

NEW LENSES ON LANDSCAPE IN THE ANTHROPOCENE

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ABSTRACT

This paper argues that traditional anthropocentric landscape theory is inadequate for addressing climate change and proposes a theoretical framework grounded in Indigenous onto-epistemologies and more-than-human scholarship. Positioning Indigenous knowledge systems as foundational rather than supplementary, I develop three interconnected lenses for understanding landscape formation: significations (human representations that acknowledge more-than-human agency), relations (ongoing kinship networks between humans, living beings, and terrain), and enactments (material processes of mutual constitution between multiple agencies, following Gan and Tsing's (2018) definition of landscape as "material enactments of space and place by many historical actors—both human and non-human").

Through literature-based examination of salmon and water systems in the Salish Sea bioregion, this theoretical exploration demonstrates how non-human agents actively create landscapes and climate resilience through complex relationships that exceed human control. Indigenous Coast Salish peoples have maintained these relationships for over seven millennia through ceremonial practices, linguistic systems, and management approaches that recognize salmon and water as active agents and relatives deserving of respect. Scientific research validates this Indigenous knowledge, revealing how salmon transport marine nutrients inland to create forest composition, support diverse wildlife populations, and maintain carbon sequestration essential for climate stability, while water systems simultaneously shape and are shaped by geological, biological, and human processes.

This historical and theoretical analysis suggests that effective climate response requires moving beyond anthropocentric frameworks that treat landscape as human constructions toward approaches that recognize ongoing enactments between multiple agencies. For landscape theory, this suggests the need for fundamental theoretical reorientation: positioning Indigenous knowledge systems as foundational and developing frameworks for understanding human agency within more-than-human relationships. This theoretical foundation prepares the ground for future empirical research examining how landscape architecture practice might transform to work with rather than against the complex relationships that create climate resilience.

Keywords

Anthropocene, Non-Human Agency, Indigenous Onto-Epistemologies, Climate Resilience, Multispecies Landscape

1 INTRODUCTION

How can landscape architecture reconsider landscape formation and agency in light of the climate crisis? While recent scholarship such as LAF's (2016) *The Landscape Declaration*, Merten's (2021) *Resilient City*, and Hohman and Langhorst's (2005) "Landscape Architecture: A terminal case?" offer important responses to anthropogenic climate change, they frame solutions through a human-centric lens in landscape intervention. In contrast, scientific research and Indigenous understandings of landscape demonstrate that this human-centered lens is inadequate for understanding the complex relationships between multiple agencies that shape landscapes.

In the Anthropocene, this inadequacy is not merely academic but represents a barrier to effective climate change response. As Tsing (2015) demonstrates in her research on the relations between humans and matsutake mushrooms, landscapes emerge through "contaminated diversity", the messy collaborations between species that create possibilities for life in damaged environments. Gordillo (2021) extends this insight to argue for recognizing "the power of terrain", which recognizes the capacity of the Earth's own materiality itself to affect human and non-human relations. Additionally, Indigenous onto-epistemologies have long understood landscapes as emergent through kinship relationships between humans, living beings, and terrain itself (Coulthard, 2014; Goeman, 2013; Kimmerer, 2017; Simpson, 2017, 2025; Watts, 2013; Whyte, 2017).

The Salish Sea bioregion of Western Washington and British Columbia evidences both the potential and the crisis of more-than-human landscape formation. The bioregion encompasses the traditional territories of numerous First Nations and tribes, including the Lummi, Tulalip Tribes, Muckleshoot, Squamish, Tsleil-Waututh, Musqueam, and many others, each maintaining distinct languages, governance systems, and territorial relationships developed over millennia and its geography includes the inland waters of Puget Sound, the Strait of Georgia, and the Strait of Juan de Fuca, along with their interconnected river systems including the Fraser, Skagit, and numerous smaller watersheds. The terrain's own agencies from the ancient glacial carving of the Salish Sea itself and the ongoing processes of seismic activity creating mountain ranges and tidal flows connecting fresh and saltwater systems provided the material foundation for salmon migrations, old-growth forest, and Indigenous lifeways spanning millennia. Coast Salish peoples in the region co-created resilient and bountiful landscapes through those they regard as kin. This paper examines how Indigenous onto-epistemologies and more-than-human theories provide essential frameworks for expanding landscape theory beyond anthropocentric limitations, positioning Indigenous knowledge systems as foundational for understanding landscape formation rather than attempting to modify existing European frameworks. Through empirical examination of salmon and water systems in the Salish Sea, I demonstrate how human and non-human agents actively create landscapes in ways that directly impact climate resilience, revealing implications for landscape architecture practice and education in the Anthropocene.

2 POSITIONALITY

I write as a white American researcher approaching this work as a student of landscape history and theory. While I have direct experience with the ecosystems, salmon runs, and seasonal rhythms of this area through residence and observation, I do not have ancestral, cultural, or sovereign relationships to these lands and waters. I am not from the Salish Sea region and do not have lived experience with the Indigenous peoples of the area. My relationship to this place is that of a settler-researcher who has come to know these landscapes through living here rather than someone with inherited knowledge systems developed through millennia of territorial relationships. This positionality requires careful attention to how I engage with Indigenous knowledge systems, ensuring that my theoretical framework serves to amplify rather than appropriate Indigenous ways of knowing, while recognizing the difference between recent residence and time immemorial relationships.

My theoretical positioning emerges from growing recognition that Western landscape theories' anthropocentric assumptions represent not merely academic limitations but barriers to effective climate response. Scholars such as Nina-Marie Lister (2019), Guy Nordenson and Catherine Seavitt (2015), and Kristina Hill (2020) have argued that traditional landscape architecture's anthropocentric frameworks prove inadequate for climate adaptation, requiring theory that recognizes landscape agency beyond

human control. Through witnessing and researching the complex agencies that Western landscape theory fails to capture adequately in the Salish Sea bioregion, I argue that Indigenous onto-epistemologies must be understood as foundational rather than supplementary to landscape theory. The Indigenous scholars and knowledge keepers whose work I draw upon offer insights from contemporary culture that have maintained relationships with these specific lands since time immemorial, providing frameworks that landscape architecture theory needs to address climate change effectively.

3 LITERATURE REVIEW

This literature review establishes my central argument: that landscape architecture must transform its understanding of landscape formation to address climate change effectively. Current approaches remain inadequate because they position humans as primary agents who design and manage landscapes, rather than recognizing that humans are always participants in ongoing landscape-creation with other organic life and non-organic processes. Rather than treating Indigenous knowledge systems as supplementary sources to enhance Western landscape theory, this paper positions Indigenous onto-epistemologies as foundational for understanding how landscapes actually form through relationships with multiple agencies. Drawing from Indigenous and non-Indigenous academic sources, I propose three analytical lenses: significations, relations, and enactments. These lenses reveal landscape formation as ongoing processes of mutual constitution rather than human constructions imposed upon passive environments. In doing so, this literature review demonstrates that this theoretical reorientation is not merely academic but essential for developing practices capable of working with rather than against the complex relationships that create climate resilience.

Source selection emerged from attempting to find theoretical frameworks that could explain both what I read in scientific literature and what I observed in site observations in the Ballard Locks in Seattle. Examinations of ecological studies, such as those of Reimchen et al. (2003) and Hocking and Reynolds (2011), revealed landscape formation processes that could not be adequately explained within human-centered landscape theory literature. Indigenous scholarship such as that of Kimmerer, Simpson, Whyte, Coulthard, and Kelly, along with the more-than-human scholarship of Barad, Gordillo, and Tsing offered conceptual tools for both understanding these processes and how humans exist both in relationships and as parts of these processes. Rather than approaching sources with predetermined theoretical commitments, the selection followed evidence toward literature that could provide adequate explanatory frameworks for the landscape formation processes of formation through ongoing enactments between salmon, water, terrain, human communities, and others.

3.1 Indigenous Knowledge Systems

The theoretical foundation this paper requires already exists within Indigenous scholarship represents the distinct onto-epistemologies of hundreds of different nations, each with unique languages, territories, governance systems, and relationships to specific places. This is not a matter of “incorporating” Indigenous perspectives into existing Western frameworks but rather recognizing that Indigenous knowledge systems offer the comprehensive understandings of landscape formation that Western landscape theory lacks. This paper draws primarily from Nishnaabeg, Dene, and Potawatomi scholars who offer foundational insights that emerge from their specific territorial relationships and should not be understood as representing all Indigenous ways of knowing. The Native peoples of the Salish Sea each maintain their own specific knowledge systems, languages, and ceremonial practices developed through millennia of relationships with particular watersheds, salmon runs, and territories.

Michi Nishnaabeg scholar Leanne Betasamosake Simpson’s (2017; 2025) work on Nishnaabeg onto-epistemologies proves essential because it demonstrates knowledge as emergent through ongoing relationships with *land as first-teacher* where landscapes actively teach humans how to live in relation with all beings. Her theoretical framework directly challenges Western landscape theory’s *nature versus culture* division by positioning landscape as an active agent in knowledge creation, fundamentally reframing the relationship between human consciousness and environmental processes. This Nishnaabeg understanding offers insights that emerge from specific relationships to the Great Lakes region and cannot be generalized to other Indigenous knowledge systems.

Potawatomi sustainability professor Kyle Whyte's (2017) work on Indigenous climate science proves crucial for establishing the relations lens because it reveals how Indigenous knowledge systems understand environmental change through kinship networks that include more-than-human beings across temporal scales that scientific frameworks fail to include. Similarly, Potawatomi biologist Robin Wall Kimmerer (2017) examines how Potawatomi language encodes kinship with living landscapes, as indicated by *wiikwegama*, "to be a bay" (p. 131), reveals water as an active being rather than inert object. These examples illustrate what Mohawk and Anishinaabe sociologist Vanessa Watts (2013) terms *place-thought*, the understanding that consciousness emerges from the land itself, suggesting that thinking and being are fundamentally shaped by more-than-human relationships.

Dene-Canadian Indigenous studies scholar Glen Coulthard's (2014) analysis provides an ethical foundation by demonstrating the clear difference between Indigenous understandings of land as relation versus settler-colonial frameworks that treat land as property. As Coulthard (2014) declares that First Nations see "land as a system of reciprocal relations and obligations that can teach us about living our lives in relation to one another and the natural world in non-dominating and non-exploitative terms" (p. 13) is practiced, establishing ethical frameworks that recognize more-than-human agency as essential to human flourishing within Dene territories and governance systems.

Scholar Dara Kelly (Leq'á:mel First Nation, Stó:lō Coast Salish) establishes how the knowledge systems of the Indigenous peoples of the Salish Sea are rooted in specific relationships to river systems and ceremonial practices. Kelly's (2017) research on the Stó:lō "economy of affection" brings to light how **Sqwéłqwel** (oral histories of the recent past) and **Sxwoxwiyám** (oral histories of the distant) create knowledge through relationships. Her methodology is informed by *Riverwordview*, "a broad metaphor for Coast Salish worldview... how Coast Salish philosophy informs human behavior and relational exchange between Xwélmexw, Coast Salish people, Xá:ls, The Creator and S'ólh T'é México, our world" (p. 11), provides the place-specific framework this analysis requires. While Stó:lō ways of knowing arise from their particular territorial relationships to the Fraser River and its environs, Kelly also notes that "each Coast Salish region has its own locally defined and distinct worldview that reflects its history, location and affective ties between these three spiritual relationships. Within this ontological framework, what changes across different Coast Salish regions is the terminology" (p. 11).

While these Nishnaabeg, Potawatomi, Dene, and Stó:lō scholars offer theoretical insights that challenge Western landscape theory, their work represents specific cultural and territorial knowledge that has developed through distinct relationships to particular places and beings. The knowledge systems of the Indigenous peoples native to the Salish Sea region emerge from different linguistic, territorial and ceremonial relationships developed through seven millennia of interaction with salmon, cedar, and the waters of the Salish Sea. Rather than seeking a unified "Indigenous approach", this paper recognizes that each Indigenous nation offers distinct ways of understanding landscape formation through their unique relationships to specific terrains, while acknowledging the shared critiques of anthropocentric frameworks that treat landscapes as human constructions rather than ongoing relationships between multiple agencies.

3.2 Emerging Western Recognition of Non-Human Agency

While Indigenous knowledge systems have long recognized non-human agency, Western scholarship has only recently begun developing frameworks that acknowledge what Indigenous peoples have always known and continue to know. This recognition spans multiple disciplines but remains fragmented compared to comprehensive Indigenous ontologies, often failing to acknowledge its debt to Indigenous knowledge systems while struggling to move beyond anthropocentric assumptions. Most significantly, even the most progressive Western scholarship continues to position humans as primary agents who must learn to "collaborate with" non-human beings rather than recognizing that humans are always already part of more-than-human relationships.

Sarah Whatmore's (2002) *Hybrid Geographies* represents important progress by establishing how landscapes emerge through networks of human and non-human actors whose relationships exceed human control, challenging the nature/culture binary that has dominated Western thought. Steven Hinchcliffe's (2007) urban ecology research shows cities as sites of complex multispecies interactions that

challenge nature/culture binaries, while Jamie Lorimer's (2015) *Wildlife in the Anthropocene* demonstrates how conservation must move beyond human management toward multispecies collaboration.

Multispecies studies scholars like Eben Kirksey and Stefan Helmreich (2010) argue that human and non-human lives are *always already entangled* in ways that exceed human control, suggesting that the question is not whether to include non-human agency, but how to recognize the non-human agency that is already shaping landscapes. Tsing's (2015) work on matsutake mushrooms demonstrates how landscapes emerge through "contaminated diversity," messy collaborations between species in damaged environments that create new possibilities for life in the ruins of capitalist extraction.

Critical landscape scholars reveal how seemingly neutral concepts encode political relationships that have significant implications for how we understand landscape formation. Don Mitchell's (2008) analysis shows that landscape representations are always embedded in struggles over territory and power, while Kenneth Olwig's (2002) work demonstrates how landscape representations have historically naturalized particular human-environment relationships while hiding alternatives. This matters because many inherited concepts may be incompatible with Indigenous relational ontologies, requiring careful examination of how Western landscape theory perpetuates colonial relationships with land.

This Western scholarship represents progress but remains fragmented and often fails to acknowledge its debt to Indigenous knowledge systems while positioning humans as primary agents who must learn to "collaborate with" non-human beings, rather than recognizing that humans are always already part of more-than-human relationships. As Zoe Todd (2016) argues, Western theory is often "discovering" what Indigenous peoples have always known, without adequate acknowledgment, highlighting the need for theoretical frameworks that position Indigenous knowledge as foundational rather than supplementary.

3.3 More-Than-Human Agencies

More-than-human scholarship becomes valuable not as an alternative to Indigenous frameworks, but as support for understanding how Indigenous insights about landscape formation align with cutting edge theoretical developments. These frameworks prove essential for constructing the enactment lens while demonstrating convergence between Indigenous knowledge systems and contemporary scholarship that recognizes the limitations of anthropocentric approaches.

Gastón Gordillo's (2021) theory of terrain provides essential insights for understanding landscape formation beyond biological agencies. Drawing from Spinoza's understanding of power as capacity to affect, Gordillo demonstrates how terrain's "hard, soft, liquid, and gaseous components" possess agency through their ability to disrupt human territories. His concept of *primacy of terrain* argues for terrain's ontological priority over human places and territories. As he states, "the unruly materiality of Earth is ontologically primary in relation to the human experiences of it as places and territories—and certainly much more powerful" (p. 192).

Crucially, Gordillo argues that "human bodies and all living forms are intrinsic parts of terrain and relate to other bodies from within terrain" (p. 192), challenging landscape architecture's tendency to position humans as external designers and suggesting instead that humans are always already participants in terrain's ongoing processes. This insight demands fundamental reconsideration of design practice that recognizes human intervention as occurring from within, rather than upon, landscape processes.

Karen Barad's (2007) agential realism provides complementary insights through what she terms *enactments*—relationships that are mutually constitutive rather than interactions between pre-existing entities. For Barad, reality emerges through ongoing enactments where "distinct agencies are only distinct in relation to their mutual entanglement; they don't exist as individual elements" (p. 33). As Lakota scholar Suzanne Kite (2023, para. 4) notes, agential realism has "close affinities with Indigenous philosophies, where the arrangement of the universe is so deeply braided together that the world can only be known through communication with and through the non-human in the land."

Building on Barad's framework, Gan and Tsing (2018) define landscape as "material enactments of space and place by many historical actors – both human and non-human" (p. 136), emphasizing how landscapes emerge through ongoing processes of mutual constitution between multiple agencies. Barad's framework demands *ethico-onto-epistemology*—ways of knowing, being, and acting that recognize human and non-

human beings as equally capable of agency and equally deserving of ethical consideration. This convergence with Indigenous knowledge systems demonstrates that effective climate response requires fundamental ontological and ethical transformation, not simply technical solutions.

3.4 Three Lenses for Understanding Landscape Formation

Drawing from Indigenous and more-than-human theoretical foundations, this paper proposes three interconnected lenses for understanding landscape formation that position Indigenous knowledge systems as foundational while incorporating insights from more-than-human scholarship to create frameworks adequate for understanding and responding to climate change:

1. **Significations** encompass human cultural artifacts that attempt to capture relationships with more-than-human beings and terrain. Unlike traditional landscape representation, this lens recognizes that all representations are partial and that non-human beings and terrain agencies exceed human representational capacity, demanding humility about the limits of human understanding while acknowledging the ongoing work that representations do in shaping relationships.
2. **Relations** examine the ongoing kinship relationships between humans, living beings, and terrain that Indigenous scholars identify as basic to landscape formation. Following Simpson and Whyte, these are material relationships that create mutual obligations and responsibilities, extending beyond human social relationships to encompass what Coast Salish peoples understand as relationships with salmon, water, and terrain itself as relatives deserving of respect and reciprocity.
3. **Enactments** follow Barad's agential realism and Gan and Tsing's understanding of landscape as "material enactments of space and place by many historical actors – both human and non-human," examining ongoing processes through which human and non-human agencies mutually constitute each other and landscapes. As Gordillo argues, bodies exist "from within terrain" rather than acting upon it from outside, recognizing that all landscape formation occurs through ongoing processes of mutual becoming rather than human imposition upon passive environments.

These three lenses reveal landscape as an ongoing process of relationships rather than fixed object or human construction, creating the theoretical foundation for examining the Salish Sea bioregion, where salmon, water, terrain, and Coast Salish peoples demonstrate how landscapes emerge through complex enactments that create climate resilience when respected and climate vulnerability when disrupted.

4 METHODS

This historical and theoretical analysis applies the three lenses developed above as an analytical framework for existing literature on landscape formation in the Salish Sea bioregion. This methodology combines Indigenous scholarship, scientific research on salmon ecology, and historical analysis of human relationships with salmon and water systems, recognizing that understanding more-than-human landscapes requires engaging multiple knowledge systems simultaneously rather than privileging any one epistemology. The methodology acknowledges what Foucault (2002) terms the "archaeology of knowledge" examining how different knowledge systems create different possibilities for understanding and relationship while recognizing that Indigenous knowledge systems offer foundational insights that Western scholarship is only beginning to articulate.

The focus on salmon and water systems comes from their central roles in both Indigenous knowledge systems and scientific understanding of landscape formation in the Salish Sea bioregion. Source selection, as noted in Section 3 above, followed evidence toward literature that could provide adequate explanatory frameworks for landscape formation processes, rather than beginning with predetermined theoretical commitments. Historical sources include Indigenous oral histories (as recorded by Indigenous scholars), treaty negotiations, and scientific studies documenting ecological relationships over time.

This place-based approach aligns with Indigenous methodologies that understand knowledge as emergent through ongoing relationships with specific places and beings rather than through abstract theoretical frameworks.

5 THREE LENSES IN THE SALISH SEA CONTEXT

5.1 Significations: Representing Salmon-Water-Terrain Relationships

Human signification of salmon and water reveal divergent understandings of landscape formation and agency between Indigenous and settler-colonial onto-epistemologies that have strong complications for climate resilience¹. These representations are not neutral cultural artifacts. Rather, they encode particular relationships between humans and more-than-human beings that create different possibilities for ethical engagement; these possibilities directly shape the material outcome of these relationships. Crucially, following Gordillo's insight that terrain withdraws from full human comprehension, effective significations must acknowledge their own limitations while creating space for ongoing relationships with agencies that are not necessarily captured by human representation.

To the Indigenous peoples of the Salish Sea, salmon are more than resource: they are kin with agency of their own whose lives depend on the well-being of their water habitat, demanding respect from the humans who have for millennia and continue to depend on the salmon for survival. Among the peoples of the Salish Sea, diverse salmon ceremonies serve as annual acknowledgment of the mutual relationship between human and salmon, whereby the salmon will return annually to feed the people, and the humans will in turn, treat the salmon bones with respect and keep the waters they inhabit clean. While each Coast Salish community maintains distinct ceremonial approaches with different protocols, timing, and specific cultural meanings developed through their unique territorial relationships, shared principles of reciprocity and recognition of salmon agency remain consistent across these practices. Salmon ceremonies have been documented in writing since the early 19th century, with multiple contemporary sources from Indigenous tribes and nations in the Pacific Northwest, such as the Tulalip Tribes of Washington, the Muckleshoot Tribe, the Squaxin Indian Tribe, the Nisqually Tribe, the Lummi Nation, the WSÁNEC First Nations, and the Upper Skagit Tribe (Columbia River Inter-Tribal Fish Commission, n.d.; Hibulb Cultural Center and Natural History Preserve, n.d.; Squaxin Indian Tribe, n.d.; Morago, 2025; Cultee, 2018; Muckleshoot Indian Tribe, 2025; Nisqually Tribe, 2002; Amross, 1987; WSÁNEC Leadership Council, n.d.; First Nations Wild Salmon Alliance, 2022; Salmonelli, 2024; Valdillez, 2017). As Lummi Chairman Tony Hillaire states, "We are the salmon people; it is part of our cultural identity" (Simonelli, 2024), while Tulalip Chairwoman Marie Zackuse emphasizes that ceremonies serve "to honor our culture and carry out our teachings" (Valdillez, 2017). Contemporary ceremonial practices continue to be guided by tribal elders and cultural leaders, with many Coast Salish communities having revived these ceremonies in the 1970s after decades of suppression. As Tulalip ceremony leader Glen Gobin explains, "What we thought was almost lost, was actually being done individually—as a family. Today we're doing it as a people, as a tribe, as a community; honoring and respecting our visitor" (Valdillez, 2017). These ceremonial representations position salmon as active participants in landscape creation whose continued presence depends on respectful human reciprocity, while simultaneously acknowledging that salmon agency cannot be completely comprehended or controlled by human understanding. This ceremony has been documented in writing since the early 19th century, when Lewis and Clark's exploration of the Pacific Northwest noted its occurrence, and ethnography from the early 20th century documents the practice as well. It is still practiced and observed by Coast Salish tribes in Western Washington and northern Oregon, as well as among First Nations peoples in present-day British Columbia around the Salish Sea (Discover Lewis & Clark, n.d.). These ceremonial representations position salmon as active participants in landscape creation whose continued presence depends on respectful human reciprocity, while simultaneously acknowledging that salmon agency cannot be completely comprehended or controlled by human understanding.

Water, too, is central to the lifeways of Coast Salish tribes and First Nations, along with other Indigenous peoples of the Salish Sea, and the representations are embedded within the linguistic significations of space, the names for the peoples themselves, and their historical claims to territory. Both Lushootseed and Musqueam, two Coast Salish languages, contain complex directional systems that reveal deep spatial practices of living between rivers, fresh water, and salt water that define how the peoples of the Salish Sea thought of their world. These languages describe directions through relationships to bodies of water, encoding water as an active agent that shapes spatial understanding and movement patterns. (Bates et al., 1994; Hess & Hilbert, 1995a, 1995b; Suttles, 2004). Multiple Coast Salish first nations have ethnonyms related to water: Stó:lō, meaning "river" in Halqemelem, "Tsleil-Waututh (səlilwətał)", the

people of the Inlet", Squamish (Skwxwú7mesh), "people of the sacred water", Sq'éwlets - comes from "q'éw" meaning "to go around a bend in the river" (Kelly, 2017; Tsleil-Waututh Nation (n.d.); Chatterjee (n.d.)). Contemporary Indigenous representations continue this tradition of representational humility, as seen in Lummi scholar Temryss MacLean Lane's writings on the importance of water, which employ multiple metaphors – *waterway as kin*, *waterway as dinner table*, *waterway as medicine* – rather than claiming a singular definition, demonstrating an understanding that water's agency requires multiple approaches to representation (MacLean Lane, 2017).

The Tulalip Tribe's Puget Sound Chinook Salmon Subway Map (Figure 1) exemplifies contemporary Indigenous signification that combines scientific understanding with recognition of salmon as kin while acknowledging representational limitations. Unlike conventional fisheries maps that represent salmon as resources moving through human-controlled spaces, this map acknowledges salmon intelligence and agency in navigating landscapes they help shape and create. The subway metaphor positions salmon as commuters with their own destinations and purposes, revealing an understanding of landscape as co-created by multiple intelligent beings rather than as passive environment managed by humans, while the metaphor itself acknowledges human representations can only approximate salmon experience rather than fully capturing it (Tulalip Tribes Natural Resources, n.d.). This representational humility becomes crucial for theoretical frameworks that acknowledge the limits of human understanding while creating space for ongoing relationships with agencies that exceed human representational capacity, following Indigenous models that maintain resilient and sustainable relationships across millennia through representations that explicitly acknowledge their own partiality.

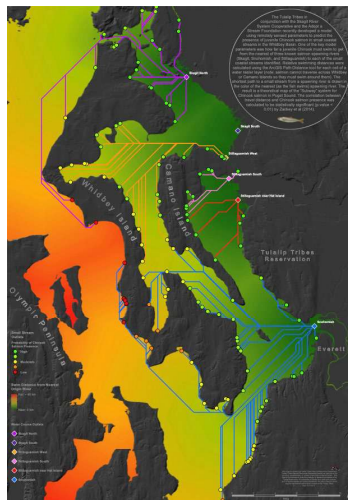


Figure 1. Puget Sound Chinook Salmon Subway Map. Tulalip Tribes Natural Resources.

5.2 Relations: Kinship Networks Creating Climate Resilience

This second lens examines the ongoing kinship relationships between humans, salmon, water, and terrain that Indigenous scholars identify as foundational to landscape formation (Simpson 2017, 2025; Watts, 2013; Coulthard 2014). These are not simply cultural constructions but material relationships that create mutual obligations and responsibilities with direct implications for climate resilience (Coulthard 2014; Kelly 2017; Whyte 2017), demonstrating how ethical relationships with more-than-human beings generate practical outcomes for environmental stability. Unlike Western approaches that often separate social and ecological systems, Indigenous kinship frameworks understand these relationships as simultaneously ethical, material, and essential for the wellbeing of all beings involved, creating what might be understood as social-ecological resilience through obligations that extend across species boundaries (Simpson 2017, 2025; Whyte 2017; Kimmerer 2017).

Archaeological evidence reveals that Coast Salish peoples established salmon as central to their diets by 5000 B.C.E., and these relationships have been maintained for at least 7,500 years (Campbell & Butler, 2010). As documented by Harper and Walker (2015), salmon comprised up to half the caloric intake prior to colonization, but this relationship extends far beyond nutrition to encompass what MacLean Lane

(2017) describes as waterways serving as *kin*, *medicine*, and *home*. These kinship relationships created what can be understood as climate resilience through diversified relationships across seasons and species, developing sophisticated knowledge of each salmon species' timing, characteristics, and preservation methods that created food security capable of adapting to environmental changes (Atlas et al., 2020; Bingham et al., 2021; Reid, 2022). As Musqueam elder qiyəplenəxw describes: "our mothers would talk about lowering cedar branches into the water, and the herring spawning on them, so they would have fresh spawn for the winter... When the tide went out, our table was set", paralleling a story related by MacLean Lane (2017) about her grandfather. (Museum of Anthropology at UBC, 2024). This description reveals knowledge systems that worked with rather than against seasonal rhythms and species behaviors, creating abundance through respectful engagement with more-than-human agency rather than domination and control, while establishing reciprocal obligations that ensured the continuation of these relationships across generations.

First Nations and Native tribes around the Salish Sea consider salmon as both kin and resource and recognize water as central to their understanding of the terrain their ancestors have long inhabited. The legal recognition of these relationships came through the treaty negotiations of the 1850s, when Coast Salish peoples insisted on maintaining fishing rights "in all accustomed places" despite ceding vast territories². As Muckleshoot tribal historian Walter Kinggeorge explains, his ancestors understood they were securing the ability for their descendants to "be Indian in the 20th, in the 21st centuries" through maintaining salmon relationships (U.S. Army Corps of Engineers, Seattle District, 2017). This foresight proved crucial when the 1974 Boldt Decision finally upheld these treaty rights, guaranteeing Coast Salish tribes half the annual salmon harvest in Western Washington (Davies, 2021), demonstrating the legal and political dimensions of kinship relationships that extend beyond cultural practice to encompass territorial rights and sovereignty. These kinship obligations create what Berkes and Turner (2006) term "social-ecological resilience" through flexible, place-based practices that can adapt to environmental change while maintaining core relationships rather than relying on technological fixes that often create new problems.

Contemporary Indigenous fishery management demonstrates how kinship relationships can create climate resilience even under current conditions of environmental degradation and colonial disruption. Unlike conventional resource management that treats salmon as objects to be managed, Indigenous approaches combine traditional kinship relationships with scientific understanding, creating approaches that maintain ethical obligations while adapting to contemporary conditions. As Leonard Forsman of the Suquamish Tribe explains, ceremonial fishing maintains "traditional food for our ceremonies including memorials, funerals, and hosting canoe journeys," preserving relationships that have proven resilient across millennia while adapting to contemporary conditions (U.S. Army Corps of Engineers, Seattle District, 2017). Larry Petersen of the Upper Skagit Indian Tribe articulates the continuing kinship: "We are a salmon people. Salmon mean more than just money, more than just food, it's a way of life for us. We are tied to this river by blood," revealing how kinship relationships create obligations and responsibilities that exceed economic calculations (King5News, 2022). These kinship-based management approaches have proven more effective than top-down resource management in maintaining salmon populations despite widespread environmental degradation, with Indigenous-managed fisheries consistently showing better outcomes than state-managed ones, demonstrating how relationships based on reciprocity and responsibility create more resilient systems than those based on extraction and control (Northwest Indian Fisheries Commission, 2024)³.

5.3 Enactments: Terrain, Salmon, and Humans as Co-Creators

Following Barad's insight that reality emerges through ongoing enactments where "distinct agencies are only distinct in relation to their mutual entanglement," and Gan and Tsing's (2018) definition of landscape as "material enactments of space and place by many historical actors – both human and non-human" (2018, p. 136), the third lens examines how terrain, salmon, water, and humans mutually constitute each other and the landscapes they inhabit through ongoing material processes of becoming. As Gordillo argues, humans exist "from within terrain" rather than acting upon it from outside, fundamentally challenging landscape architecture's tendency to position humans as external designers while revealing landscape formation as an ongoing process of mutual becoming where all agencies participate in terrain's continuous emergence rather than operating upon it as external substrate.

The Salish Sea bioregion demonstrates how terrain's own agencies create the material foundation for all subsequent relationships through processes that continue to shape landscapes in the present, while simultaneously being shaped by the very relationships they enable. The region's current topography results from 2.4 million years of glacial enactments, with repeated ice advances carving Puget Sound and Lake Washington while creating upland till plains cut by meltwater channels (Troost & Booth, 2008). These geological processes continue through ongoing seismic activity creating mountain ranges and tidal flows connecting fresh and saltwater systems, revealing terrain as dynamic force rather than static substrate for human activity. These terrain agencies provided the material conditions that enabled salmon evolution and migration patterns while simultaneously being shaped by salmon presence and activity, demonstrating that Pacific salmon species co-evolved with glacial retreat patterns, developing life cycles synchronized with seasonal water flows, temperature variations, and spawning habitat availability created by glacial processes (Quinn, 2018). The salmon did not simply adapt to pre-existing terrain but participated in creating the landscapes they inhabit through their migrations, nutrient distribution, and death cycles, revealing the mutual constitution that Barad identifies as fundamental to reality itself.

Scientific research reveals how salmon, forests, and water systems create climate resilience through complex enactments that exceed any single species' agency while demonstrating the inadequacy of approaches that treat these as separate systems requiring management. Thomas Reimchen's research team at the University of Victoria demonstrated that salmon transport marine-derived nutrients far inland through their spawning migrations, with Reimchen et al. (2003) finding salmon-derived nitrogen appearing in old-growth riparian forests throughout British Columbia. Their research revealed "direct relationship between the salmon spawning density and 15N enrichment in humus soil, in riparian vegetation, and in riparian insects" (p. 65), providing empirical evidence for landscape creation through ongoing material enactments between marine and terrestrial systems. One small stream supporting salmon spawning provided enough nutrients from their remains to sustain "2 martens, 4 eagles, 12 ravens, 150 glaucous-winged gulls, and 250 crows" (Reimchen, 1994), demonstrating how salmon death creates life for multiple species in expanding networks of material relationship (Figure 2). Hocking and Reynolds (2011) found that plants requiring high nutrition, such as salmonberry, depend on salmon-derived nutrients, while red alders can survive in low-salmon environments, revealing that salmon density had an inverse proportional relationship to riparian plant diversity, demonstrating how salmon presence fundamentally shapes forest composition through their material contributions to soil chemistry and nutrient availability. These enactments create what might be understood as systemic climate resilience where forests supported by salmon nutrients sequester more carbon (Ontl et al., 2020), salmon populations supported by healthy forests maintain genetic diversity essential for adapting to climate variations, and water systems regulated by both create stable thermal refugia during climate extremes, with none of these agencies alone creating resilience but resilience emerging through their ongoing enactments.

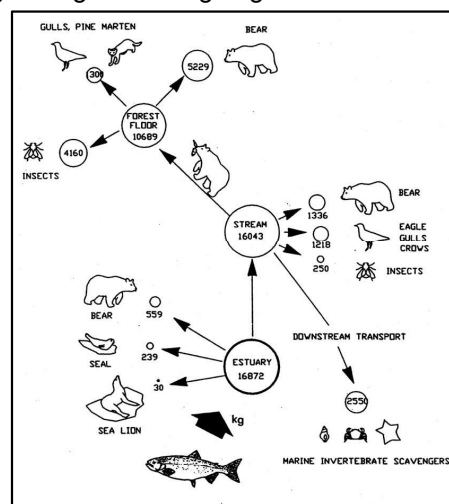


Figure 2. Nutrient Streams from Salmon Migration. Diagram from Reimchen (1994).

Settler-colonial interventions fundamentally disrupted these landscape-creating enactments by treating terrain, water, and salmon as separate resources to be managed from outside rather than recognizing their mutual constitution and working from within their ongoing processes, as can be seen in commentary by Chittenden (1910) and Denny (2009). The construction of the Lake Washington Ship Canal exemplifies this disruption: lowering the lake by ten feet, eliminating the Black River entirely, and installing fish ladders that prove inadequate for salmon navigation (Williams et al., 2017). These interventions reveal what happens when human design operates from outside ongoing enactments rather than participating from within terrain's processes, treating landscape as passive material to be manipulated rather than recognizing the complex processes through which landscapes continuously emerge. Despite engineering efforts to mitigate impacts through fish ladders and century-old hatcheries management throughout the Pacific Northwest, salmon populations have continued to decline because the infrastructure fundamentally altered the enactments between water flow, temperature, nutrient transport, and spawning habitat that salmon require for survival (Raymond, 1979; Taylor, 1999; Caudill et al., 2013). The problem is not simply technical but ontological: infrastructure designed from frameworks that position humans as external to terrain cannot adequately work with enactments it doesn't recognize as real, while attempts to control these processes from outside inevitably create cascading failures that exceed human ability to predict or manage.

6 CONCLUSION

This historical and theoretical analysis demonstrates that addressing climate change through landscape architecture requires moving beyond anthropocentric theoretical frameworks toward approaches grounded in Indigenous onto-epistemologies and more-than-human scholarship. By examining landscape formation through the three interconnected lenses of signification, relations, and enactments, this analysis develops theoretical understanding better suited to the challenges of the Anthropocene.

The historical examination of salmon and water systems in the Salish Sea demonstrates the inadequacy of purely anthropocentric frameworks while revealing the complex processes through which resilient landscapes emerge. Salmon restructure entire riparian ecosystems through nutrient distribution that shape plant composition, support diverse wildlife populations, and maintain forest health far beyond riverbanks, while water simultaneously acts upon and is acted upon by human and non-human forces, creating complex webs of relationships that traditional landscape theory fails to capture. These cases reveal that landscape is an ongoing process of enactments between multiple agents rather than a human creation or perception, demanding theoretical frameworks capable of recognizing and working with more-than-human agency.

This theoretical reorientation provides critical for understanding climate change in three key ways. First, it reveals interconnections that might otherwise remain invisible, highlighting how disruptions to salmon cascade through multiple systems affecting climate resilience while demonstrating that effective understanding must recognize rather than dismiss these relationships. Second, it challenges the resource-based paradigm that has accelerated climate destabilization by recognizing salmon, water, and other terrain as active agents deserving of ethical consideration rather than passive resources for human exploitation. Third, it demonstrates that effective climate response requires fundamental ontological transformation, following Indigenous models that have maintained resilient relationships across millennia of environmental change.

Contemporary examples illustrate the theoretical insights this analysis provides. Hillary Belle Pritchett's (2016) thesis *Concrete Nursery Logs*, which proposes letting the Chittenden Locks degrade rather than repairing them, recognizes that effective climate response might require allowing human infrastructure to fail in order to restore more-than-human landscape processes, challenging conventional approaches that assume human infrastructure must be maintained regardless of environmental consequences. The removal of the Elwha River dams (2011-2014) provides historical evidence of how quickly salmon-forest-water enactments can re-emerge when colonial disruptions are removed and terrain's own processes are allowed to resume. Within months of dam removal, salmon returned to previously inaccessible habitat, and within years, riparian forests began showing increased growth from salmon-derived nutrients (Foley et al., 2017), demonstrating the resilience of enactments when given opportunity to resume while revealing

the speed with which landscape-creating processes can recover when colonial infrastructure is removed rather than perpetually maintained.

This expanded theoretical approach establishes that landscape theory must position Indigenous knowledge systems as foundational rather than supplementary while developing frameworks capable of recognizing agencies that cannot be fully controlled or comprehended. The theoretical foundation provided by Indigenous scholars like Simpson, Whyte, Coulthard, and Kelly demonstrates comprehensive understanding of landscape formation through relationships with multiple agencies, while more-than-human scholarship from Barad, Gordillo, and Tsing offers complementary insights that support Indigenous frameworks without substituting for them.

Future research building on this theoretical foundation will investigate how practitioners might become facilitators of ongoing enactments rather than imposers of exclusively human visions, learning to participate from within terrain's processes rather than operating upon them from outside. As the climate crisis intensifies, landscape architecture cannot afford theoretical frameworks that ignore the agency of more-than-human beings essential for climate resilience. The salmon and waters of the Salish Sea offer guidance toward understanding resilient landscapes as emerging through respectful relationships between all beings, human and more-than-human alike.

Endnotes

1 Although I use "salmon" generically here, there are five species of Pacific salmon that occur in North America: Chinook salmon (*Oncorhynchus tshawytscha*, also known as quinnat, spring, blackmouth, or tyee salmon), coho salmon (*Oncorhynchus kisutch*, also known as silver salmon), chum salmon (*Oncorhynchus keta*, also known as dog salmon), sockeye salmon (*Oncorhynchus nerka*, also known red or blueback salmon or kokanee), and pink salmon (*Oncorhynchus gorbuscha*, also known as humpback salmon).

2 These five treaties are: Treaty of Medicine Creek (1854), Treaty of Point Elliot (1855), Treaty of Point No Point (1855), Treaty of Neah Bay (1855), and Treaty of Olympia (1856).

3 There are multiple tribal and First Nations fisheries and resources organizations in the Pacific Northwest. In Washington State: Northwest Indian Fisheries Commission (NWIFC), Columbia River Inter-Tribal Fish Commission (CRITFC), Upper Columbia United Tribes, Lummi Nation Fisheries, Tulalip Tribes Natural Resources, Muckleshoot Fisheries Division, Quinault Department of Fisheries, Makah Fisheries Management, Swinomish Fisheries Department). In Oregon: Klamath River Intertribal Fish and Water Commission, Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians, Coquille Indian Tribe fisheries program. In British Columbia: First Nations Fisheries Council of British Columbia (FNFC), Coalition of First Nations for Finfish Stewardship (FNFS), Tsawwassen First Nation fisheries, We Wai Kai First Nation (Cape Mudge) fisheries, Cowichan Tribes fisheries, North Coast Skeena First Nations Stewardship Society, Utt-a-thluk (Nuu-chah-nulth Tribal Fisheries).

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