conservation values as lands change; and changing the overall type of land conserved (e.g. sea level rise has led to thoughts on protecting upland habitat instead of shoreline habitat).

Despite changes in management strategies to account for climate-induced environmental stressors on conserved landscapes, less than half (forty-six percent) of the participants reported that their documents related to land acquisition (e.g. fee acquisition or conservation easement) account for climate change in some capacity (e.g. include a provision for adaptation and/or mitigation). Furthermore, only two participants reported that their current management plans for fee acquisition properties explicitly mention climate change and only one participant reported that they are starting to include climate terminology in their conservation easement template. A majority of participants felt that their acquisition documentation accounted for climate change to some extent by their incorporation of flexibility. Flexibility was reported as including: the ability to adapt conservation goals as lands change; ability to allow for actions that may be outside of the current easement but that ultimately enhance or maintain conservation values; leniency with landowners regarding infrastructure movement on easement properties; and reducing restrictive provisions from easements. In addition, two participants reported that their organizations manage primarily for ecological systems and that their documentation reflects explicit language around the notion of conserving natural ecological systems and their dynamic processes instead of focusing on specific habitat-types or species conservation.

Although there appears to be general awareness of the risks associated with climate change, not all interviewees thought climate change posed a substantial concern

for their region of operation. Four participants thought negative effects of climate change were somewhat to very unlikely, and of those four, two participants expressed that negative impacts are unlikely because "we are still providing the protection of a resource that does facilitate a host of wildlife habitat, of ecosystem services, water quality purification, and that connection with nature" (personal communication, March 8, 2019) and that climate change is "going to help propel the need for protection and conservation, and that's not going to have a negative impact" (personal communication, March 11, 2019) (see Figure 14). In addition, all participants said that their organization is more inclined to respond to potential climate change impacts through resilience or transition. In fact, nearly fifty percent of participants said that their organization is more inclined to respond through both resilience and transition (see Figure 15). One interviewee suggested that "it's going to be probably somewhere in-between the resilience and transition…our goal would be that the landscapes can support change over time and that they're protected in a way that allows for that. But, I do think that this idea of being involved in their transformation…is likely" (personal communication, March 11, 2019).

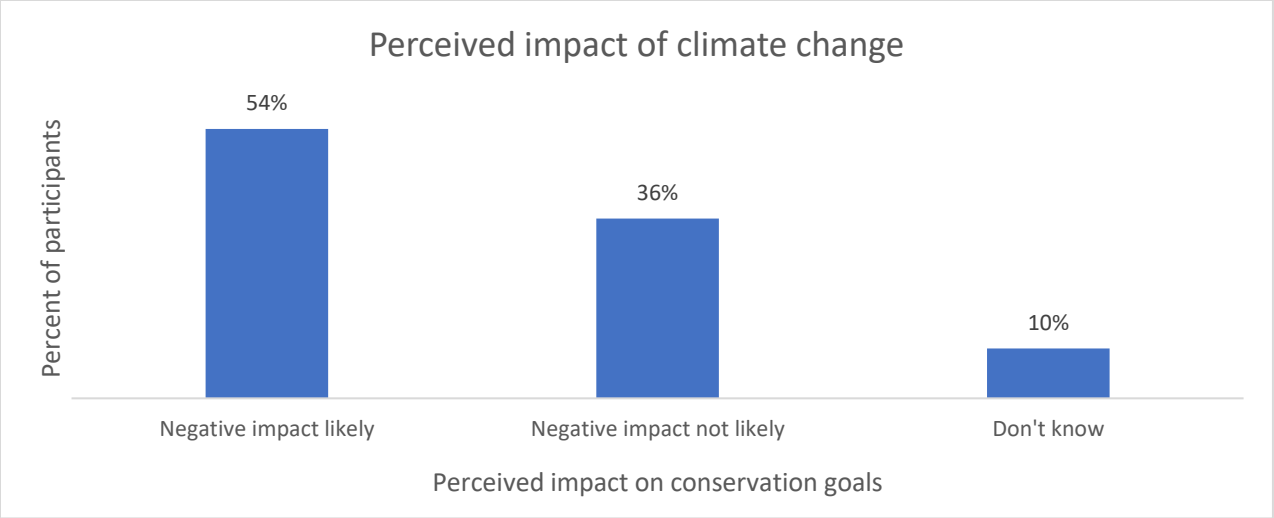

Figure 14: Perceived impact of climate change. This figure illustrates the percentage of participants who reported that climate change would or would not have a negative impact on conservation goals.

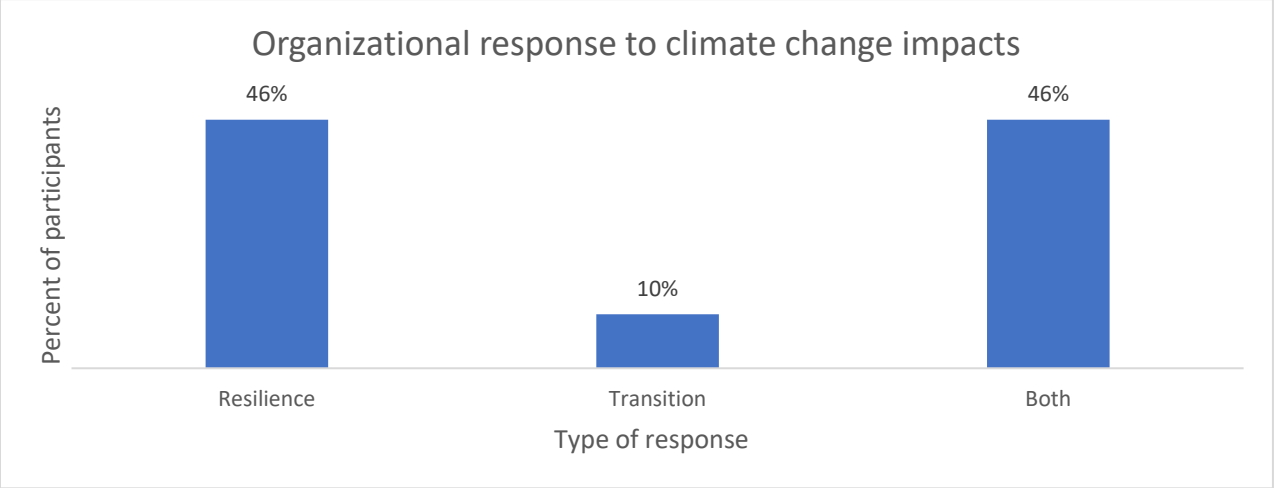

Figure 15. Organizational response to climate change impacts. This figure illustrate the percentage of participants who reported that their organization would be more inclined to respond to climate change impacts through resilience, transition, or both.

When asked what resources their organization needs in order to make effective decisions on climate change, seventy-seven percent of participants said that access to more localized, fine-scale climate data would be extremely useful. In fact, the need for fine-scale data far exceeded any other reported resource (see Figure 16). Other reported resources included access to: more money/funding; best practices for climate messaging;

guidance on how best to manage lands under a changing climate; more representation in climate resiliency frameworks; and advisers who can interpret and apply climate change literature to conservation work.

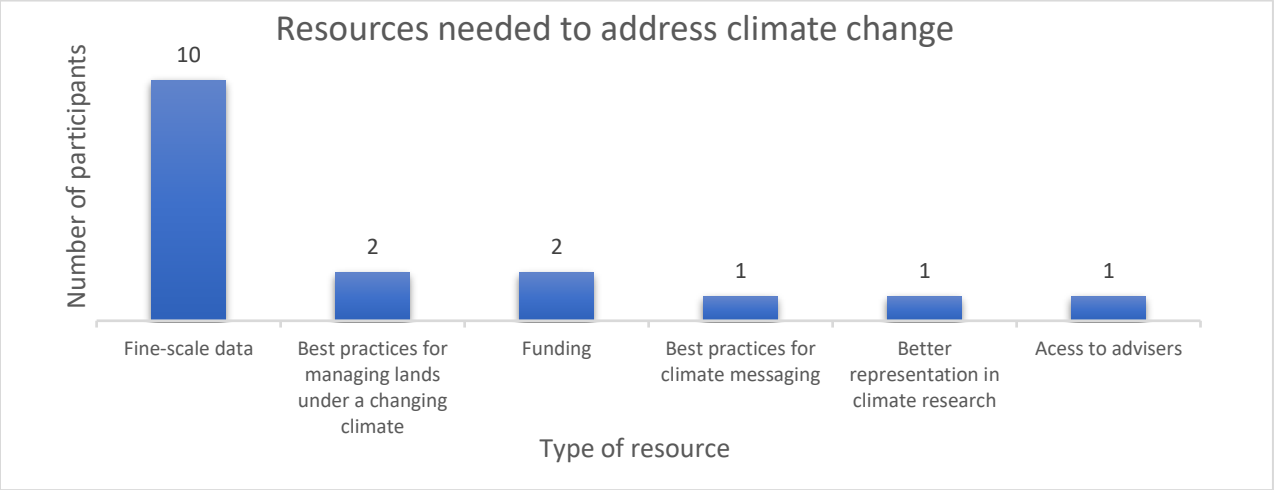

Figure 16: Resources needed to address climate change. This figure illustrates the type of resources participants reported would be needed in order for their land trust to make effective decisions on climate change.

Comparative analysis results.

A cross-contextual examination between mission statements, strategic planning documents and interviews reveals both similarities and discrepancies of land management strategies, conservation priorities, goals, and strategies, and climate awareness across Washington State accredited land trusts. Word frequency data collected from both the mission statements and strategic planning analyses reveals that, in general, examined land trusts are predominately focused on the conservation of "*wildlife*" habitat-type, and that the top management strategies utilized to achieve their goals include "*stewardship*," "*collaboration/partnership*," and "*engagement*." In addition, all mission statements examined lacked climate change terminology, however forty-one percent of strategic planning documentation explicitly mentioned climate change. This information was then

compared with personnel interview responses to reveal that, in general, the top conservation priority is to "*protect habitat*" and that the most effective management strategy utilized to meet their conservation priority is "*stewardship*." Conversations with land trust personnel also revealed that climate change and its associated impacts are of great concern, with sea level rise being the greatest perceived threat to conservation goals.

Climate change awareness and response. To gauge general involvement with climate change among land trusts, word frequency data collected from both the mission statement and strategic planning analyses was compared to information collected from participate responses to interview questions 5, 22, 23, 24, 25, 26, and 31. The proceeding paragraphs offer a brief overview of the cross-examination.

Question 5: Table 16 provides the results for interview question five. The most common reported conservation goals were compared to the most common conservation goals detailed among mission statements. The most common reported conservation goal and/or purpose from the interview analysis was "*protection*" over "*habitat*." Ten of thirteen participants explicitly mentioned "*protection*" or "to *protect*" in response to question five. In addition, the most common reported habitat/land type that was being protected was "habitat," with eight of thirteen participants explicitly mentioning habitat protection as a priority. Conversely, "*stewardship*" and "*natural/open*" habitat/land type were the most commonly reported goals and/or priorities across mission statements.

Table 16

Question five comparative analysis. This table describes the most frequently reported conservation goals and purposes for region of operation, defined by habitat/land type and strategy, with most common conservation goals and purposes, defined by habitat/land type and strategy, mentioned across mission statements.

Variable	Mission Statement	# of References	Interview	# of References
Strategy	Stewardship	8 (2)	Protect	8 (6)
Habitat/Land Type	Natural/Open	6 (1)	Habitat	6 (2)

Notes: The number enclosed by parentheses, (x), indicates how many times that code was referenced in comparative analysis; for example, *stewardship* was only mentioned twice across interview responses.

Question 22: Table 17 provides results for interview question twenty-two. The percentage of reported responses categorized as yes was compared to the percentage of mission statements that mention climate-related terminology and to the percentage of strategic documents that mention climate-related terminology. All thirteen interview participants indicated that climate change is likely to influence their operational region. Responses ranged from "absolutely" to "yes," and all responses were categorized as "yes" for the purposes of this analysis. Conversely, all seventeen mission statements lacked climate and climate-related terminology. However, 82% of the examined strategic planning documents include climate-related terminology.

Table 17

Question twenty-two comparative analysis. Percentage of interview participants who reported that climate change is likely to influence their region of operation compared with percentage of mission statements and strategic documents that mention climate-related terminology.

Percentage of reported interview response categorized as yes	100
Percentage of mission statements that mention climate related terminology	0
Percentage of strategic documents that mention climate-related terminology	82

Question 23: Table 18 provides results for interview question twenty-three. The reported responses, categorized as “not likely” or “somewhat likely” or “very likely” or “inevitable,” were compared to the most common management strategies mentioned across mission statements as well as strategic documents for each ecoregion. Two of twelve respondents indicated that climate change is not likely to negatively impact the conservation goals of the organization, yielding a 17% percent response rate; four respondents indicated that climate change is somewhat likely to negatively impact goals, yielding a 33% response rate, and six indicated that climate change is very likely to negatively impact conservation goals, yielding a 50% response rate. The most common management strategies mentioned across mission statements included stewardship (47%), protection (29%), and conservation (29%). The most common management strategies mentioned across strategic planning documents included collaboration/partnership (82%), engagement (82%), stewardship (76%), and acquisition (76%). Percentages for management strategies do not add up to 100% because several mission statements and strategic planning documents indicate the utilization of two or more management strategies listed.

Table 18

Question twenty-three comparative analysis. This table describes the reported likelihood of climate change having a negative impact on organization’s conservation goals compared with percentage of most common management strategies mentioned across mission statements and strategic documents.

Percentage of reported interview responses categorized as not likely, somewhat likely, or very likely	Not likely: 17%	Somewhat likely: 33%	Very likely: 50%
Percentage of most common management strategies mentioned across mission statements	Stewardship: 47%	Protection: 29%	Conservation: 29%
Percentage of most common management strategies mentioned across strategic documents	Collaboration/partnership (82%)	Engagement (82%)	Stewardship (76%)

Question 24: Table 19 provides results for interview question twenty-four. The top five reported climate change impacts of greatest concern for affecting the organization's conservation goals were compared to the top five most common goals identified across strategic plans. The top five reported impacts of greatest concern include: sea level rise; water availability; wildfire; drought and flood events; and temperature. The top five most common goals identified include: protection of diverse landscapes to sustain social, ecological, and economic benefits; organizational health; community engagement; agriculture protection; and strategic leadership.

Table 19

Question twenty-four comparative analysis. This table describes the reported climate change impacts of greatest concern to organization's conservation goals compared with the most common conservation goals identified across strategic plans.

Top five reported responses	Sea level rise	Impacts on water availability, quality, & supply	Increased wildfires	More frequent, extreme and lengthier drought & flood periods	Increased temperatures
Top five most common goals identified across strategic plans	Protection of diverse landscapes that sustain social, ecological and economic benefits	Maintain organizational health	Engage community	Agriculture protection	Strategic leadership within community

Question 25: Table 20 provides results for interview question twenty-five. The percentage of reported response strategies on climate change preparation plans were compared to the percentage of mission statements that mention climate-related terminology and to the percentage of strategic documents that mention climate-related terminology. All thirteen interview respondents indicated that their organization has prepared for, or is planning to prepare for, climate change within their operational region. Conversely, all seventeen mission statements lacked climate and climate-related

terminology. However, 41% of strategic planning documents included climate-related terminology.

Table 20

Question twenty-five comparative analysis. What has [organization] done, or planning to do in the future, to prepare for potential climate change compared with percentage of mission statements and strategic documents that mention climate-related terminology.

Percentage of reported response strategies	100
Percentage of mission statements that mention climate-related terminology	0
Percentage of strategic planning documents that mention climate-related terminology	41

Although all respondents indicated that their organization has prepared for, or is planning to prepare for climate change, the type of response varied greatly. Most commonly, respondents shared organizational strategies utilized to prepare for climate change impacts, such as the development of wildfire management plans or the inclusion of climate resiliency strategies in organizational documentation. Ecological-oriented strategies and community-based strategies were also mentioned as viable tactics to prepare for climate change, including the expansion of riparian habitat through restoration work and the enhancement of stewardship roles for community relationship building (see Table 21).

Table 21

Reported responses to question twenty-five. Responses are categorized under three types of preparation strategies: organizational, ecological, and community.

Organizational Strategies	Ecological Strategies	Community Strategies
Develop fire management plans	Expand/restore riparian habitat	Enhance and increase stewardship
Incorporate climate resiliency strategies into management strategies	Maintain water infiltration	Enhance education and outreach with community, partners, and stakeholders
Update conservation plans & management plans more frequently	Landscape scale conservation (larger parcel/property acquisition)	Enhance partnerships
Support climate initiatives and incorporate more climate policy into strategic planning	Utilize sustainable practices when and where possible	Protect farmland
Evolve goals as climate changes	Protect forestland for connectivity	
Rethink geographic region of operation	Implement carbon forest & sequestration projects	
Maintain ability to manage lands	Maintain restoration efforts	
Utilize climate data in decision making		
More active management on conserved lands		
Target landscapes for specific benefits or threats		

Question 26: Table 22 provides results for interview question twenty-six. The percentage of participants who reported that their organization has implemented changes in their management strategies to account for climate stressors was compared with the most common type of reported ecological or social stressor indicated by question 12 and the percentage of strategic plans belonging to those land trusts who reported “yes” to changing management strategies that include climate-related terminology. Sixty-two percent of interview participants reported that they have implemented changes in their management strategies to accommodate for climate-related stressors. Eighty-nine percent of those participants (i.e. those that reported “yes” to question 26) belong to land trusts who include climate terminology in their strategic planning documentation. The most

common type of overall ecological or social stressor affecting an organization's conserved lands, however, was reported as residential and commercial development.

Table 22

Question twenty-six comparative analysis. This table describes the percentage of participants who reported changes in management strategies on conserved landscapes to accommodate for climate stressors compared with the most common type of ecological stressor reported from question twelve and the percentage of participants who reported yes that include climate terminology in their organization's strategic document.

Percentage of participants that have implemented changes in management strategies	62%
Most common type of ecological or social stressor to affect conserved lands reported from question 12	Residential & commercial development
Percentage of participants who reported a change in management strategies whose organization's strategic document includes climate terminology	89%

Question 31: Table 23 provides results for interview question thirty-one. The most common management strategies mentioned across strategic planning documentation were compared with the percentage of interviewee participants who reported that their organization was more likely to respond to climate change impacts via resistance, resilience, transition, or a combination of both resilience and transition. Forty-six participants reported that their organization is more inclined to address climate change impacts through resilience strategies; in addition, forty-six participants reported that their organization is more inclined to address climate change impacts through both resilience and transition strategies. Only one participant, or eight percent, reported that their organization is more inclined to utilize transition strategies. No one reported that their organization would likely utilize resistance strategies. Both "*collaboration/partnership*" and "*engagement*" were among the most common management strategies mentioned across strategic planning documentation, followed by "*stewardship*" and "*acquisition*."

Understanding the type of management strategies utilized among land trusts may help inform decisions on types of resilience- and transition-related strategies.

Table 23

Question thirty-one comparative analysis. This table describes the most common management strategies mentioned across strategic documents compared with the percentage of participants who reported that their organization was more likely to respond to potential climate change impacts through resistance, resilience or transition.

Most common management strategies mentioned across strategic documents	Collaboration/partnership: 82%	Engagement: 82%	Stewardship: 76%	Acquisition: 76%
Percentage of participants who reported response as resistance or resilience or transition	Resistance: 0%	Resilience: 46%	Transition: 8%	Both resilience and transition: 46%

Ecoregion assessment. To determine regional conservation values and priorities, the top conservation goal reported for each land trust in their strategic planning documentation was synthesized to determine the top conservation goal for the ecoregion. Similarly, the top management strategy reported for each land trust in their strategic planning documentation was synthesized to determine the top management strategy utilized within the ecoregion. Table 24 provides these results. The most common conservation goal among ecoregions was the protection of diverse landscapes that sustain social, ecological, and economic benefits, followed by the ability to maintain organizational health. Five of the nine ecoregions included the protection of diverse landscapes that sustain social, ecological, and economic benefits as their top conservation goal. The most common management strategies utilized among ecoregions included stewardship, collaboration/partnership, and engagement.

Table 24

Ecoregion comparative analysis. This table describes deductive coding results from strategic planning documentation to determine the top conservation goal and top management strategy utilized by ecoregion.

Ecoregion	Top Conservation Goal	Top Management Strategy
Northwest Coast	Protection of diverse landscapes that sustain social, ecological and economic benefits; maintain organizational health; engage community	Stewardship (6); Conserve (6); Collaboration/Partnership (6); Engagement (6); Secure/Acquire (6)
Puget Trough	Protection of diverse landscapes that sustain ecological, social, and economic benefits; maintain organizational health; engage community	Collaboration/Partnership (9); Engagement (9)
North Cascades	Protection of diverse landscapes that sustain ecological, social, and economic benefits	Stewardship (3); Conserve (3); Collaboration/Partnership (3); Engagement (3); Secure/Acquire (3); Education & Outreach (3); Program development (3)
West Cascades	Protection of diverse landscapes that sustain ecological, social, ecological and economic benefits	Stewardship (3); Conserve (3); Collaboration/Partnership (3); Engagement (3); Secure/Acquire (3)
East Cascades	Protection of diverse landscapes that sustain ecological, social, and economic benefits; collaboration/partnership	Stewardship (3); Conserve (3); Collaboration/Partnership (3); Engagement (3)
Okanogan	Maintain organizational health	Stewardship (2); Collaboration/Partnership(2); Engagement(2); Secure/Acquire(2); Education & Outreach (2); Accreditation(2)
Canadian Rocky Mountains	Agriculture protection	Strategic planning; conserve; education; stewardship
Columbia Plateau	Maintain organizational health; strategic leadership	Stewardship (2); Collaboration/Partnership(2); Engagement(2); Secure/Acquire(2); Education & Outreach (2); Philanthropy(2); Strategic planning(2)
Blue Mountains	Maintain organizational health; strategic leadership	Stewardship (2); Collaboration/Partnership(2); Engagement(2); Secure/Acquire(2); Education & Outreach (2); Philanthropy(2); Strategic planning(2)

Results from the comparative analysis suggest that disparities exist between mission statements, strategic planning documentation, and land trust personnel in regard to organizational priorities, strategies, and general response to climate change. Although land trust personnel are concerned that climate change is likely to influence their region

of operation, less than half of the strategic documentation include explicit mention of climate change. Furthermore, a majority of land trust personnel reported that their organization has, or plans to prepare for climate change, however, this notion was not inherent within either the examination of mission statements or strategic planning documentation – documents that guide organizational work. Also, the cross-examination between the top reported climate change impacts and the top identified conservation goals mentioned across strategic planning documents indicates that, overall, climate impacts are not met with appropriate mitigation- or adaptation-specific strategies, which is especially concerning when nearly all participants reported that their organization would likely respond to climate change through resilience-related strategies.

CHAPTER THREE

DISCUSSION

"If we really listen, the land will tell us what it wants, and tell us how we can live more responsively." -Terry Tempest Williams, Listening to the Land

Synopsis. Private, often not-for-profit land trusts are currently responsible for conserving more than fifty-six million acres of land in the contiguous United States, with approximately seventy-two percent of land held in trust allowing public use (Land Trust Alliance, 2018). Less subject to the political winds of government and governmental regulations, land trusts continue to play an increasing role in land protection and conservation, often serving as "agile catalysts for public investment in conservation initiatives" (Fishburn et al., 2009, p. 74). In Washington State alone, twenty-five land trusts have helped to protect over 866,000 acres of wildlife habitat, outdoor recreation spaces, and working lands, in addition to collectively owning over 126,000 acres of land dedicated to conservation priorities (WALT, 2019). However, climate change poses many challenges for conservation, both at the global and local scale (IPCC, 2014). Anthropogenic induced climate change, in conjunction with natural climate variability has, and will continue, to alter landscapes across the Pacific Northwest (IPCC, 2018; Climate Impacts Group, 2018; Kump, 2010). Landscape alterations induced by climate change impacts across Washington State continue to impact biotic systems, often displacing critical habitat and disrupting natural resources derived from myriad ecosystems (Dalton, 2013). In addition, alterations in land-use continue to exacerbate climate change impacts, which may have significant ramifications for both natural and built systems.

Unfortunately, conservation strategies currently utilized by conservation organizations, such as land trusts, generally include little consideration of climate change (Hannah, Midgley, & Millar, 2002). Although management strategies utilized to facilitate conservation often include diverse and interdisciplinary tactics, many strategies lack appropriate avenues allowing for adaptation and mitigation to support ongoing conservation efforts within dynamic lands (Owley et al., 2018). However, many conservation organizations are starting to acknowledge the potential threats climate change poses and are beginning to reorient their work out of necessity to meet the challenges of climate change through enhanced strategies that support conservation goals (Hansen et al., 2016). The research component of this thesis asked whether land trusts, in particular, are adapting their land management strategies as landscapes respond to climate induced environmental pressures. In addition, the research attempted to reveal whether land trusts are adapting the concept of conservation as climate change presents new challenges to meeting conservation goals.

Seventeen Washington State land trusts were examined through a qualitative study design, assessing if, how, and why they are adapting their land management strategies, if at all, to support conservation efforts as Washington landscapes succumb to climate pressures. Content analysis and interview analysis methodologies were utilized to determine if, how, and why Washington State land trusts are adapting such strategies. Content analysis supported an examination of land trust mission statements and strategic planning documentation to discern regional conservation priorities, management strategies utilized to achieve conservation priorities, and formal organizational acknowledgement of climate change. Interview analysis supported a more in-depth

understanding of land trust responsibilities and procedures related to conservation land management, staff acknowledgment of climate-induced environmental pressures, and organizational response to climate change impacts. A comparative analysis was further employed to support a cross-contextual examination between mission statements, strategic planning documents, and interviews to discern disparities in management strategies related to climate change adaptation and mitigation, and to provide a regional assessment of land conservation across myriad landscapes of Washington State.

The following discussion aims to summarize the results of the Washington State Study in the context of the examined literature, particularly addressing the application of conservation of resources theory, biophilia theory, and ecological resilience theory to better understand implications of the study. The discussion begins with an overview assessment of the "*if*" component of the research question, addressing if land trusts are responding to climate change and if they are adapting their management strategies to account for climate-induced environmental pressures. The discussion then incorporates an overview of the "*how*" component of the research question, addressing how land trusts are responding to climate change, if at all, and how they are adapting their management strategies to account for climate pressures. Similarly, the discussion then addresses the "*why*" component of the research question, providing context to why land trusts may, or may not be, responding to climate change and adapting management strategies to account for climate pressures. The discussion then includes an overview of private land management in the context of climate resiliency, addressing how land trusts will likely need to rethink their conservation strategies to better account for climate change. Finally, the discussion introduces five recommendations for land trusts to consider to aid in the

development of adaptation and mitigation strategies; recommendations that help set the precedence for implementing practices that support resilient landscapes.

Climate change & Washington State land trusts: The if. The primary component of this thesis asked *if* land trusts in Washington State are adapting their land management strategies to support conservation under climate change. The results of the analyses indicate that, overall, Washington State land trusts are responding to climate change and, in some cases, examined land trusts are reorienting their management strategies to account for climate-induced environmental stressors. Fourteen of seventeen examined strategic planning documents, nearly eighty-two percent, include climate-related terminology, suggesting that land trusts are thinking strategically about climate change and akin environmental pressures. Furthermore, seven of the examined strategic planning documents, or forty-one percent, explicitly mention climate change, suggesting that climate change is of importance when thinking about conservation efforts throughout the state. In addition, all interviewed land trust personnel recognized the importance of climate change, reporting that their organization is concerned that climate change is likely to influence their region of operation. Similarly, all thirteen personnel reported that their organization has, or plans to, prepare for climate change, with eighty-five percent of the interviewed personnel reporting that their plans directly account for climate change impacts.

The examination of land management strategies revealed that stewardship, collaboration/partnership, and engagement were among the top strategies utilized by land trusts to facilitate conservation work. In fact, stewardship was the top mentioned strategy across mission statements in addition to being reported as the most effective management

strategy utilized to meet conservation goals from interviewed personnel. Furthermore, stewardship narrowly succumbed to collaboration/partnership and engagement as the most common management strategy mentioned across strategic planning documentation, with thirteen of seventeen strategic planning documents directly referencing stewardship as a top management strategy. These findings imply that land trusts incorporate stewardship both as a primary strategy to facilitate conservation and as a promise to their community, drawing on aspects of community conservation to achieve conservation goals.

Sixty-two percent of interviewed personnel indicated that their organization has adapted, or changed, management strategies on conserved landscapes to account for climate-induced environmental stressors. Increased temperatures and sea level rise were among the most influential stressors reported to affect change. In addition, restoration strategies were reported as the most commonly adapted and/or changed strategy. Several personnel reported that their organization has had to re-think vegetative plantings on restoration sites that are more conducive to survive under warmer temperatures and prolonged drought; another interviewee reported that their management plans now account for increased irrigation after plantings to ensure sapling and seedling viability as restoration sites endure prolonged summer drought. These findings suggest that historical and contemporary restoration practices may not be apt in achieving similar outcomes under current climate change impacts, findings congruent with the examined literature. However, over half of the examined strategic documents reference restoration as a top management strategy, indicating that restoration is an active strategy prioritized to meet conservation goals. Therefore, many land trusts will need to reevaluate their restoration

tactics to ensure conservation goals are met in perpetuity as landscapes succumb to climate-induced environmental stressors.

Although stewardship serves as the most common management strategy utilized, only a few personnel reported changes to stewardship tactics to account for climate-induced environmental stressors. The reported changes mentioned were strictly social, having more to do with relationships and public access than ecological monitoring or site visitation (for tracking purposes). This finding suggests that land trusts are relatively confident in the effectiveness of stewardship; having the ability to properly care for conserved lands ensures continuity of conservation efforts in addition to supporting ongoing resiliency efforts. The reported changes in stewardship strategies accounted for more flexibility and leniency in allowing landowners to actively manage their landscape despite a breach in easement terms; however, allowing for a breach was reported as effective in mitigating against climate threats, such as reducing fuel loads near riparian habitats to alleviate wildfire risk in response to increased temperatures and prolonged drought.

Overall, results from the Washington State study were synthesized to reveal that land trusts are adapting their land management strategies to support conservation under climate change. The results indicate that climate change is of great concern to land trust personnel and that nearly half of the examined organizations have accounted for climate change in their strategic planning documentation. These findings suggest that land trusts are accounting for climate change when determining organizational goals, priorities, and strategies. However, an important question remains – how are land trusts adapting their management strategies to account for climate pressures?

Climate change & Washington State land trusts: The how. Although land trusts are acknowledging climate change, the research component of this thesis evaluated the extent to which land trusts are accounting for climate change, asking *how* the examined organizations are adapting their management strategies to account for climate-induced environmental stressors. Drawing on both conservation of resources (COR) theory and ecological resilience (ER) theory, the results from this examination indicate that many conservation goals are community-oriented, meaning that the primary benefits derived from conservation work primarily support social values and services. In addition, the results from this examination indicate that management procedures, overall, lack adaptation- and mitigation-specific strategies utilized to directly address climate impacts. Rather, many of the organizations have shifted to incorporate more flexibility in conservation goals that are reflective of community-valued outcomes. As such, enhanced community relevancy and engagement must incorporate a platform for educational opportunities related to climate science so that future conservation initiatives reflect climate resiliency as a community value, suggestions congruent with the Land Trust Alliance's best practices for managing lands under a changing climate (Land Trust Alliance, 2019).

The context of climate-related terminology across strategic planning documentation presumes that many of the land trusts recognize environmental pressures and changing conditions as perceived threats; calling on enhanced conservation work to help protect critical habitat and natural systems that build resiliency undeterred by perturbations. Such findings reflect components of ecological resilience theory with the idea that protected systems are capable of sustaining critical elements that maintain

ecological and social services (Cumming & Allen, 2017). In addition, the context of climate-related terminology suggests that land trusts recognize the intricacies related to dynamic landscapes, exemplifying that land trusts understand change as a necessary component of natural systems; components further reflective of ER theory. To account for change, many of the examined strategic planning documentation, in conjunction with examined mission statements, describe the protection of various and diverse lands and habitats as essential to the organization's conservation work. This finding implies that, overall, land trusts are not restricted to the types of habitats and lands they protect; rather, land trusts conserve various types of lands and habitats to maintain a diverse portfolio of conservation goals and priorities. This finding is reminiscent of both 19th and 20th century conservation initiatives, highlighting a protection spectrum ranging from cultural to ecological to economic conservation priorities (Fairfax et al., 2005).

Furthermore, the protection of diverse lands and habitats exemplifies that land trusts are flexible in their conservation work. Allowing for flexibility ensures that a land trust may achieve conservation goals under a changing climate (Hansen et al., 2016). Having flexibility in the types of lands and habitats to conserve, along with flexibility in the purpose of the conservation work, may allow land trusts to proactively respond to changing conditions; because a land trust is not bound to the protection of one type of habitat or landscape, nor are they bound to one type of conservation goal, they may readily incorporate strategies of adaptation to ensure the perpetuity of conservation, even if the original conservation goal changes. The idea of protecting diverse lands and habitat while simultaneously accounting for flexibility, reflects aspects of conservation of resources theory in that land managers (e.g. land trust personnel) have the ability to

recognize threatened social or ecological resources on conserved lands and implement (i.e. invest) strategies that either provide remedial solutions to threatened resources (e.g. restoration) or provide an alternative conservation value for the land in question (e.g. protection of upland habitat vs. shoreline habitat).

Although many of the examined strategic planning documentation supported the conservation of diverse lands and habitats, inherently supporting the notion of flexibility, nearly all plans lacked specific terminology related to flexibility. This suggests that land trusts understand the importance of diversity when pursuing conservation efforts, however, the lack of flexibility terminology may suggest that many land trusts are not proactively considering the need of strategically planning and accounting for flexibility in the lands that they conserve. Similarly, the examination of strategic planning documentation revealed only three references each to adaptation and mitigation, suggesting that many of the plans do not proactively include goals or strategies related to adaptation or mitigation efforts in the context of climate resiliency. Aspects of COR may help to explain this finding in that many of the examined land trusts may not feel as if their conservation values or goals are threatened, alleviating the need to invest in the development and implementation of adaptation- or mitigation-specific strategies. Alternatively, forty-one percent of strategic planning documentation referenced resilience-related terminology, indicating that many land trusts recognize and prioritize resiliency in their conservation endeavors. Many of the resilience-related terminology supported the notion of building resilient ecosystems, allowing for systems to survive disruption and maintain their ecological functions and biological diversity, aspects represented under ER theory. Consequently, many of the resilience-related terms were

found adjacent to referenced climate change and/or climate-related terminology. This finding suggests that land trusts recognize the importance of resiliency in buffering landscapes as they respond to climate-induced changes and stressors.

When asked to think about climate change and its potential impacts on lands conserved by the land trust, all interviewed personnel reported that their organization would be inclined to respond via resilience and/or transition strategies. Nearly half of interviewed personnel reported that their organization would be more inclined to implement resilience-related strategies when responding to climate stressors. The majority of these respondents indicated that their organization has begun to ask questions about resiliency and how resilience would translate onto their conserved properties, reflecting components of the SES framework under ER theory. The implementation of resilience-related strategies would require ongoing evaluation of management strategies in conjunction with consistent and frequent site monitoring. This finding suggests that resilience-related strategies would require increased resources upfront, such as restoration and stewardship, with the supposed long-term outcome being that these landscapes could support themselves over time.

Conversely, nearly half of the other interviewed personnel reported that their organization would be more inclined to implement both resilience- and transition-related strategies when responding to climate stressors. Several of the respondents indicated that successional change in species plantings for restoration projects would be imperative to support ongoing conservation efforts on conserved lands, aiding in the ability to build site resiliency. This finding suggests that management strategies would need to account for increased costs and resources to support ongoing restoration efforts and frequent site

monitoring. In addition, land trust personnel would need to incorporate scientific data when determining the introduction of novel species in existing systems, accounting both for species distribution and viability, as well as projected site characteristics, including current and future climate.

The analysis of sixty-nine conservation goals revealed that sixty percent of goals are community-oriented, meaning that the overall goal, strategy and desired outcome would benefit the human community. In addition, thirty percent of the remaining goals are both community- and ecologically-oriented, indicating that ninety percent of the stated conservation goals across Washington State land trusts derive some sort of community, or social, benefit. This finding is congruent with COR theory in that societal values predominately drive conservation values; land trusts, in turn, may chose to focus on community-oriented goals when determining conservation priorities to ensure community relevance and continued philanthropic support. In addition, land trusts may choose to implement community-oriented goals to enhance ecological conservation to support a growing awareness of natural resources and resource protection.

Furthermore, the analysis revealed that a majority of the examined conservation goals include a management strategy that incorporates a community-engagement component, such as stewardship, partnership, collaboration, education, public access, and public advocacy. In addition, the desired outcomes support a plethora of natural resource benefits, such as viable working lands, enhanced water quality and quantity, invested sustainable infrastructure, greenspaces for aesthetics and recreation purposes, interconnection, and maintenance of regional heritage. Interviewed personnel also reported that there has been a shift in their organization's type of conservation practiced

over time, with forty percent of the reported shifts involving increased community-focused conservation. Many of the reported shifts were initiated to increase community access to conserved landscapes. These findings suggest that many land trusts recognize the importance of community values when choosing conservation goals and priorities, further drawing on COR theory to support tactics that enhance community relevancy and support. Likewise, a majority of examined mission statements revealed that Washington State land trusts have a strong affinity for regional identity, suggesting that land trusts recognize the importance of their surrounding landscapes for both their ecological and social components.

The examination of conservation goals among and across Washington State land trusts did not reveal any direct strategies to adapt for, or mitigate against, climate change. However, the examination of mission statements and strategic planning documentation, in conjunction with interview responses, did reveal that Washington State accredited land trusts are conserving diverse landscapes for the benefit of community values and priorities, incorporating aspects of flexibility to aid in supporting resilient lands of community importance. This finding suggests that the examined land trusts are adapting the notion of conservation to incorporate a more community-oriented focus. In fact, eighty-five percent of interviewed personnel reported that their organization practices both ecological and community conservation when asked what type of conservation their organization practices. This finding is representative of standards set forth by the Land Trust Alliance, who encourages the incorporation of community-oriented values to support conservation in perpetuity (Land Trust Alliance, 2019). Directly involving community members in conservation work results in a growing membership and

supporter base, in addition to growing an appreciation for natural land protection for future generations. This may help to explain why the examined land trusts prioritize stewardship, collaboration/partnership, and engagement as their top management strategies to achieve conservation goals. However, these findings do not indicate that the type of conservation practiced is adapting to account for climate-induced stressors.

Climate change & Washington State land trusts: The why. To fully understand the context in which the examined land trusts are adapting, and how they are adapting their land management strategies to account for climate-induced environmental pressures, this thesis asked *why* land trusts may be adapting their strategies. Results discussed in the preceding sections indicate that land trusts are adapting their land management strategies to support conservation under climate change, drawing support from both COR and ER theories. However, many of the management strategies being adapted to account for climate stressors are out of necessity; details on adaptation- and mitigation-specific strategies were severely lacking. Results from the preceding sections also indicate that land trusts prioritize community-oriented conservation goals, with a consensus that the examined land trusts continue to adapt their notion of conservation to align more closely with aspects of community conservation. Upon further examination, the results indicate that the examined land trusts are more concerned with residential and commercial development affecting conservation efforts rather than climate change, with thirty-six percent of the interviewed personnel reporting that climate change would not have a negative impact on their organization's conservation goals; findings also supported by both COR and ER theories. In addition, interviewed personnel reported that their organization would be better suited to make effective decisions on climate change

with increased access to resources. Collectively, these findings suggest reasons why land trusts may, or may not, be adapting their management strategies to account for climate change.

Nearly forty percent of interviewed personnel reported that residential and commercial development served as the top threat to hindering the effectiveness of conserving landscapes throughout Washington State. Only twenty-three percent of interviewed personnel reported climate change as a top threat. These findings suggest that land trusts are more concerned with impact from residential and commercial development when making decisions about conservation priorities, goals, and strategies. Because residential and commercial development impact lands and habitats at a large-scale, often immediately with readily observed degradation, land trusts may feel more pressured to protect and conserve lands from development threats; the stress from perceived development threats, in conjunction with land trust response, is further supported under aspects of COR theory in that threatened resources that are immediately felt result in action and growing awareness to implement solutions.

Upon further examination, several of the strategic planning documents referenced strategies to alleviate or reduce the amount the development occurring within their region of operation, noting that increased fragmentation and the loss of habitat stifle conservation efforts with perpetual consequences to natural resources, such as water quality or viable agricultural/working lands. Although climate change and its associated impacts have been felt across Washington State landscapes, predominately in increased temperatures and altered precipitation patterns, results from the analyses indicate that climate change does not pose as a significant threat to land trust conservation work. This

finding helps to explain why many of the examined land trusts are not adapting their management strategies to account for climate change. Rather, a majority of management strategies have been developed to support increased acquisition of diverse landscapes to protect natural resources and alleviate development pressure.

Interestingly, only fifty-four percent of interviewed personnel reported that climate change would have a negative impact on conservation goals, despite the unanimous concern that climate change would influence Washington State landscapes. The interviewed personnel who reported that climate change would not negatively impact conservation goals alluded to the idea that climate change is dynamic itself. These respondents perceived climate change as constituting many changes that, collectively, may not hinder conservation goals. In addition, these respondents generally noted that their conservation goals are diverse for their conserved properties, offering a plethora of potential benefits that may be derived despite change. These respondents also mentioned the importance of conserving for ecological functioning, inviting myriad conservation goals rather than focusing on a limited number of goals per conserved landscape, further drawing on aspects of ER theory. The analysis of strategic planning documentation revealed that land trusts, in general, include numerous conservation goals that require numerous and diverse management strategies; these findings were also represented in conversations with land trust personnel when asked about conservation goals, methods of achieving goals, and effective management strategies. Therefore, many land trusts may not recognize the inherent need to develop goals around climate change or adapt their strategies to account for climate stressors. Rather their implementation and use of diverse

goals and strategies constitute enough flexibility to ensure that some conservation effort is sustained in perpetuity despite climate perturbations.

Results from the interview analysis revealed that all examined land trusts would benefit from access to additional resources in order to make more effective decisions on climate change. The need for fine-scale (i.e. local or regional) climate date far exceeded any other reported resource. In addition to fine-scale data, several of the interviewed personnel reported that they would benefit from access to science advisers that could explain the scientific implications of the data and aid in the development of best practices for managing lands under a changing climate. Furthermore, several personnel reported that funding to adequately address climate change is lacking, suggesting the need for increased funding sources to support climate-driven initiatives. These finding may help explain why land trusts have not developed adaptation and mitigation strategies to account for climate change; the data and funding to aid in strategy development is either severely lacking or inaccessible to land trust personnel. As such, it is easy to understand why only three, or roughly seventeen percent, of the examined strategic planning documents referenced science. However, several land trusts personnel reported that their organization has recognized the importance of science in supporting conservation efforts and, are therefore actively seeking opportunities to engage with the scientific community, often expanding programming and outreach opportunities.

Private land management & Washington State's climate resiliency. As previously mentioned, land trusts in Washington State are collectively responsible for protecting over 866,467 acres of land, an equivalent to two percent of Washington's landscape (WALT, 2018). However, many of these conserved lands have been impacted

by climate-induced environmental stressors, with exacerbated effects expected to perpetuate with ongoing anthropogenic forcings (IPCC, 2018; Climate Impacts Group, 2018, Kump, 2010). Therefore, land trusts will likely need to rethink their conservation strategies to recognize that both present and future on-the-ground implications of climate change require the need for robust adaptation and mitigation programs. The adoption and implementation of such programs will only enhance ongoing conservation efforts that meet attainable and important goals, albeit for ecological, social, or economic benefits. With the implementation of adaptation and mitigation strategies, land trusts across Washington State will set the precedence for land management reflective of climate resiliency, for both akin conservation organizations across public and private agencies.

Drawing primarily on biophilia theory (BET), the proceeding discussion highlights the role Washington State land trusts play in climate resiliency, offering contemporary examples of how interconnection between human and ecological communities may remedy perpetual environmental degradation. In addition, the proceeding discussion attempts to reason why the examined land trusts may, or may not, reflect similar goals set forth by the Land Trust Alliance despite their affiliation with the organization. Finally, the proceeding discussion defines five recommendations, based on the synthesis of the Washington State study in conjunction with the examined literature, to support land trusts in developing and implementing adaptation and mitigation strategies that support climate resiliency.

Do Washington State land trusts contribute to climate resiliency? Results from the Washington State study indicate that examined land trusts are contributing significantly to ongoing conservation efforts across the state. However, many of the

management strategies utilized to facilitate conservation do not directly account for adaptation to, and mitigation for, climate change impacts. Instead, many of the examined strategic planning documents indicate the use of flexibility when deciding on what lands and habitat to conserve, ultimately diversifying their conservation portfolio. In addition, many of the examined strategic documentation referenced resilience as an important consideration when determining conservation goals that can be met in perpetuity. Similarly, all interviewed respondents acknowledged a growing concern for climate change and reported that their organization would likely respond to impacts with resilience- and transition-related strategies. Therefore, it may be inferred that land trusts in Washington State are contributing to the state's climate resiliency, both through their ongoing ability to conserve important and diverse landscapes along with their ability to engage communities with the importance of conservation accompanied by educational opportunities that disseminate climate change information.

By protecting diverse landscapes (e.g. critical habitat to working forests), land trusts have the ability to contribute to climate resiliency through efforts that enhance carbon sequestration, protect ecological systems, maintain water quality and availability, and conserve natural areas – essential components that aid in buffering landscapes against various climate threats (Hansen et al., 2016). Results from the analyses indicate that restoration is prioritized as an adaptable and effective strategy in managing lands under climate change. In fact, many of the interviewed personnel reported that their organization has changed restoration tactics to account for climate-induced environmental stressors. This finding suggests that restoration continues to aid land trusts in facilitating conservation, with the ability to adapt strategies that help meet

conservation goals. Stewardship, the most common management strategy utilized among the examined land trusts, provides opportunities to ensure that conservation goals are being met on conserved lands, helping to establish procedures that aid in the adaptation of restoration tactics. In addition, stewardship offers a way to involve the community in connecting with conserved lands, enhancing the appreciation for the conservation of diverse landscapes for the benefit of social, ecological, and economic systems.

Aspects of biophilia theory (BET) may be interpreted to better understand how land trusts are contributing to climate resiliency. In summary, BET serves as a novel theory that simply describes one's innate love for life, highlighting the role that anthropogenic emotions play in environmental protection, or degradation. Results from the analyses indicate that all of the examined land trusts practice community conservation, with a majority of conservation goals benefiting community values. To facilitate community conservation, many of the examined land trusts have developed educational and recreational programs to increase opportunities that connect their surrounding communities with natural landscapes; findings reflected in both the content and interview analyses. Providing modes of connection are essential in stewarding communities to appreciate natural landscapes. In addition, providing an array of educational and recreational opportunities that are well-suited in appealing to a diverse range of community members, will ensure that all community members have a chance to engage with natural landscapes, ultimately increasing support for conservation work while simultaneously developing biophilous-oriented communities. As communities grow in biophilous-orientation, they are more likely to care for and respect nature in

addition to taking responsibility for harmful actions and disseminating ecological knowledge – components that encourage climate resiliency.

Are Land Trust Alliance goals reflected in Washington State land trusts?

Surprisingly, a majority of the examined land trusts did not reflect climate change goals as described by the Land Trust Alliance, despite their affiliation with and accreditation through the organization. The Land Trust Alliance continues to recognize the "moral obligation" land trusts have in addressing the "climate crisis," noting that the implementation of robust adaptation and mitigation strategies, in conjunction with continued land acquisition (i.e. conservation easement or fee simple acquisition), will be imperative for conservation in perpetuity that ensures maintenance of ecological functioning, effective stewardship, and sustained natural resources (Land Trust Alliance, 2019). The Alliance has also launched an organizational program dedicated to climate change, complete with best practices for managing landscapes under a changing climate (Land Trust Alliance, 2019). Recommendations set forth by the Alliance detail ways in which land trusts can adapt natural climate solutions, such as carbon sequestration through protection of forest lands, in addition to providing material on climate communications and renewable energy, offering avenues for land trusts to become more apt in advocacy efforts and alternative energies (Land Trust Alliance, 2019).

Although goals were disparate, the integration of novel strategies require strategic planning, in addition to administrative and monetary resources, which may explain why many of the examined land trusts have not yet integrated strategies and recommendations set forth by the Alliance. However, the Alliance has developed several funding opportunities to support land trusts interested in this work. At least one of the interviewed

personnel reported that their organization has received funding through the Alliance to initiate work dedicated to addressing climate change. A majority of that work includes educational opportunities for staff and board members, who can then translate learned knowledge into practice for the organization. Furthermore, the same respondent reported that partnership and communication between engaged stakeholders and community members is essential when making effective decisions on climate change, furthering the notion that community conservation will continue to play a large role in determining conservation priorities.

Future recommendations. A synthesis of the Washington State study, together with the examined literature, have led to five recommendations to aid land trusts in adapting their management strategies to better account for climate-induced environmental stressors. These recommendations are: 1) enhance education and recreation opportunities; 2) enhance stewardship programming; 3) conserve for ecological systems; 4) target specific landscapes for climate change purposes; and 5) maintain accreditation with the Land Trust Alliance. Independently, each recommendation will provide avenues to implement adaptation and mitigation strategies, adhering to an organization's capacity to do so. Collectively, these recommendations will provide a robust management plan that incorporates diverse adaptation and mitigation strategies that support climate resiliency.

The first recommendation relates to education and recreation. Foremost, land trust personnel, including staff and board members, should seek information to better understand the potential implications of climate change for the Pacific Northwest. Understanding regional climate change, along with its associated impacts, will help to garnish a cohesive approach to climate change impacts of regional concern. Sea level rise

was among the top climate impact concern expressed by land trust personnel in the preceding study, however, conversations with land trust personnel revealed that changes to management strategies to account for climate change more readily incorporated restoration tactics to relieve prolonged drought – tactics not conducive for mitigating against, or adapting to sea level rise. Therefore, a growing understanding of regional impacts and how they may disrupt conservation goals is necessary, helping to bridge disparities, or provide for more robust action strategies, to account for perceived threats. In addition, as land trust personnel enhance their knowledge on climate change and its associated regional impacts, they are encouraged to incorporate that information into decision-making processes. The incorporation of such knowledge will help steer strategic planning processes that may be more adept in supporting the notion of conserving land in perpetuity, a recommendation further supported by Owley and colleagues (2018).

Akin to enhancing internal educational facets, land trusts are recommended to enhance their educational and recreational opportunities for their surrounding community. Enhanced opportunities will provide a platform to better engage people with their surrounding landscapes, helping to increase a general awareness of benefits derived from protected landscapes and how conservation aids in sustaining a diverse array of natural resources. Drawing on aspects of biophilia theory, increased connection with nature will instill a deeper appreciation for the natural environment. A growing appreciation for the natural environment, as described by biophilia theory, will encourage pro-ecological attitudes and aid in relieving the detrimental impacts humans have on the environment. Furthermore, land trusts are recommended to utilize their educational and recreational opportunities as a platform to discuss the implications of climate change and

the importance of land conservation under a changing climate. Regardless of membership, the Land Trust Alliance provides an array of educational material to help land trust personnel incorporate climate literature into their educational programs. Enhanced exposure to climate change and its impacts on valued landscapes may encourage more community action in supporting climate initiatives.

The second recommendation for land trusts to consider includes stewardship. Land trust personnel, including staff and board members, should continue to enhance and adequately fund stewardship programming. The result of enhanced and well-supported stewardship is two-fold, with both internal and external organizational benefits. First, enhanced stewardship will benefit internal operations as conserved landscapes are better monitored. Having increased staff, or volunteer, presence on conserved landscapes, coupled with appropriate reporting techniques, will help personnel better understand the landscape as a system, with increased knowledge on the various components that contribute to the landscape's conservation value. With a better understanding of the landscape itself, personnel are well-equipped to develop, or reevaluate, individual landscape management plans. As landscapes respond to internal and external perturbations, personnel may incorporate appropriate strategies to mitigate, or adapt to, impacts; aspects reflective of ecological resilience theory. The second benefit derived from enhanced stewardship programming pertains to the external community; as land trusts enhance stewardship programming, they provide more ample opportunities for community engagement. Drawing on aspects of biophilia theory, an engaged community serves to better appreciate and support the conservation and protection of natural landscapes. As such, people are better supported to express their passion for the natural

environment, albeit direct engagement with the natural environment or philanthropic support to protect valued landscapes in perpetuity.

The third recommendation relates to general land conservation and acquisition. Land trust personnel, including staff and board members, are recommended to think more critically and strategically about conserving for ecological systems rather than specific habitat or land types. Thinking systematically will help a land trust establish a baseline for resiliency, aspects reflected in ecological resilience theory. According to Hansen et al. (2016) this means that land managers may be better equipped to understand ecosystem processes and species that are most vulnerable to projected climate change, and in which places they are most vulnerable. Having the forethought to think systematically will help land trusts establish a diverse portfolio of conservation priorities and their associated goals, which will direct acquisition-related decisions. In addition, prioritizing the conservation of ecological systems will allow for ongoing flexibility in conservation goals. As climate change continues to adversely affect specific components over others, the incorporation of flexibility will be imperative to ensure that conservation efforts are productive and worthwhile. Furthermore, the conservation of ecological systems will require that land trust personnel think more holistically over the long-term, with greater consideration of how the loss or inclusion of system components (e.g. species loss) will not inhibit the overall conservation value of a conserved landscape.

The fourth recommendation for land trusts to consider also relates to general land conservation and acquisition. Akin to implementing acquisition efforts that support the conservation of ecological systems, land trusts should also continue to incorporate the acquisition of diverse landscapes, with strategic consideration of fine-scale climate

impacts. In general, land trusts should prioritize the acquisition of landscapes of their choosing, working more strategically than opportunistically, having the ability to incorporate novel climate information. Furthermore, conservation directors are encouraged to target the acquisition of landscapes that will support the achievement of conservation goals under a changing climate, a recommendation supported at the national level by Owley and colleagues (2018). Conservation directors are also encouraged to work collaboratively, partnering on the conservation and protection of specific landscapes threatened by climate pressures, or other ailing stressors. Prioritizing landscapes through a climate lens will enable land trust personnel to think critically about how to best protect threatened landscapes while simultaneously supporting conservation in perpetuity.

The final recommendation for land trusts to consider relates to accreditation. Land trusts are recommended to seek out, or maintain, accreditation through the Land Trust Alliance. Accreditation ensures the promise of sound conservation work through the implementation of best practices under a robust land management framework that is in compliance with national standards. In addition, the Land Trust Alliance serves as an instrumental resource, both for organizational development in the implementation of best practices and for providing monetary funding for conservation initiatives. Because the Land Trust Alliance serves as a voice of the land trust community, much of their work is reflected at the legislative level through the adoption of policies and regulations. The establishment of such policies and regulations ensures that conservation efforts pursued by land trusts are met with the notion of perpetuity that is worthy of the public trust.

In summary. The preceding sections discussed the important findings from the examination of seventeen accredited Washington State land trusts, drawing on content, interview, and comparative analyses to highlight if, how, and why the examined land trusts are adapting their land management strategies to account for climate-induced environmental stressors. Drawing on both ecological resilience theory and conservation of resource theory, in conjunction with congruent aspects of the examined literature, the preceding discussion revealed that the examined land trusts are responding to climate change and, in some cases, are reorienting their management strategies to account for climate-induced environmental stressors. However, the reported changes are out of necessity, often reflecting changes in restoration tactics to account for increased temperatures and prolonged drought. Furthermore, the preceding discussion revealed that the examined land trusts are implementing community-oriented conservation goals, which are primarily supported by stewardship, collaboration/partnership, and community engagement management strategies; rarely did any of the examined mission statements or strategic planning documentation account for adaptation- and mitigation-specific strategies. Conversely, the preceding discussion also revealed that land trust personnel are well aware of climate change, with increased temperatures and sea level rise constituting the greatest climate change concerns. Despite unanimous concern of climate change, just over half of the interviewed personnel reported that climate change impacts would have a negative effect on conservation goals. Yet, all personnel reported that their organization would respond to climate change impacts with resilience- and transition-related strategies and that access to more fine-scale climate data would help their organization make more effective decisions on climate change.

The preceding sections further discussed the application of biophilia theory to better understand the role Washington State land trusts play in climate resiliency. To facilitate community conservation, many of the examined land trusts have developed education and recreation programs to increase opportunities that connect their surrounding communities with natural landscapes, aiding in the development of biophilous-orientation. With increased biophilous-orientation, communities are more likely to support the wellbeing of natural lands for the ecological and social benefits they derive. Furthermore, the preceding sections discussed the implications of disparate climate change goals between the Land Trust Alliance and Washington State land trusts, differences likely resulting from limited capacity in administrative and monetary resources. Lastly, the preceding sections discussed the synthesis of the examined literature and the Washington State study to support the implementation of five recommendations to aid land trusts in adapting their management strategies to better account for climate-induced environmental stressors. These recommendations are: 1) enhance education and recreation opportunities; 2) enhance stewardship programming; 3) conserve for ecological systems; 4) target specific landscapes for climate change purposes; and 5) maintain accreditation with the Land Trust Alliance. Collectively, these recommendations will aid land trusts in development of a robust management plan that incorporates diverse adaptation and mitigation strategies that support climate resiliency.

CONCLUSION

"The lesson here is obvious – never give up. When matters of principle are at stake, and especially when those principles involve sustaining our earth and sharing its resources fairly, never, ever give up." – Larry Nielsen, Nature's Allies

Landscapes are changing in response to global climate change, and they are doing so at an alarming rate (Climate Impacts Group, 2018; IPCC, 2014). Anthropogenic induced action, including the release of greenhouse gas emissions and sulfate aerosols is altering the climate, ecology, and economy of Pacific Northwest landscapes, with legacy impacts that degrade the biodiversity and services once rendered by these impressive lands (Climate Impacts Group, 2018; IPCC, 2018; Kunkel, 2013). Climate change will cause species to shift their distributions, likely forming new communities and ecosystems that are historically different than what is known today (Reside et al., 2018). Anthropogenic stewardship will be imperative to sustain ecological processes to ensure the continuity of the benefits communities rely on; such benefits include: clean water, disturbance mitigation, economic livelihood, critical habitats, biodiversity, and landscapes of cultural significance (Hansen et al., 2016). Because landscapes are inherently complex, it is imperative that the development of, and implementation of management strategies be collaborative, coordinated, and interdisciplinary to ensure landscape-scale ecological longevity (Hansen et al., 2016).

Conservation efforts managed by private conservation organizations play a critical role in preserving, sustaining, and restoring landscapes to ensure perpetuity of social, ecological, and economic benefits. In addition, conservation organizations continue to fulfill an increasing role in land conservation, surpassing federal and state agencies through their action-based management strategies (Fairfax et al., 2005). Many of these

conservation organizations rely on collaboration and partnership, as well as community engagement, to garner support and connect communities with the value of land preservation. Such aspects are responsible for the ongoing implementation of community conservation, a practice that simply includes more people in conservation initiatives through active listening and response.

Washington State landscapes constitute some of the most ecologically rich areas in the United States (Dalton et al., 2013). The complex and varied topography inherent within Washington State lands contributes to the region's rich climatic, ecological, and social diversity, which fuels the region's economy and environmental connections. Unfortunately, the rapid acceleration of climate induced stressors will cause many of the current climatic assumptions, including decision-making strategies, infrastructure, and policies, to become increasingly inefficient. If communities are to preserve landscapes for the benefits they provide, it will be of critical importance to define conservation targets to determine the severity of future change and identify means to protect natural and cultural resources. Luckily, conservation initiatives practiced by Washington State land trusts are becoming increasingly focused on community-oriented conservation, where landscape-level priorities are beginning to account for climate-induced environmental pressures.

The research component of this thesis asked whether Washington State land trusts, in particular, are adapting their land management strategies as landscapes respond to climate induced environmental pressures. In addition, the research attempted to reveal whether land trusts are adapting the concept of conservation as climate change presents new challenges to meeting conservation goals. Seventeen land trusts were examined through a qualitative study design, assessing if, how, and why they are adapting their land

management strategies to support conservation as landscapes succumb to climate pressures. A qualitative study design, including both content analysis and interviews, supported an examination of land trust mission statements and strategic planning documentation, to discern regional conservation priorities, management strategies utilized to achieve conservation priorities, and formal organizational acknowledgement of, and response to, climate change. Interview analysis supported a more in-depth understanding of land trust responsibilities and procedures related to conservation land management, staff acknowledgment of climate-induced environmental pressures, and organizational response to climate change impacts.

Drawing on three primary theoretical frameworks, results from the study reveal that the examined land trusts are responding to climate change through strategic planning, and, in some cases, are reorienting their management strategies to account for climate-induced environmental stressors on conserved lands. Furthermore, the results from the study reveal that the examined land trusts are implementing community-oriented conservation goals, utilizing stewardship, collaboration/partnership, and community engagement management strategies to facilitate conservation work; but rarely did any of the examined mission statements or strategic planning documentation account for adaptation- and mitigation-specific strategies. Conversely, results from the study reveal that land trust personnel are well aware of climate change and that their organization would respond to climate change impacts through resilience- and transition-related strategies, despite their lack of specific mitigation and adaptation strategies. Therefore, over half of the land trusts examined will need to better account for climate change in their strategic planning efforts. One immediate solution to address climate change, as

expressed by land trust personnel, pertains to increased access to fine-scale climate data, both physical access to and interpretation of such data. Regardless of efforts examined through this study, land trusts, and akin conservation organizations, will likely need to rethink their conservation management strategies to better account for climate change, especially as these organizations continue to promise conservation in perpetuity.

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APPENDIX A

Interview Questionnaire

Date of interview:
Method of interview (e.g. in person; telephone; web platform):
Name of participant:
Job title of participant:

*Disclaimer: For the purposes of this study, you'll here me refer to "the region". This simply refers to the region and/or area that [organization] operates within.

Part 1:

1. In 2-3 sentences, can you describe what your responsibilities are at [organization]?
2. Would you consider this organization to practice ecological conservation (i.e. conservation focused on wildlife and ecosystem protection) or social conservation (e.g. community conservation; conservation focused on natural resource protection and outdoor rec/public access)?
3. Follow-up to question 2: Has there been a shift in the type of conservation practiced over time? If yes, proceed to question 4, if no, skip to question 5.
4. Follow-up to question 3: Was this shift in response to ecological changes (e.g. changing landscapes; species dynamics; climate change; environmental stressors) or social changes (e.g. cultural paradigm of conservation; cultural values)?
5. What are your organization's conservation goals and purposes in the region?
6. Have your organization's conservation values and purposes changed over time?
    - Yes (describe)
    - No (describe)
7. Do you foresee a future change in the organization's conservation practices/goals?
    - Yes (describe)
    - No (describe)

I'm going to shift my focus a little bit and ask general questions related to conservation strategies and how this organization promotes conservation.

8. What are the top (3-5) tools your organization uses to promote conservation?
9. Do you foresee changes in the types of tools utilized?
10. What is the most effective management strategy used to meet your organization's conservation goals? (e.g. restoration; education)
11. How does your organization assess where risks to conservation goals are higher or lower on landscapes?
12. Have any social or ecological landscape changes affected any of your organization's conserved lands?
13. What do you feel is the top threat or threats to the effectiveness of conserving landscapes in the region?

Now I would like to shift my focus again and ask questions about stewardship & monitoring

14. Is active land management important for meeting your organization's goals on its conserved properties?
    - Yes. If yes, in what way?

- No
- Don’t know

15. Does your organization have a stewardship or endowment fund that can be used for monitoring and enforcement?
    - Yes
    - No
    - Don’t know
16. How often does your organization monitor its conserved properties, on average?
    - Two or more times per year
    - Once a year
    - Every 2-5 years
    - Every 6-10 years
    - Every 11-15 years
    - Less than every 15 years
    - Don’t know
17. What monitoring techniques does your organization use?
18. Has your organization adapted the management or stewardship strategies of conserved landscapes to any changes over time?
    - Yes, proceed to question 19
    - No. If no, skip to question 20
    - Don’t know
19. If yes, what circumstances have required adaptation?
20. Does your organization coordinate with other organizations in the region to meet conservation goals?
    - Yes. If yes, in what way?
    - No. If no, would coordination with other organizations be helpful?
    - Don’t know
21. How closely does your organization work with tribal agencies?

Finally, I'd like to ask a few questions about climate change.

22. Is your organization concerned that climate change is likely to influence this region?
    - Yes. If yes, how?
    - No
    - Don’t know
23. How likely is climate change to negatively impact the conservation goals of [organization]?
    - Not likely
    - Somewhat likely
    - Very likely
24. What climate change impact has the greatest concern for your organization’s conservation goals?

25. What has [organization] done, or what are you planning to do in the future, to prepare for potential climate change in this region?
26. Has your organization changed any of their management strategies on conserved landscapes to account for climate-induced environmental stressors?
    a. Are these management strategies that impact landscapes directly (i.e. direct actions on lands)?
    b. Are these management strategies that impact protocols/procedures (i.e. document language the accounts for climate change; transition to more fee acquired properties)?
27. Do any of the documents related to land acquisition (CE or fee) account for climate change in any capacity? (e.g. do they provide provisions for adaptation and/or mitigation strategies?)
28. Will your organization need to reconsider their acquisition strategies to account for climate change impacts?
29. What resources does your organization need in order to make effective decisions on climate change?
30. Where do staff members of your organization obtain information on climate change for the region?
31. When thinking about climate change and its potential impacts on lands conserved by [organization], would your organization be more inclined to respond through resistance, resilience, or transition? *Define what is meant by resistance, resilience, and transition
    - Resistance: Prevent change – the organization has high economic/social/ecological values that they are not willing to compromise on, which leads to strategies that prevent change and promote resistance to climate change impacts.
    - Resilience: Ability to be flexible – the organization has the capacity and ability to absorb, stretch, and bounce back (much like a rubber band) from impacts. Organization manages ecosystems in a way where they can account for some stress to occur and for that place to undergo some change, however, the implementation of select management strategies allow for that place to be "recognizable" and to maintain some sense of its identity (e.g. managing for diversity & various age classes in a forest).
    - Transition: Intentional change – the organization intentionally encourages a change on the landscape that they think is going to be better matched to future conditions and will alleviate risk (of losing conservation values) of the long-term (e.g. incorporating assisted migration strategies; changing a closed forest to an open savanna ecosystem).

Part 2:
Ask any questions that were left unanswered from content analysis series that you think the participant can answer, to the extent you have time.

APPENDIX B

Informational Letter with Project Overview

My name is Alexandra James and I am a graduate student at The Evergreen State College. The purpose of this study is to provide supplementary research to compliment ongoing research exploring the relationship between climate change and conservation efforts proposed by accredited land trusts throughout the contiguous United States. The following research is in partial fulfillment of the requirements associated with a Master of Environmental Studies degree accredited by The Evergreen State College.

This research follows a qualitative study design, incorporating both content analysis and interviews for data collection. As such, I would like to evaluate land trust mission statements and strategic planning documents from each accredited land trust in Washington and conduct at least one interview with an identified professional from each land trust.

You have been selected among land trust professionals in Washington State to participate in this study as an interview candidate based on your job title and responsibilities. The interview process is designed to take up to 30 minutes of your time with an additional option to expand the conversation by 10 minutes to allow for follow-up questions. Information gathered will be used to help further understand the role Washington State land trusts play in land management, conservation, and climate change preparedness. Questions and procedures are designed to gather information about job-related tasks and responsibilities from identified professionals, rather than personal perceptions and attitudes. All questions and procedures have been approved by the Human Subjects Review committee at The Evergreen State College.

Your participation is greatly appreciated and will contribute to the growing understanding of conservation and land management.

Central Question: How are land management strategies utilized by Washington State land trusts adapting to promote conservation as landscapes respond to climate induced environmental pressures?

The research is to be conducted in a two-part series through content analysis and interviews.

Part 1: Content Analysis - Qualitative content analysis of mission statements and strategic plans

Intention: The following research is supported through the analysis of mission statements and strategic planning documents (i.e. strategic plan) held by accredited land trusts in Washington

State. Information gathered will be examined to discern changes in conservation values over time, differences in management strategies and conservation values among land trusts, and regional differences in approaches to land conservation.

Framework: Mission statements and strategic plans will be evaluated using a prepared coding framework indicative to iterative qualitative analysis.

Analysis: Mission statements and strategic plans will be analyzed with ATLAS.ti and JMP software. ATLAS.ti is an analytic software designed for qualitative content analysis. Coding schematics will be devised based on terminology categories to organize the data. JMP is an analytic software designed for quantitative analysis. Quantitative data will be synthesized through JMP software for data representation in the form of tables, figures and maps. Quantitative visualization will identify emerging patterns.

Part 2: Interviews - Qualitative interviews with land trust professionals

Intention: The following research is supported through qualitative interviews with land trust professionals. Information gathered from each interview will be examined to understand the breadth of the evaluated strategic planning documents, land trust mission statements and current understanding of climate change impacts on landscapes held in trust. Interview participants were identified using job titles and/or colleague recommendations. Professionals with "conservation director/coordinator/manager", "acquisition director/coordinator/manager", and/or "stewardship director/coordinator/manager" were contacted for interview inquiry.

Consent Form: A required completion of an informed consent form is required before the interview begins.

Analysis: Interview content will be examined using ATLAS.ti and JMP software. ATLAS.ti is an analytic software designed for qualitative content analysis. Coding schematics will be devised based on categories to organize the data and reveal any emerging trends. JMP is an analytic software designed for quantitative analysis. Quantitative data will be synthesized through JMP software for data representation in the form of tables, figures and maps. Quantitative visualization will identify emerging patterns.

I appreciate you taking the time to review this overview document. I am happy to answer any questions that you may have, or to provide you with more information on the study.

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Master's Candidate - Master of Environmental Studies
The Evergreen State College

APPENDIX C

The Evergreen State College
Consent for Participation in Research

"Climate Change & Land Conservation"

Why am I being asked?

You have been selected among land trust professionals in Washington State to participate in this interview because of your job title and responsibilities at your organization. In order to decide whether or not you want to be a part of this research, you should understand enough about the purpose of the research and ask any questions you may have before agreeing to participate. You should understand the risks and benefits of participating in order to make an informed decision. This process is known as informed consent. This consent form gives detailed information about the research project, which will be discussed with you. Once you understand the study, you will be asked to sign this form if you elect to participate in the study.

What is the purpose of this research?

The purpose of this study is to provide supplementary research to compliment ongoing research exploring the relationship between climate change and conservation efforts proposed by accredited land trusts throughout the contiguous United States. The following research is in partial fulfillment of the requirements associated with a Master of Environmental Studies degree accredited by The Evergreen State College.

You are one of 17 professionals being asked to participate in this study. Alexandra James, a current graduate student at The Evergreen State College will conduct a 30-minute interview with you.

There are two components to this interview. The first component includes four sections totaling 31 questions. Section 1 asks general questions about your job responsibilities, the organization and conservation goals of the organization. The second section asks general questions about conservation strategies. The third section asks questions about monitoring and stewardship. The fourth section asks questions about climate change. The second component is designed to ask any unanswered questions the researcher may have about the organization's mission statement and strategic planning document examined from the content analysis research conducted prior to the interview. Questions are designed to gather information on strategies utilized by the organization; personal perceptions about topics disclosed are not of interest, rather a general understanding of how the organization functions and staff knowledge of disclosed topics are of interest.

What procedures are involved?

The first part of the interview is designed to take approximately 30 minutes. 10 minutes of follow-up questions may be asked depending on time availability of participant. Interviews may be conducted in-person, over the phone, or by internet platform (e.g. skype; google hangouts). Interviews will be recorded

by use of the QuickTime Player application on a Macbook and by an iPhone. Responses will be transcribed using Atlas.ti software.

Will I be reimbursed for my participation in this research?

There will be no monetary compensation for participation in this research.

Can I withdraw or be removed from the study?

Your participation in this study is voluntary. You may choose to refuse to answer any or all questions asked of you. You also have the right to withdraw from the study at any time without penalty or any effect on your present or future relationship with The Evergreen State College.

What about privacy and confidentiality?

Your responses will be reviewed by Alexandra James. Information gathered from responses will be used as data to support a written thesis of the research. Your identity, including name and affiliated organization, will not be used explicitly for any portion of this study. Information gathered will not be given to a third/outside party. If any information and/or responses are published, there will be no information that would identify you as a participant without proper consent as described below. Data presented in the thesis will be represented in the most unbiased form possible using analysis software. In the event that this is subject to change, you will be notified with request of an additional consent form.

This consent and release applies to use of my personal information and/or my response(s) as indicated below:

☐ My personal information (e.g. my first and last name, job title, employer) described as: _____
_____

☐ Direct quotes and/or paraphrasing described as: _____
_____

☐ Other described as: _____

What are the potential risks and discomforts?

No risks are expected during any phase of this study. Questions are designed to gather information about job-related tasks and responsibilities from identified professionals.

How do I benefit from participating in this research?

Benefits of this study will help further understand the role Washington State land trusts play in land management, conservation, and climate change preparedness. This information will help inform organizations of strategies utilized, highlight effective management techniques and collaboration efforts.

By signing below, you are agreeing to participate in a research study. Be sure that any of your questions about the study have been answered to your satisfaction, and that you have a thorough understanding of the research project.

Participant's Signature: _____ Date: _____

Print Name: _____

Interviewer's Name: _Alexandra James_____ Date: __2.22.2019___

APPENDIX D

Climate Change Terminology & Context

Analysis: Terminology absence or presence of climate-related strategies and context

- SJPT: References: 0
- CLT: References: 4
    - "prioritize conservation projects that…face imminent threat of ecological degradation, typically from land use change; code: environmental pressure
    - "We will protect these lands and waters [for]…the ecological functions they support, such as…**climate regulation**"
        - Code: climate
    - "…establish a process for ongoing scientific monitoring"
        - Code: science
    - "management plan[s] are updated as changing conditions indicate"
        - Code: changing conditions
- Methow: References: 1
    - "This plan is intended to be adaptable so that the organization remains prepared to respond to unanticipated opportunities" (plan reevaluated 2x/year)
        - Code: adaptation
- Chelan-Douglas: References: 4
    - "Human well-being in North Central Washington is interdependent with the health of our natural lands, waters, and systems"
        - Code: viability
    - "People choose this area as their home because of its natural beauty and quality of life – the very traits that are now at risk" (more associated with increased development and population pressures – area has seen a 57% increase in past 30 years)
        - Code: environmental pressure
    - "…the Chelan-Douglas Land Trust has a unique opportunity to make a meaningful contribution to the effort to restore the health and resiliency of…mixed conifer forest in North Central Washington"
        - Code: resiliency
    - "Given the real threat of **climate change**, this has potent ecological and economic implications for the communities we serve" (when referring to restoring forest health)
        - Code: climate change
- Skagit: References: 3
    - "Coastal resiliency"
        - Code: resiliency
    - "Reduce the impact of flooding on our community" (by conserving lands important to river processes)
        - Code: environmental pressures

    - "protecting and stewarding resilient ecosystems"
        - Code: resilience
- NOLT: References: 1
    - "economic, social and ecological health and resiliency"
        - Code: resiliency
- Nisqually: References: 2
    - "…there is no doubt that our watershed is under assault"
        - Code: environmental pressure
    - "**Climate change**, extreme weather, real-estate development, resource extraction, and any number of other factors are taking their toll"
        - Code: climate change
- PCC: References: 0
- Columbia: References: 3
    - "We monitor the effectiveness of our strategies and adapt to changing conditions and emerging opportunities" (guiding principle/value)
        - Code: adaptation; changing conditions
    - "Changes to our region's landscape over the next 25 years will define our communities well into the future"
        - Code: changing conditions
    - "We conserve diverse habitat, to support the great diversity of species and to promote natural resilience in a changing world"
        - Code: resilience
- GPC: References: 1
    - "Our work builds resiliency for wildlife, our local communities and the land trust itself" (when referring to value of sustainability)
        - Code: resiliency
- BMLT: References: 0
- Bainbridge: References: 4
    - "Another significant event that has occurred is increased awareness of the natural resource attributes of Bainbridge Island and the functions they provide to the community not only for habitat, but also water resource protection, storm water control, carbon sequestration, and contributing to a healthy and vibrant community"
        - Code: viability
    - "Updates to the Conservation Plan will continue through 2018. These update efforts will include…Integration of **Climate Change**. There has been much work performed by others, including the City of Bainbridge Island Climate Adaptation Assessment of 2017, UW Climate Change Study and other regional efforts to help inform protection, and likely restoration, endeavors resilient to climate change"
        - Code: climate change
    - "…by the end of 2018, BILT's goal will be to have an integrated plan with a refined CVI [conservation values index], expanded stakeholder feedback and climate change data in order to guide work over the next 10 year"
        - Code: science

    - Conservation tool described: mitigation – "land can be protected as part of a mitigation need"
        - Code: mitigation
- Jefferson: References: 7
    - "We expect even more will change in the coming years as our population continues to grow and the **climate changes**"
        - Code: climate change
    - "We all think this place is incredible, yet in the face of so many pressures and demands it will not remain that way forever on its own"
        - Code: environmental pressure
    - "Patterns within the community feedback emerged and much of the most relevant input falls into four main categories: Growth, Public Awareness, Markets and Policy, and Climate Change"…serving as driving forces that support conservation actions (e.g. climate change as driving force that informs conservation actions related to ecology and adaptation)
        - Code: climate change
    - Climate change was a sub-section under each conservation goal/priority, warranting 7 total references for document – discussed implications of climate change and strategies of adaptation and mitigation
        - Code: adaptation; mitigation
- Whidbey: References: 5
    - "Permanent changes to the islands' landscapes are accelerating"
        - Code: changing conditions
    - Entire sub-section devoted to climate change and resiliency "**Climate continues to change**, and at an increasingly rapid pace, and the Land Trust is incorporating the best available science to guide its land protection strategies"
        - Code: climate change
    - "One common characteristic of much of the current research is the important of resilience, or the ability of a system to survive disruption and to maintain its ecological functions and biological diversity despite **climate change**"
        - Code: climate change
    - Sea level rise – "one of the larger concerns with climate change"
        - Code: climate change
    - "Protect ecological corridors between protected lands and Puget Sound to promote climate resiliency and allow viable movement of native fish and wildlife"
        - Code: resiliency
- Whatcom: References: 1
    - Carbon sequestration as a conservation tool – "large-scale conservation of biomass to offset carbon emissions"
        - Code: mitigation
- Lummi: References: 3

    - "Inventory native habitat, wildlife, and natural resources on LIHT properties to assess changes over time due to **climate** and/or demographic **changes**"
        - Code: climate change
    - "Protect native habitat and wildlife from the effects of population pressures and **climate change**" (both in reference to stewardship and land management conservation goal)
        - Code: environmental pressure, climate change
    - "Address climate change through LIHT land conservation, stewardship and education programs" (in reference to organizational effectiveness and governance conservation goal)
        - Code: climate change
- Forterra: References: 9
    - "There are plenty of facts and figures to provide a measure of our success, as well as the grave challenges of population growth, **climate change** and expanding regional land economic divides"
        - Code: climate change
    - "Often, agricultural lands are at the greatest risk of conversion to non-open space uses, and will bear the brunt of impacts associated with **climate change**, particularly reduced availability of water resources and shifting weather patterns"
        - Code: climate change, changing conditions, weather
    - "**Climate change** will be a significant factor shaping agriculture in the years ahead. The availability of water – as well as increasing temperatures are expected. This will likely reduce the viability of some crops in our region"
        - Code: climate change
    - "Our forests will also shift in area and character with **climate change**, particularly in patterns and amounts of snow and rain"
        - Code: changing conditions, climate change
    - "With **climate change** accelerating, we will need to address lasting effects by maintaining refugia and connectivity corridors for fish and wildlife and create economically viable working forests within this new paradigm"
        - Code: climate change, viability
    - "**Climate change** threatens major disruptions to our native ecosystems, shifting home ranges, inundating coastal habitat, igniting massive forest fires, acidifying our marine waters, and exacerbating invasive species issues"
        - Code: climate change, environmental pressure, changing conditions
    - "Water is increasingly a challenge and concern facing development in rural communities, notably in Central Washington"
        - Code: environmental pressure
    - "**Climate change** will impact our future and refugees from other parts of the country and the world may change the number and diversity of people living in our region"

        - Code: climate change
    - "Climate change is predicted to have multiple impacts on our water systems"
        - Code: climate change, environmental pressure