First, Let us Look Together .

through forests, trees, wood, and building

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Abstract

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Wood construction has grown out of the relationship between people and the landscapes they inhabit. Small diameter timber is a material that was once a key component of vernacular building around the world but is now problematized as a low-value by product of forest management. This thesis studies the material's prevalence in Korean and Coast Salish architecture as a dimension of their respective traditional ecological knowledges. Their stories provide lessons that prompt us to question our contemporary relationships to materials and the landscapes that create them. To further explore this, I imagine Swan Creek Park in Tacoma, WA as a productive forest shaped over time by community memory, stewardship, and building.

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With immense gratitude, I want to acknowledge Daniel Winterbottom and Kimo Griggs who have been my thesis co-chairs. Daniel, for your creative character, breadth of insight, and ability to dance to Aretha. Kimo, for the thorough care you bring to any task and your huge generosity. You both have brought value to my education beyond measure.

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o n e . introduction
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memories of the land

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The learning process of this thesis has been circuitous. Diverse interests arose at different points and each appear here in some way : wood working, craft, memory, tradition, sense of place, story telling, and community design. The project solidified around exploring relationships to the landscapes that we inhabit. While scientific understandings of natural systems are growing, I realized that I have lived in a place that is distant from recognizing the diversity of everyday relationships between people and the landscapes we inhabit. The quantity of our relationships is telling of contemporary lifestyles and I am interested in how we can cultivate a greater breadth of experience. But this work has also been an exploration of the quality of relationships and their potential impact on us as individuals and as whole communities.

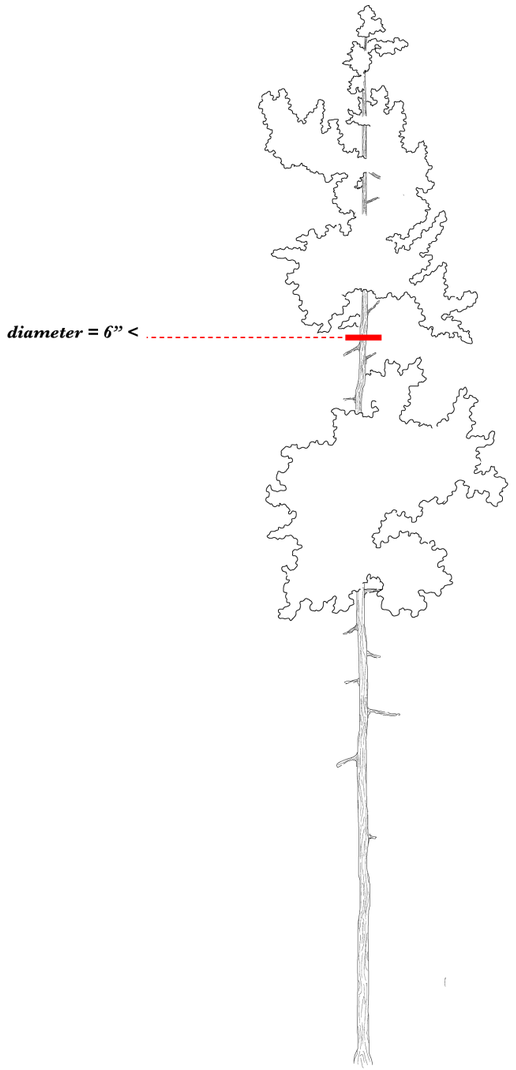

figure 1 . small diameter timber are typically determined by a measurement taken near the base of the tree's crown

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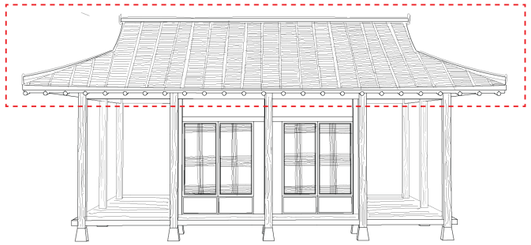
Building is "a passive reworking of a landscape through gathering, moving, and condensing native materials into cohesive but temporary structures"[1]

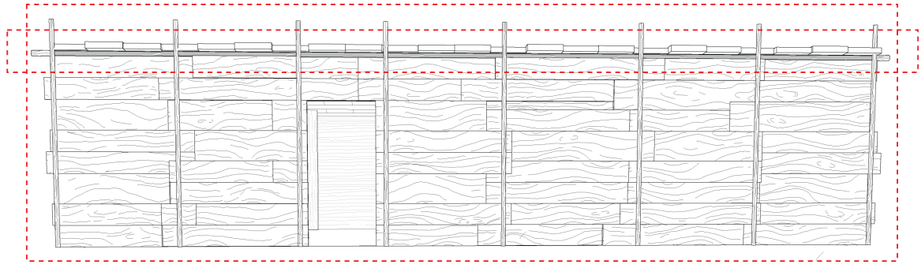
Bijoy Jain

Wood construction has grown out of the relationship between people and the landscapes they inhabit. Although wood is prone to age and wear over time, traditions around its construction provide an alternative testament of longevity.[2] Examining traditional wood building can inspire more than an understanding of form, function, and structure. It can provide insights into ways of living that have been erased or lost through the passage of time and changing of traditions.

Specific material stories are formed through intertwined cultures of building and landscape cultivation. These stories can be used to understand patterns and shifts in traditions. Building and land management traditions will continue to change or fade according to the present needs of a culture, and new forms of knowledge. However, the social, ecological, and economic relationships that comprise past traditions still bear lessons that may have relevance today. Today, small diameter timber is problematized as a material that is expensive to remove in relation to its marketable value.[3] It is generally categorized by trees that are six inches or less at their crown, which is an inefficient size for the production of dimensional lumber. Instead, when felled, the trees join low value market streams such as pulp or firewood. These low value end products make the removal of small diameter timber an economic challenge for the timber industry, and for conservation practices. Historically however, it has played a reverse role. Utilized in the round and with minimal processing, small diameter timber has been a key component of vernacular building examples from around the world.



Korean Giwajip



Coast Salish Plank House

figure 2 . Small diamter timbers were used to frame the roof of Giwajip, natural curves were carefully noted and utilized aesthetically. Plank Houses used small diameter timbers to attach cedar planks to roofing and siding

In the Pacific Northwest, the Coast Salish plank houses utilize small diameter poles as the primary structure of their flexible exterior wall systems. In the forests of the Amazon, the indigenous Pahikwene build payt masikahaki, collective houses, out of a range of size and species of small diameter roundwood.[4] In Malawi, vernacular buildings are finished with earth plasters and mud bricks atop thin roundwood frames.[5] Throughout the Balkans, agricultural buildings and farmhouses utilized small diameter roundwood as a range of framing members.[6] In Korea, traditional buildings from chogajip, thatched roof houses, to more grand temples and palaces utilized small diameter roundwood for roof framing. These building traditions are economical and are a testament to efficient material use. However, they also embody cultural values that were founded upon a deep respect and reverence for the landscapes they inhabited.

Our modern relationship with material goods is premised on connections to invisible working landscapes. Invisible does not just mean that they come from a place beyond where we live, but that we have no conception of how they have come to be or what implications are held within them. Traditional ecological knowledge (TEK) provides an alternative view of material relationships. TEK are indigenous bodies of knowledge that are cultivated through observation, practice, and study over generations.[7] The principles that inform TEK are the result of hundreds of years of collective experience in negotiating human needs within greater natural systems. TEK has grown out of technical knowledge as well as deeply engrained cultural and spiritual practices linked to a sense of place.

Historically, the use of small diameter timber was the result of utilizing forests for a diversity of products. It's low value today is a reflection of a shift in forest management practices and the subsequent evolution of harvesting and milling technologies, marketing and, ultimately, construction. The result is a salient disconnect between people and the natural productivity

traditional ecological knowledge principles

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sustainability .

Maintaining the land's productive capacity for future generations is a primary goal.

relationships .

People's connections among themselves and to their territory are not severed by the use of new knowledge, ideas, or techniques.

identity .

People maintain their distinct cultural identity.

reciprocity .

People maintain their system of benefit sharing among themselves.

limits on exchange .

While people may engage in market exchange with the flow of products from the land, the fundamental productivity of the system itself is not viewed as capital to be exchanged.[8]

of forests. To bring multiple perspectives to this story, this project highlights traditional Coast Salish and Korean practices of building with small diameter timber. Both histories emphasize building materials within contexts of culturally unique land use and resource management. Despite their unique practices, their respective socio-ecological resilience can be expressed through a set of common principles.

In a study of traditional forest practices from around the world, John Parrota, Yeun Yeo-Chang, and Leni D. Camacho distill sustainability, relationships, identity, reciprocity, and limits of exchange as key measures for adaptive relationships between traditional communities and landscapes that are mutually sustaining.[9]

In the following chapters, these principles will be used to introduce Coast Salish and Korean traditional ecological knowledge. The embedded stories are not all-encompassing, but they provide examples of small diameter timber within a socio-ecological context. They also illuminate patterns that have informed a sustained balance between people and nature.

As our experience of natural landscapes is increasingly urbanized, opportunities to cultivate urban relationships with nature are growing in importance.[10] Traditional stories and practices have invaluable lessons to impart in the re-imagination of what urban relationships with nature can be. The final portion of this work looks at forests as an urban park typology. The study focuses on how urban parks have largely been utilized for recreation and passive ecological benefits. A working landscape typology is proposed to reframe our relationship to forests. Forests are inherently productive ecosystems, but in urban areas they are primarily used for storm water retention, carbon sequestration, and habitat.[11] How can traditional ecological knowledge inform the design of multi-generational productive urban parks? To explore this question, a design model is proposed for Swan Creek Park in Tacoma, Washington. A phased design imagines the integration of forest management, cyclical construction, and the cultivation of perennially productive forests and woodlands.

two. framework

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sense of place

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This inquiry into materials, traditions, and their contextual stories began with reflections on the importance of place in design. Place is a common term in English used to describe spaces of personal or collective value. It has also been explored conceptually through academic investigations in a range of disciplines across the arts, humanities, and social sciences.[12] Within the fields of architecture and the built environment, place has been thoughtfully explored through perspectives around aesthetics (Frampton, Alexander, Tschumi, Norberg-Schultz). An exploration of place by Daniel R. Williams and Susan I. Stewart (1998) offers comprehensive insights into the layered complexity embodied in what a sense of place means:

the emotional bonds that people form with places (at various geographic scales) over time and with familiarity with those places;

the strongly felt values, meanings, and symbols that are hard to identify or know (and hard to quantify), especially if one is an "outsider" or unfamiliar with the place;

the valued qualities of a place that even an "insider" may not be consciously aware of until they are threatened or lost;

the set of place meanings that are actively and continuously constructed and reconstructed within individual minds, shared cultures, and social practices; and

the awareness of the cultural, historical, and spatial context within which meanings, values, and social interactions are formed.[13]

In building, materials can contribute to our sense of place aesthetically; the forests of the Pacific Northwest have a relationship to building with wood just as the deserts of New Mexico do with earth and adobe. But in addition to visual and emotional connections to the "spirit of place", our material use has physical impacts on people, economy, culture, and ecology.

figure 3 . Chinook Plank House, Ridgefield, WA
figure 4 . Gila cliff dwellings, Silver City, NM
Traditional aesthetic links to place were rooted in peoples intergenerational relationships to local landscapes

Place has also been an essential component of cultivating traditional ecological knowledge. Generations of people inhabiting the same place allows for the accumulation and transmission of local knowledge. Knowledge adapted over time plays an essential role in discerning what becomes a tradition. Joyce Johnson, a Cherokee great-grandmother, highlights a distinction between culture and tradition by noting that "some things that have become a part of culture might even be bad", but tradition is what "tells you the way you are supposed to be. It has to give us good. It has to give us growth".[14] A fundamental human subsistence has and remains tethered to the long term productivity of natural landscapes. In traditional ecological knowledge, a sense of what is good for us has had equal bearing on what is good for the natural landscape. This is not a purely objective pursuit, but it is a reflection of aspiring towards a shared social and ecological sustainability. This balance has been stewarded through intimate knowledge of a place.

three . historical memory
3

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Our current cultural legacy's effect on nature is yet to be fully realized. The world's ecologies are changing at unprecedented rates. Discarded glass, plastic, and metal accumulate, much of which will reside "longer than the lifetime of trees – longer than the lifetime of our species, perhaps.[15] Yet amidst this, identities of traditional ecological knowledge endure. In the Pacific Northwest, Valerie Segrest, a Muckleshoot tribal member, works to promote awareness and knowledge of traditional foods among the local tribes. "Native foods have been in this region for thousands of years… These food's help us remember who we are".[16] In Korea, maeulsoop, traditional forest groves, remain a symbol of home in Korean villages."For outsiders, this [village grove] looks "green" and good, but to us [villagers] this is the place of our daily life, just part of our life like air".[17] Modern identities continue to grow and adapt traditions and collective ways of seeing the world in a contemporary context.[18] As we are gripped by social and ecological change, there is leadership to be sought and wisdom to learned from those who continue to steward traditions in old and new ways.

Korean and Coast Salish traditional identities have been cultivated from unique readings of their local landscapes. These readings inform culturally specific patterns for living as part of an ecological whole. The physically marks on the landscape embody an intersection of culture and ecology.

In the Pacific Northwest, indigenous ways of knowing express the landscape as "alive, sentient, empowered, and moral".[19] This knowledge is both a means to see the world and to cultivate a living within it. The Coast Salish peoples reflect the larger cultural group of the many tribes and bands who have lived along the Salish Sea for over 10,000 years.[20] "Coast Salish" is the language family of the region and is comprised of over two dozen languages and numerous dialects.[21] Historically their diverse and mobile societies traced the patterns of perennial plants, fish, and other wildlife around the Pacific Northwest. Their geographic movement impacted far beyond a single site. The whole region formed a socio-ecological "continuum within which the village was only one of the several equally important social groupings".[22] These groupings varied by area and could consist of a single

family, a collection of related families living together in a plank house, a village made up of a collection of plank houses within a common territory, or a tribe as a series of villages along a large stretch of a shoreline or drainage field.[23] Settlement location depended on the season. Permanent winter villages were located along the coast or large rivers and inlets while spring and summer village structures and temporary dwellings corresponded to shifting specialized habitats of culturally important plant and animal communities.[24]

The wide spread distribution of perennial management rather than the intensified production of annuals is critical to understanding the full extent of how the Coast Salish transformed the landscape. Their impact can be traced across a range of environmental zones including: low elevation meadows, rainshadow (Douglas-Fir) forests, coastal rainforest, montane forest, freshwater marshes and swamps, freshwater bogs and fens, tidal wetlands, and large human occupation sites.[25] A range of techniques were employed to affect multiple landscape scales. The controlled burns commonly practiced in the Willamette Valley, Whidbey Island, and southern Vancouver Island were used to create and maintain Gary Oak, Quercus garryana, prairie conditions for the harvesting of blue camas, Camassia spp..[26] Ecologically, this management was key to maintaining the oak prairie's successional stage which otherwise be at risk of competition by conifer forest.[27] As a cultural form of marking place, controlled burns demonstrate how landscape cultivation can build off of a naturally occurring ecological state rather than an enforced order.

Traditional Korean villages practiced agro-forestry and were characterized at a planning scale by their particular location within a watershed. Their organization was based on the geomantic principles of pungsu. Pungsu was developed in Korea based on the Chinese practice feng-shui. In village planning, feng, "wind", raises the importance of topography and mountains, and shui, "water", indicates the relationship between land, rivers, and stream quality.[28] The principle planning objective of pungsu is to identify Myung dang, an ideal piece of land to settle.[29]

Sites that did not contain the ideal conditions would be altered to create a spatial "completeness". A series of common interventions emerged to fulfill pungsu principles that also had ecological impacts. Deuksu-bibo, artificial ponds, developed to reroute straight flowing water, which was considered ominous. As a management technique it gave villages the capacity to hold and store water as well as to control rates of flooding.[30]

Maeulsoop, woodlands, were cultivated around streams and rivers to slow water flow, decrease soil erosion, reduce the rates of flooding, and improve water quality.[31] As they developed into mature woodlands, they were utilized as a space for spiritual and cultural rituals in addition to the harvesting of timber, fuel wood, and compost.[32]

Maeulsoop and deuksu-bibo were marks on the landscape that formed people's sense of place and became a symbol of home.[33] Their integrated cultural and ecological benefits embody the idea of chisan chisu, that people's happiness is dependent upon the proper care of water and forests.[34] In this way, village identity became a form of stewardship, jointly comprised of the local community of people and the surrounding natural landscape.

The intersection of culture and ecology is a critical component of Traditional Ecological Knowledge's resilience over time. Through spiritual belief and cultural practice, Traditional Korean and Coast Salish identities dispel the division between people and the natural environment. Instead, they highlight that patterns of settlement and land cultivation can be produced out of mutual benefit to people and nature.

reciprocity

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Natural landscapes are complex adaptive systems. Forests, as an example, are comprised of thousands of species of plants, "soil organisms, herbs, lichens, moss, insects, birds, and mammals".[35] Each engage in ecological processes where they interact, exchange, and adapt from one another.[36] Our modern society often fails to recognize them in such intricacy which is a disincentive to complex management.[37] At the same time, it undermines the legibility of our full impact on an ecosystem. Traditional ecological knowledge illustrates an alternative where the fundamental exchange between people and natural landscapes is diverse but also conscious of the reciprocal relationship between the health of people and nature.

There were defined borders among different tribes and bands within the Pacific Northwest. In a particular territory, chiefs or elite families often oversaw the management, harvest, and distribution of resources. A chief's status was collectively upheld, at least in part, due to their ability to redistribute their wealth throughout the village or community.[38] This validation was supported by feasts such as potlatches and specific ceremonies around culturally significant resources. The Chehalis "First Fruits Ceremony" would occur seasonally at the beginning of a harvest.[39] For satske, the young suckers of wild raspberry, a chief would elect a member of his family to gather a bunch when he deemed that they were ripe.[40] Then, with the community gathered together, he would conduct a ceremony acknowledging the bounty given and expressing hope for future abundance. After the conclusion of paying respects, people were free to pick them at their pleasure.[41] The ceremonies reflect a reverence of nature, "that...the salmon, or the deer, or the berry, or the root, was not merely a fish or an animal or a fruit… but something more".[42] Within this reverence there was a respect for the productivity of nature as finite and that resources were gifts to be received rather than plundered.

Similarly, the Duwamish Tribe would sing special songs to and for the Duwamish River. The prayer songs were an exchange with the Spirits of Water to supply salmon and other fish which were a critical source of sustenance.[43] A Duwamish elder said that "if these Prayer songs were not carried on or continued, the people living around the Duwamish would live a miserable life because the Spirits would not be at rest".[44]

The ceremonies and the subsequent periods of harvest also became important times for teaching and passing knowledge to younger generations. During these times, children were immersed in the traditions and techniques of giving thanks and gathering plants.[45] In this way a diverse communal wealth developed around knowledge and access to a wide range of resources. Through giving thanks and practices of moderation, this wealth was shared among people and all living spirits.

In Korea during the Joseon Dynasty, Neo-Confucian scholars were called sallim. The characters for sallim represent "mountains" and "forests", corresponding to their role as sacred stewards of the natural landscape.[46] Sallim were responsible for holding community ceremonies to teach the Neo-Confucian value that human health is interconnected with the health of the surrounding natural landscape.[47] Maeulsoop were used for community rituals as well as a general public space to hold community meetings.[48] The values imparted by Neo-Confucianism along with the integration of maeulsoop into daily life created an ethic of conservation and management. This ethic has allowed for the preservation of maeulsoop over generations.[49] Preserved or restored maeulsoop continue to serve this function in Korean villages today.[50]

Villagers also maintained the surrounding natural forests as working landscapes. In the Joseon Dynasty all forested land was owned by the kingdom. However, villagers were permitted to use forests as resources to support their common needs such as building materials, fuelwood, and fodder.[51] Songgye emerged as a form of community forest management that regulated forest protection, conservation, and patterns of harvest.[52] Its title is derived from Song, pine, and Gye, organizations for community cooperation and assistance.[53] Songgye was one of several types of Gye, which were created as a community tax to assist in culturally significant events such as weddings or funerals.[54] Songgye's role was to monitor sustainable forest stewardship, but it also became an essential component of a village's social fabric. As a community collective, the organizations integrated personal relationships with managing resource needs and sustainability.[55]

Throughout Korean and Coast Salish traditions, reciprocity takes form through economic, social, and spiritual exchange. Community organizations and spiritual rituals were essential to teach knowledge and reinforce values that cultivated intimate relationships with nature. They also became arenas for social life, placing traditional ecological knowledge within the common community culture. The result is an ethic that preserves and enables the complexity of nature while cultivating ways for people to maintain their livelihoods.

relationships

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There is undoubtably no single right way to see, experience, and know a landscape. However, there appears to be a growing disconnect between our communities and the landscapes we inhabit. In the United States, "the average person knows the names of less

than a dozen plants, and this includes such categories as 'Christmas Tree'".[56] Names are an innately human way that we create relationships between ourselves as well as with the world around us.[57] While knowing scientific plant names is hardly essential, common names or even nicknames can be a form of respectful acknowledgement. In traditional ecological knowledge, acknowledgment is a first step towards the ability to "identify names, uses, and related stories of living organisms and natural phenomena within their social-ecological systems".[58] This ecoliteracy encompasses intimate knowledge of a natural landscape system and people's role within it. Applied, it is an essential component of creating social and ecological resilience.[59]

A vast number of herbaceous and woody perennials comprise the physical and cultural sustenance of the Coast Salish peoples.[60] Each have names, uses, and specific cycles of harvest and growth. However, their relationship with plants transcends far beyond identification and knowledge of use. For the Duwamish, and many of the Coast Salish peoples, it was fundamental that "everything had a spirit or a soul; rocks, trees, the ground".[61] The words used to communicate amongst people and with other living entities were carefully minded. It was believed that "when we talk our words become 'living'… words are power of life and death".[62]

Words were used to convey respect and a sense of community between people and plants. The Kwakwaka'wakw would offer words of praise, such as these for a young cedar tree :

Look at me, friend! I come to ask for your dress. For you have come to take pity on us; for there is nothing for which you cannot be used. For you are really willing to give us your dress, I come to beg you for this, Long-Life Maker. For I am going to make a basket for Lily-roots out of you. I pray, friend, not to feel angry on account of what I am going to do to you. And I beg you friend, to tell our friends about what I ask of you! Take care, friend! Keep sickness away from me, so that I may not be killed by sickness or in war, O friend! [63]

Relationships were a form of respect and reverence. They also acted to limit waste and to create cultural guidelines discouraging taking too many resources.[64]

The dense forests of the Pacific Northwest have limited understory plants due to low light availability. As a result, distribution of Coast Salish food resources were concentrated in open successional forests, along forest edges, and in natural and managed clearings.[65] Some valued species such as Beaked hazelnut, Corylus cornuta, were only found sporadically

and required travel or trade to obtain them.[66] The basis of people's knowledge of a plant was both it's use as well as it's preferred growing location. Certain growing locations were favored for yielding higher quality resources, reflecting complex knowledge of site conditions and plant use and qualities.[67] People's relationships to these sites were carefully cultivated and managed. In sites where ownership of resources took place, the succeeding generation would be "instructed, almost like apprentices, about these places and their resources, and how to care for them".[68]

The mountainous terrain of Korea makes ideal arable land limited. As a result, a vast amount of traditional knowledge has accumulated around the cultivation and harvest of wild plants and herbs. Rural diets are largely based on vegetables and it remains a daily village practice to go out and gather foods from the forest.[69] A 2016 study gathered traditional knowledge of 924 culturally relevant taxa, 707 of which were found and gathered in the wild.[70]

In Who Ate Up All the Shinga, Park Wan-suh recounts her memories of growing up in a small rural hamlet in the 1930's and later moving with her mother and brother to Seoul.[71] Park provides a valuable children's perspective for how intimate knowledge of the landscape benefited daily village life in addition to becoming a form of place attachment. She joyfully recounts :

We had our three meals a day at home, but we were always on the lookout for snacks and coming up with ways to while away our time in the mountains and fields. There would be new sprouts galore to choose from – sweetgrass, wild rosebuds, mountain berries, arrowroot, bindweed root, chestnuts, acorns, and shinga. When we picked them we were able to satisfy our creeping hunger and had the chance to please the grownups, as when we collected mountain herbs and mushrooms.[72]

Her knowledge of the hamlet's landscape was not a part of a formal education or process of memorization. It was "the result of sensate experience within nature".[73] The ability to read a landscape in it's diversity requires physical experiences. In this way, our knowledge of a place is not abstract, but cultivated through collections of memories. After Park moved to Seoul with her family, she is struck with melancholy while adjusting to a drastically different landscape and sense of freedom :

What I missed even more than my friends, though, were the hills of the countryside… To me, mountains, like fields, meant a constant supply of treats, and I knew well that the tasty snacks were found in the shade,

rather than high up in the trees.[74]

The bare, enervated ridge of Seoul made me think instead of a dying old man. To relieve my loneliness on my daily climb, I dwelled in memories... My peers in Seoul… could never know the translucent blue of the dayflower's petals or the beautiful music that lurked within its leaves.[75]

Park's accounts convey a mature knowledge of both the locations and types of edible plants that grew in her village. But she also presents a great value for what it meant to access such a relationship. In addition to sustenance and cultural meaning, intimate knowledge of the landscape can be a source of great joy, familiarity, and meaningful memory.

People's relationships to the natural landscapes they inhabit form the core of Traditional Ecological Knowledge. These relationships are the result of generations worth of cultivation. As they are passed on through oral teachings, personal observation, and experience. They become a daily participant in personal, communal, and wider ecological health. One of the greatest values of such relationships, is that they are intergenerational. The preservation of the traditions that enable them and the resources that nurture them were and remain essential to their continuation.

limits on exchange

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In order for a land's productivity to be exchanged as capital, the product of the land must create a profitable economic yield. Capital driven management consistently reduces the inherent productive diversity of a landscape in order to achieve economic efficiency. Around the world, forests have been converted into mono-crop plantations, comprised of even-aged trees, uniformly spaced, and devoid of understory plants.[76] While it is a highly effective mode of producing wood products, it is a management logic diametrically opposed to forests functioning as complex adaptive systems. Plantations sit at the extreme of a spectrum, but capital driven management is pervasive. Economic pressures provide

difficulty for alternative forms of complex ecological management.[77] Traditional Korean and Coast Salish land management practices are examples of how cultural ethics can influence ecological productivity. Through moderation, their respective practices were able to be sustained for generations.

In Coast Salish tradition, people's sense of moderation is a confluence of environmental reverence and pragmatism. It is oriented around all life being sacred.[78] As a result, a natural landscape becomes a negotiated space between all living things. A Kwakwaka'wakw story tells that :

Even when the young cedar-tree is quite smooth, they do not take all of the cedar-bark, for the people of the olden times said that if they should peel off all the cedar-bark… the young cedar would die, and then another cedar-tree near by would curse the bark-peeler so that he would also die. Therefore, the bark-peelers never take all of the bark off a young tree.[79]

This story advocates for careful harvesting of resources as well as conveying the danger of overuse. It imparts the fundamental knowledge that girdling a tree will kill it, but it also reveals that our impact on the living world around us has a bearing on our own livelihoods. The story also contains a sensitivity to the relationships between cedar trees in a given area. It is traditional wisdom that trees are in communion with one another. Modern science is just beginning to broach the subject of a communicative intelligence in plants through the study of mycorrhizal networks and the exchange of resources among trees.[80]

Successive generations of tending the same land also informed decisions not to overdraw from its productivity. The knowledge of how resources should be managed, both through techniques and wisdom, was able to be passed on, and built upon each generation in order to be passed on, and built upon by the next.[81] This practice was upheld throughout the Pacific Northwest and was the foundation of long-term sustainable land use.[82]

Moderation was cultivated in selective harvesting as a practical knowledge. Size became a useful determinant for what was appropriate to use or leave. When digging up camas, small soft bulbs would be left to grow for the following year while the largest bulbs, measuring up to two and a half inches, would be left as seed producers.[83] In combination with tending and replanting, this became a way to assure future productivity.

In Korea, a balanced ecology was also the result of spiritual beliefs and practical needs. It was cultural expectations that people adapt to natural systems rather than attempt to conquer or control them.[84] A diversity of knowledge about forest resources was an element of daily life.[85] Forest management set gathering areas and limits because the forests were utilized for everyday needs. Community organizations such as Songgye established and enforced how much wood was harvested and specific areas of use.[86]At the time, there was not a focus on replanting trees so the preservation of forest forest structure, habitat, and resources was essential for maintaining quality and access for future generations.[87]

Moderation influenced Korean politics, culture and social life as well. During the Joseon Dynasty, Confucian values were adopted as the official ideology of the state. People were expected to uphold five core values : benevolence, righteousness, the proprieties, wisdom, and sincerity.[88] Through the proprieties, Confucian concepts of naturalistic simplicity enmeshed with indigenous Korean beliefs that also oriented around naturalism.[89] The result became a profound aesthetic change in Korea's culture of art, craft, and building from the preceding Buddhist Goryeo Dynasty (918-1392).[90] The shift maintained the aesthetic belief that "simplicity was the quintessence of nature".[91] An aesthetic affinity with nature upheld ideals of mirroring natural beauty as well as tempering a human desire to control and dictate material form and appearance.[92] Two common terms emerged to embody these ideals. Gumibulu, "looking frugal but not shabby" and hwaibulchi, "looking splendid but not extravagant".[93] The aim to become unified with nature became both a practical application in landscape maintenance and a cultural aspiration through social codes and building and craft aesthetics.

Korean and Coast Salish traditional ecological knowledge both maintained limits on exchange by cultivating a diverse set of relationships with their surrounding natural landscapes. Respect and reverence for these relationships was reinforced by spiritual and cultural practices. Observing limits to how much was gleaned from a landscape ensured biodiversity and productivity over the course of generations.

sustainability

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In the United States, the geographic and economic mobility of modern life has largely displaced the idea of families succeeding each other in place.[94] Intertwined with this, intergenerational care and knowledge of place is commonly fragmented. Traditional Ecological Knowledge teaches that the exchange between generations enables sustainable ways of life. In this way, sustainability is not merely a technology; it is the knowledge and relationships between generations of people and the landscapes they inhabit.

Traditional Korean and Coast Salish architecture both facilitated and embodied sustainability. Each building tradition relied on wood and became enriched by intimate knowledge around a particular species of tree. For the Coast Salish people, xəčéčlc, Western red cedar, Thuja plicata, was used for all aspects of traditional building and was perhaps the most diversely utilized plant species in the Pacific Northwest.[95] In Korea, Sonamu, Korean red pine, Pinus densiflora, was the favored wood for all timber construction and remains one of the most culturally valued plants due to its multiple uses.[96] Their traditions of building are the result of hundreds of years of accumulated knowledge and experience. Historically, large scale tree planting was not widely practiced in Korea or the Pacific Northwest, so great care had to be taken to preserve valuable timber stock. Reverence and thrift led to utilizing as much of a tree as possible. While small diameter timber is problematic and resists standardization today, it was ubiquitous throughout Korean and Coast Salish building. It's use was a product of function, aesthetics, and the cultural relationships to harvesting timber.

The Coast Salish peoples developed unique cultural traditions according to different tribes and bands. However, the plank house was a largely shared building type across the Pacific Northwest.[97] Plank houses are representative of the layered relationship between Western red cedar and the Coast Salish peoples. Massive three foot wide slabs were commonly used as columns and beams as large as two feet in diameter spanned across them as much as sixty feet.[98] Interlocking cedar planks formed the roofs and the walls. Small diameter poles were used as purlins and as the structure for the facades. Cedar withes were crafted into cord to tether elements together but also allow for disassembly.

A plank house ranged in size based on economic status and the number of families living within them. They could be small enough to house a single family or be comprised of several households and amount to several hundred feet long.[99] If a family grew or a household joined through marriage, additional structural bays would be added to increase the size of the plank house. Through upkeep and maintenance, the spatial flexibility allowed for plank houses to accommodate the shifting needs of generations.

Plank houses were used as permanent dwellings during the winter months. At these times they became the focal point of life and also housed a range of spiritual rituals and ceremonies.[100] Each year during the spring and summer months, the walls of plank houses would be disassembled and transported to harvesting sites of culturally valued resources. There, the small diameter poles would be reconstructed into a variety of simple lean-to and shed structures.[101] The scale of small diameter timber lent itself to transport and a range of structural uses. Its heavy use also meant that if a member needed to be replaced it could be done without an exhaustive effort or need to fell a mature tree.

The Coast Salish peoples held a deep respect for cedar and tribes such as the Duwamish would hold an annual Cedar Ceremony each winter.[102] Their spiritual relationship to cedar and a limited quantity of substantial trees meant that they would only fell a tree out of necessity. There are accounts of dead, down, or dying trees being utilized before a healthy living tree if suited for the required purpose.[103] Forms of culturally modifying cedars to yield bark or even full slabs were developed to leave the integrity and health of the harvest tree intact.[104] Careful harvesting preserved a tree's life as well as maintained high quality material for future generations.

The tradition of building in Korea during the Joseon Dynasty was passed down through generations of Daemok, master builders. Daemok were trained under a philosophy to "build it right. If the wood can withstand seven centuries...build a house that is so constructed as to withstand a millennium".[105] Their expertise surrounded all aspects of construction, including understanding the patterns of tree growth and the subsequent implications for building.[106] For longevity, the conditions a tree grew in were noted and it's timbers were made to maintain their original orientation and sun exposure.[107]

The natural building aesthetic of the Joseon Dynasty also sought to be a visual reflection of nature.[108] Korean red pine is typified by broad and irregular growth.[109] In building this led to

an array of crooked columns, beams, and rafters. Naturally curved beams and small diameter roundwood rafters were used throughout all building typologies at the time. Column style varied between buildings by both class and function. Giwajip, tile roof houses for upper or middle class families, tended to be made from squared timber columns while roundwood columns were used for the most elite families and for temples and royal architecture.[110] In the most humble chogajip, thatched roof houses for commoners, naturally curved columns were prevalent. Here they were likely a product of economic efficiency in addition to spiritual and cultural beliefs. Neo-Confucian temples highlighted the natural curvature of red pine in the most visible ways. The expressive use of asymmetrical and bent columns was a demonstration of the spiritual beliefs to not control nature and to mirror the surrounding forrest.[111] The tradition of building with uniquely shaped pieces of wood made efficient use of available forest resources. As part of a wider cultural aesthetic, the tradition cultivated respect and reverence for natural forest conditions.

Hanok, traditional Korean houses, were built to be passed through generations, simply repaired, and for the flexible use of rooms. Hanok were found in three typologies, giwajip, chogajip, and neowajip or gulpijip, oak bark roof houses. Each relied on a post and beam structure and non-load bearing interior walls.[112] Single rooms always served more than one primary function.[113] Doors between spaces hinged upwards, so there could be an unimpeded connection between two rooms. Timber elements were prefabricated and connected through wood joinery. Construction for disassembly allowed for the replacement and repair of individual members over time.[114]

In addition to being used for timber, Korean red pine was utilized for the oils it produces. Changpanji, a thick oiled paper, formed the top layer of the ondol floor heating system.[115] Ondol were a radiant floor system common utilized throughout Korea. They were made by creating a series of stone ducts connecting all the rooms of a hanok. The ducts were connected to the fireplace and cooking area. The floors were made of stone, typically a granite, and then finished with changpanji.[116] A fire burning for two to three hours would reliably heat the hanok through the entire night.[117]

The space outside a hanok was kept bare in order to be a functional work space while framed views utilized the concept chagyeong, borrowed landscapes.[118] The yard's practical use strengthened people's relationships with the surrounding natural landscape as a wild garden for food and scenic beauty.[119]

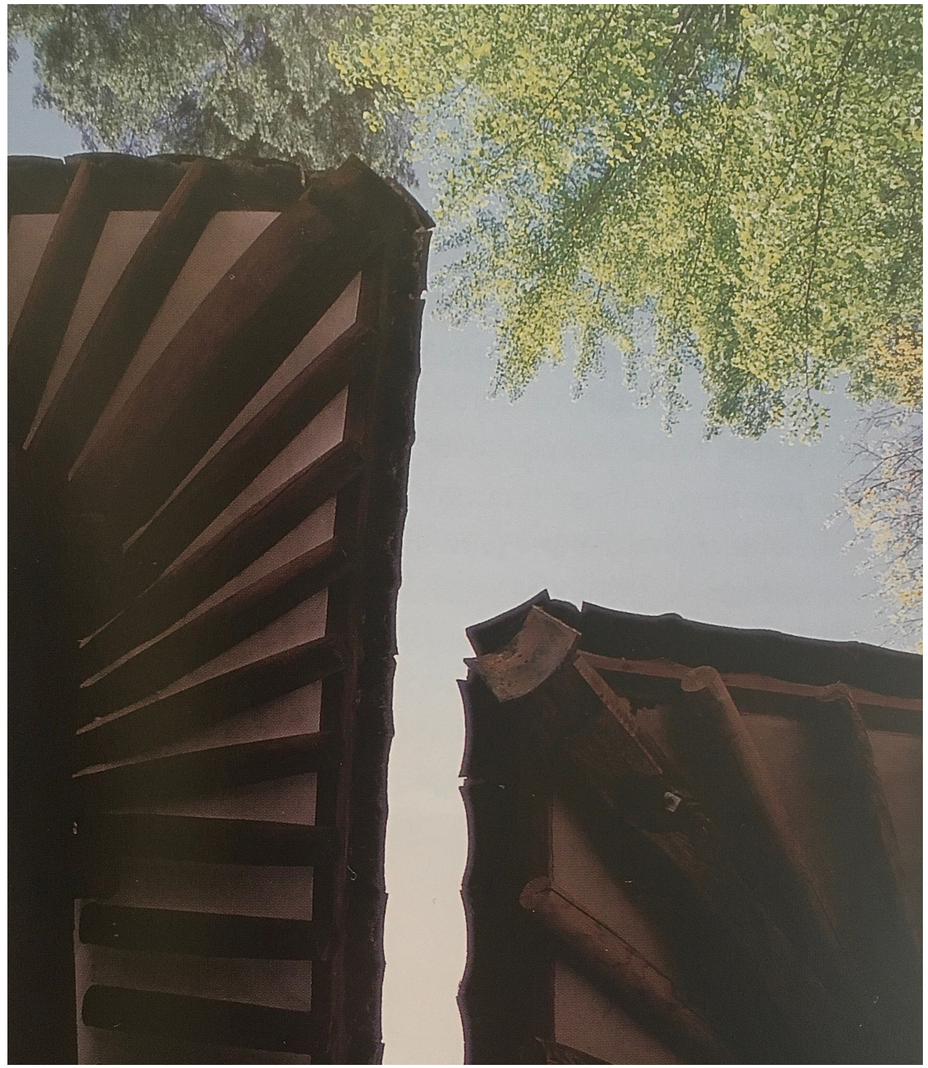

figure 5 . Hanok eaves overlapping

The sustainability of traditional Korean and Coast Salish architecture is represented by the myriad of ways buildings are integrated within a larger cultural ethic of multi-generational planning. Plank houses and hanok both functioned as multi-generational dwellings. But what distinguishes them from contemporary building is that their construction and aesthetics also embodied people's relationships to the trees that enabled them and the natural systems that support all forms of life. Their applications for small diameter timber are creative and functional but most importantly represent the diversity of uses sought out of a material source. The longevity of both traditions of building is the ultimate testament to sustainability.

shared principles

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Korean and Coast Salish traditional ecological knowledges teach that intergenerational sustainability can be achieved by imparting identities that intersect culture and ecology; practices of reciprocity that share respect and benefits among people as well as the natural landscape; diverse relationships that cultivate knowledge, skills, and a sense of place; and limits on exchange that maintain a landscape's diverse productivity through practices of moderation. The principles shared among their respective traditional knowledges are a product of time.

This project is a small introduction to rich and complex histories. Neither of the presented societies are infallible nor are all their traditions pure and unalloyed.[120] Eva Marie Garroutte notes well that "we should not expect that our ancestors chose to live in the light of their sacred teachings (any more than we do)".[121] Additionally, "'tradition' does not equate to some petrified pattern of life".[122] Instead, in beginning to look, patterns emerge that undoubtably weathered and adapted to varying intensities of social and ecological changes. This is a definition of resilience. Other practices of traditional ecological knowledge from around the world will surely carry similar testimonies. In a time where our own society feels to be in a state of rapid flux, it is invaluable to learn from principles that have positively persisted through adaptation and change.

four . parks and the borders of forests
4

translation of tradition ii

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In the context of architecture and landscape architecture, traditional ecological knowledge is not a simple toolkit. If traditional ecological knowledge is to broadly inform the professions of architecture and landscape architecture, contemporary holders of knowledge must be acknowledged and looked to as leaders. This initial study has yielded a common vocabulary that emerges from the principles of identity, reciprocity, relationships, limits on exchange, and sustainability. Even across disparate cultures, Korean and Coast Salish peoples' patterns of daily life illustrate how everyday words and actions are both mediums for acknowledging the value and complexity of nature. In cities today, our vocabulary is slim because our relationships are limited. Public landscapes in cities are typically plazas, gardens, promenades, or parks.[123] They contribute socially, culturally, and ecologically to the city as a landscape. However, they often repeat a set of functional parameters. This next section explores a model for how urban parks could be a medium for enhancing our relationships with nature.

urban relationships

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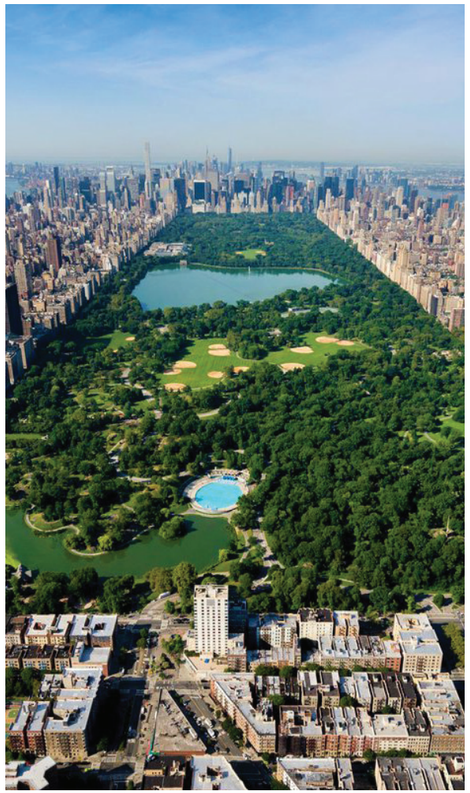
Parks have traditionally served as a place of respite within the city and as a driver for urban development.[124] Parks typically fall within "a set of fairly specific compositional techniques, images, and experiences.[125] As the aesthetic embodiment of nature in urban environments, parks are laden with cultural values. Throughout history, park design has varied to respond to the most visible social issues and goals of a particular time.[126]A study completed by Galen Cranz and Michael Boland has found five distinct park typology trends in the United States : the Pleasure Ground (1850-1900), the Reform Park (1900-1930), the Recreation Facility (1930-1965), the Open Space System (1965-?), and the Sustainable Park (1990-present).[127]



Pleasure Ground

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1850 - 1900

leisure, public health, social reform

figure 6 . Central Park, New York City, NY

Reform Park

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1900 - 1930

social reform, safe play, cultural assimilation

figure 7 . Burke-Gilman Playground Park, Seattle, WA

Recreation Facility

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1930 - 1965

recreation service

figure 8 . Morningside Park, New York City, NY

Open Space Network

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1965 - present

public participation, revitalize the city

figure 9 . Gasworks Park, Seattle, WA

Sustainable Park

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1990 - present

human and ecological health

figure 10 . Magnuson Park, Seattle, WA

Community Gardens

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1917 - present

food production and community building

figure 11 . Good Shepherd P - Patch, Seattle, WA

In 1853, Central Park was opened to the public for the first time. The park's completion realized Frederick Law Olmstead's vision for a natural relief from New York's crude industrial environment.[128] The park's design created a "sanitized view of the woodlands and fields" that the city had replaced.[129] It's expansive scenes and promenades served as a recreational setting for upper middle class society.[130] Central Park is the icon of the Pleasure Ground as a large-scale park that is valued for its stark contrast to the urban surroundings. Pleasure Ground's were located away from a city's tenement housing, restricting working class access.[131] Towards the end of the nineteenth century, advocates voiced the need for park space within the inner city. In tandem with the growing need for safe play spaces for children, the Reform Park grew as a typology that was small, economical, orderly, and with no stylized nature.[132] The typology became recognized for having central field houses that were community spaces for working class citizens.[133] Park managers of both the Pleasure Grounds and the Reform Parks qualified expenses by setting goals to "reduce class conflict, to reinforce the family unit, to socialize immigrants to the American way of life, to stop the spread of disease, and to educate citizens".[134]

Robert Moses was appointed as commissioner of the New York City Parks Department in 1930. Moses saw no justification for the previous park models and worked as part of a national scale trend to develop and implement simple uniform standards.[135] The result ushered a new era of the Recreation Facility: "the stadium, parking lot, and asphalt ball courts".[136] It was not until the 1960's that the sterility of these spaces began to be widely challenged. Artistic sensibilities brought a revitalized energy back to the cultivation of public space and intuited that recreation could also be occurring "in the streets, on a rooftop, at the waterfront, along an abandoned railway line, as well as in traditional plazas and parks".[137] In 1975, Richard Haag's design of Gas Works Park in Seattle illuminated the potential of adaptive reuse to ameliorate the decrepit urban remains of industrialism and modernist city planning. The Open Space System resulted from viewing the city as an expanded network of public spaces. This idea of urbanism still remains prevalent today. The Sustainable Park builds off of the Open Space System with a distinct focus on ecological health and resilience. To achieve this, parks are designed to utilize "the use of native plants, restoration of streams or other natural systems, wildlife habitat, integration of appropriate technologies or infrastructure, recycling, and sustainable construction and maintenance practices".[138] The Sustainable Park's have also made significant steps to plan for the long-term social and ecological success of a park. Designing for plant succession and climate resilience has signified a notable shift from prior typologies. Additionally, the formation of non-profit organizations and community based stewardship programs has offered a means to mitigate shrinking management budgets and implement a park's self-sufficiency.[139]

The Open Space System and the Sustainable Park have re-envisioned the potential for urban development to be ecologically sound for people, plants, animals, and the landscapes we all inhabit. Since the publication of Cranz and Boland's study in 2004, an additional focus on community, culture, and memory have become a strong element of park design. Hood Design Studio, Nelson Byrd Woltz Landscape Architects, and most recently Studio Zewde have all challenged the typical context of a site to include layers of history, narrative, and story telling. Nelson Byrd Woltz Landscape Architects have also been at the forefront of exploring large-scale links between agriculture and landscape architecture. While interests have been sparked, imagining parks as productive landscapes for human use remains fertile ground for testing. Through the lens of traditional ecological knowledge, this is an essential step to cultivating the relationships necessary for sustainable land use. Working landscapes present a process and aesthetic of ecological change that differs from a "wild" landscape. Through collaborative efforts, they can strive for ecological restoration, biodiversity, and resilience. Simultaneously, they offer unique opportunities for meaningful community engagement and relationship building.

In the United States, a long history of community gardens provides a valuable model for how different ideas of urban productive landscapes can be integrated into public parks. As a form of small scale community-driven management, they have demonstrated methods to "create social cohesion, increase access to municipal services, and create positive feedbacks for ecological, physical, social, and economic improvements".[140] In 2017 Jeffrey Hou and David Grohmann completed a study of the relationship between community gardens and urban parks in Seattle. From a user perspective, interviews communicated that gardening is a form of recreation, but that it also enhances people's relationships with their communities and the landscape itself.[141] From a practical perspective, collaboration and negotiation between community management and the city's parks department has contributed to the gardens' success and garnering broader neighborhood support.[142] Seattle's history of community gardens dates back to the national gardening campaign that took place during World War I.[143] However, community gardens have historically been considered an interim use for underutilized space. Ongoing work and advocacy has inspired a recent shift to recognize and secure community gardens as beneficial public amenities.[144]

Productive Urban Forests

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human and ecological health, food production,
wood production, community building

figure 12 . Swan Creek Park, Tacoma, WA

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In the Pacific Northwest, there is a rich opportunity to engage multiple forest types as productive urban landscapes. However, to do so will require expanding our cultural use of forests. Currently, the term "urban forest" is utilized by cities to quantify total canopy cover and the passive social and ecological benefits of trees in an urban environment.[145] Trees are noted to have an effect on people's health and wellbeing while also providing wildlife habitat, passive cooling, and stormwater filtration.[146] Additionally, they have the potential to provide jobs and infrastructure related to their use as a material, such as tree removal, milling operations, and wood craft businesses. Implementing working forests as a park typology could include or build off of these infrastructures while also highlighting the diversity of relationships forests present beyond just trees. Broadening our urban relationships to forests could also slowly begin to influence rural and industrial forests to be managed for increased ecological complexity.[147]

Contemporary forest management traces back to the Industrial Revolution. Factories, mines, and building construction all greatly increased the amount of timber that was required from Europe's forests.[148] The additional onset of economic liberalism transformed management so that "the purpose of forests was to maximize profits for landowners".[149] Prior to this, European forests were managed based on local knowledge that was accumulated through experience, largely related to clearings for animal grazing and agriculture.[150] Forest products had been used in economic markets, however, it was largely in local and regionally stable economies.[151] Quantifying forests in terms of their capacity to produce timber created new systems of management in Central Europe. The resulting suite of silvicultural practices based on stand-age is now used around the world and applied "independent of local conditions".[152] This mode of management propels "a strong focus on trees to the exclusion of other plants, animals, and ecosystem processes".[153] It also relies heavily on predictable outcomes.[154]

The industrial production of timber also resulted in an evolution of timber products. Prior to industrialization, trees were cut and sized based on a carpenter's order.[155] However, increases in available timber and innovations in steam engine technology created a new

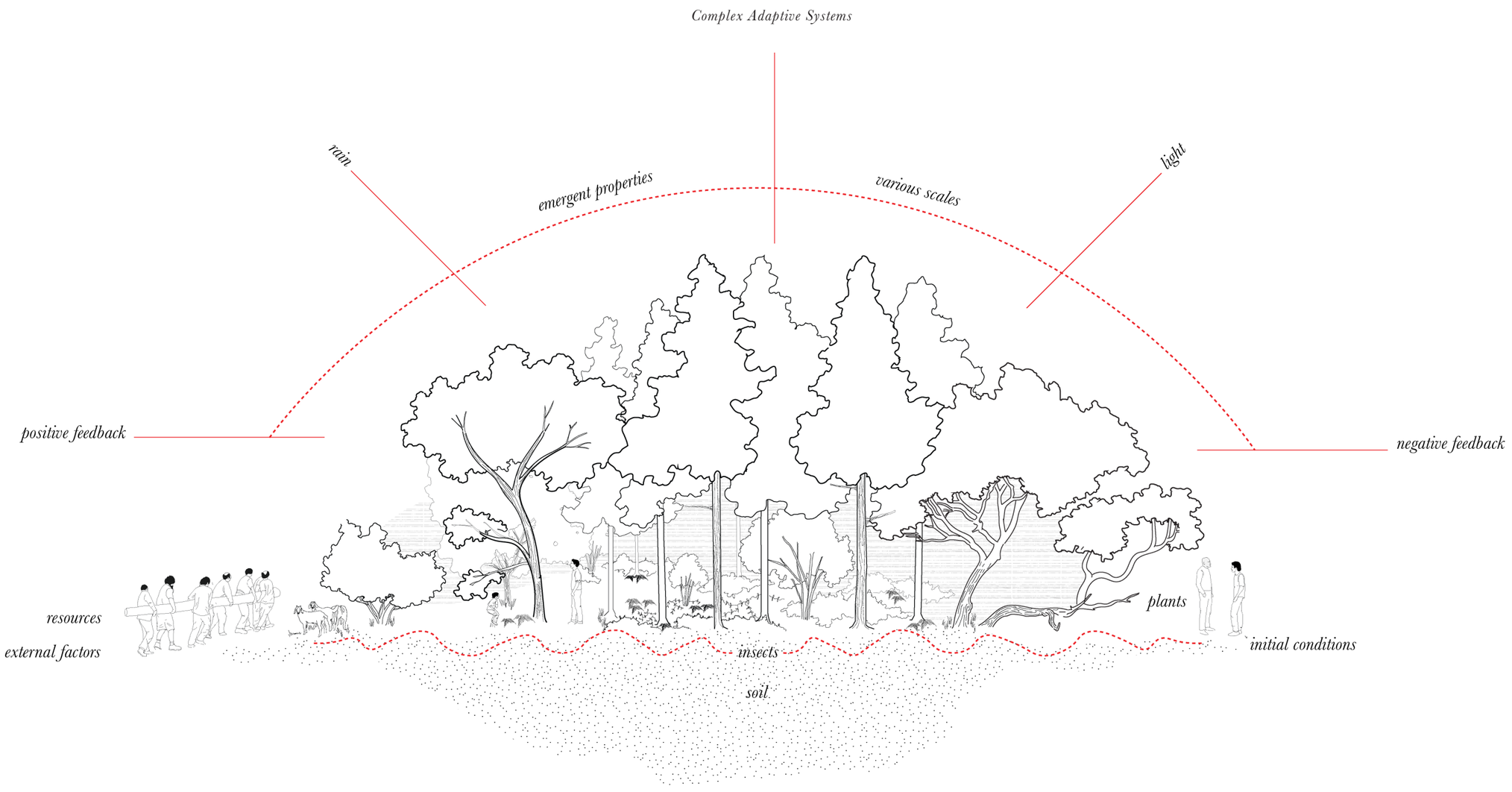

figure 13 . The value of forests extends well beyond trees,they are a result of thousands of ecological relationships and processes

context of long-distance transportation and industrial milling operations. In the United States, the railroad enabled timber to be shipped around the growing country. Steam engine technology also powered the invention of circular saws which were used to mill timber into smaller lumber sizes. The demand for small dimensional lumber responded to the invention of balloon framing and the cost of railroad shipping at the turn of the 20th century.[156] At the time, shipping rates could double the price of lumber due to cost determinants of travel distance and total weight.[157] Kiln drying technologies also evolved at this time in order to closely regulate moisture content in relation to weight.[158] The American Lumber Congress attempted to completely standardize sizes in 1919. However increases in lumber demand and competing building materials continued to influence size changes. Ultimately, uniform size standards and moisture content was agreed upon in 1964, presenting us with the 1-1/2" x 3-1/2" 2x4 that we use today. The logging, milling, transportation, and construction industries have all co-evolved, which presents immense challenges to shifting practices in the first stage of the process – forestry.

In January of this past year I visited Pack Forest, a University of Washington field research station in Eatonville, Washington. The last stop of the site visit was along a gravel service road looking out across two Douglas-fir stands. Both stands had been recently logged, but each read as a distinct landscape. One was a clear hillside with a handful of tall lanky survivors. The other was a patchwork of elongated tree stands and open space. Gregory J. Ettl stood in the middle of the road recounting his joy when a young male deer hurdled at him while he was monitoring the latter of the two stands. Greg is an ecologist and to see the deer was a sign that despite the logging, the number of trees remaining was allowing nature to still happily move about its ways. However, Greg is also the manager of PACK forest, and he went on to explain how every tree still standing ultimately equates to less logs, less money, and less budget to pay hardworking staff.

This economic challenge to ecological forest management is an urban and a rural issue due to capital exchange. It is relevant to the fields of design and construction as well as our individual roles as consumers. Parks alone are clearly not a solution. However, if the historical role of parks has been to question how public space can negotiate pressing social issues, the contemporary context is necessarily broad. Galen Cranz and Michael Boland propose that the Sustainable Park addresses a site's urban ecology. Thick readings of a site's related cultural-ecological stories are also becoming more sensitively considered today. The contexts of forests raises the additional question of how regional ecologies are connected

beyond borders of urban and rural. A park in this scenario is not an enshrinement of the sustainable city, but a reminder that we are dependent upon a wide array of landscapes beyond the ones that we immediately inhabit. They also become a vehicle to acknowledge local forms of traditional ecological knowledge and historic landscape conditions and uses.

Utilizing parks as productive forests presents an opportunity for people to gain diversified relationships with nature, but they also have the potential to be an economic opportunity for sustaining management. In 2004, the Vashon Forest Stewards worked with the Vashon Parks District and a team of forestry experts, led by Dr. Jerry Franklin, to create a forest management plan for Agren Memorial Park. The project became the first park in King County to utilize ecological thinning at a large scale to improve forest health and aesthetics.[159] Variable density thinning took place throughout the thirty acre park in order to create four forest densities : no entry, moderate thinning, heavy thinning, and gaps (see figure32).[160] The result is a diversified forest structure that aims to increase the forest's health and ecosystem services. The forest thinning also yielded $45,000 through marketable logs which provided funds for replanting, trail building, and a reserve for future management. [161]

five . swan creek park

the productive park

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In the midst of an entangled context, traditional ecological knowledge presents a case for a slow design process, one that asks for internal growth within people as much as external change in an existing landscape. Architecture and landscape architecture have a unique capacity to bring people together through a common desire to make and change our environments. As a community effort phased over time, the design and construction of a park could layer generational legacies and lessons in one place. The following is the beginning of a design model that is premised on community memory, growth, and production. Restorative urban ecologies rely on human inputs. The goal is to encourage a range of ways they can intersect and allow for rediscovered relationships between people and nature.

Swan Creek runs along the intersection of Tacoma and Pierce County. It's headwaters begin at 120th Street East and flow towards the Puyallup River. The creek's confluence with Clear Creek occurs in the Puyallup River's historic flood basin. Both waters join the Puyallup river shortly after. The creek is a tributary of the Clear / Clarks Creek Basin. Swan Creek is actively stewarded by the Puyallup Tribe and other local community members to preserve it's capacity to bear salmon.[162] Tribe-led restoration efforts have been paired with educational outreach, teaching kids about the creek and the processes of the salmon life cycle. Swan Creek Park is 373 acres that stretches along the northern portion of Swan Creek. 290 acres are owned and operated by Metro Parks Tacoma and 83 acres are owned by Pierce County. The park is typified by two areas, its uplands and Swan Creek canyon. The uplands consist largely of second-growth uniform Douglas-fir stands. The canyon is notable for it's steep slope and a diverse mix of tree species and age classes.

Swan Creek Park is enmeshed in the history of land acquisition in the United States. In 1854, the Medicine Creek Treaty stated that all Native tribes and bands in the Washington territory would cede their tribal grounds to the United States. A condition of the treaty maintained tribes' access to usual and accustomed hunting and fishing grounds.[163] The land of and around Swan Creek Park was a part of the Puyallup Tribe's usual and accustomed grounds.[164] In 1887 the Dawes Severalty Act divided reservations into private allotments to assimilate Native Americans into the United States. In the following land exchanges,

figure 14 . Construction of Old Salishan
figure 15 . Remnant streets in Swan Creek Park uplands

the Puyallup tribe lost 17,463 acres of the 18,000 acres it had previously been entitled to, including the land now known as Swan Creek Park.[165] Despite this, the Puyallup Tribe's continued advocacy for Swan Creek has preserved and maintained the site's cultural and ecological functions.

The land's transition into a park began in 1942 with the Tacoma Housing Authority purchasing 465 acres of land east of Portland Avenue from Pierce County and private land owners. The effort was part of a commission from the Public Housing Administration to build war-time worker's housing. At the time, people were flooding to Tacoma in order to fulfill manufacturing and support positions at "McChord Field, the Mount Rainier Ordnance Depot, Fort Lewis, and in Commencement Bay shipyards".[166] With the rapid influx, rents rose dramatically as vacancies decreased.[167] The Tacoma Housing Authority responded with plans for the Salishan neighborhood. Salishan began as 1,600 combined units of permanent and temporary housing that was constructed using lumber harvested from the site.[168]

In 1951, with the settling of the post-war environment, the Tacoma City Council voted to retain 900 units of the development for low-income housing and to demolish the rest. The plots that had been cleared lied fallow with no long-term plan in place. In 1956, 52 acres of that property was transferred to the Tacoma Park District.[169] A combination of replanting and natural regeneration has yielded the Swan Creek Park upland forest conditions that are visible today. The street grid also remains clearly legible, along with traces of foundations, water pipes, and other artifacts of the housing that once existed there (see figure 15).

Over the following decades, without a formal master plan, community advocacy and volunteer work shaped Swan Creek Park. Public resistance blocked proposals to convert Swan Creek canyon into a landfill in 1960 and a mining operation in 1971. Throughout the 1900's, sedimentation and pollution runoff from adjacent uses had rendered the creek nearly uninhabitable for salmon.[170] Decades of stewardship and restoration efforts led by the Puyallup Tribe and local community members have revitalized Swan Creek.[171] Over it's history, the park has been used for auto cross events, remote control plane testing, and police demonstration and training. It has weathered proposals for a golf course and an organic farm center. The conditions today are the result of continuous volunteer support for trail building, creek and canyon maintenance, and involvement at the park's community garden. The park's most recent improvements have been interconnected to the redevelopment of

Salishan.

In 2001, the Tacoma Housing Authority received a $35 million Hope VI grant to demolish the existing neighborhood and implement a new sustainable housing development.[172] Over it's history, Salishan has been burdened by negative stereotypes. While violence and theft were realities, the neighborhood also was a place of community.[173] Darlene Hilyard, Outreach Coordinator at Washington State University, spent part of her childhood growing up in Salishan. Her cherished memories of it have a significant connection to Swan Creek Park and the natural areas that permeated throughout the neighborhood. She recounts how as kids they would spend all day outside playing and exploring in the woods, "there were so many things you could eat… there were hazelnut trees, apple trees, blackberries… we never went home for lunch we just stayed out and played".[174] Memories such as this enrich the narrative of a place and re-emphasize the value productive landscapes can contribute in a neighborhood setting. The New Salishan development has a neat and orderly aesthetic. The neighborhood has numerous playgrounds, urban street trees, and is equipped with green stormwater infrastructure. However, I question whether its rigorous order invites the same curious investigation of the surrounding environment, particularly for children.

New Salishan has also provided momentum for two formal master plans of Swan Creek Park. The first plan was completed by MIG in 2011. The project catalyzed the city's commitment and community momentum to make improvements. Upgrades have been made to the community garden; a permaculture food forest was started; trail restoration for hiking and mountain biking has been revamped; and work parties continue to remove invasive species and trash from the canyon. A master plan update for the park's uplands was completed by Mithun in 2019. Design work and community engagement is still ongoing. However, current programmatic features will likely include a new restroom, a new parking lot, new planting, trail improvements, and a dog park. [175]

The land of Swan Creek Park has been used productively by people throughout history. The Puyallup Tribe have been continual stewards of the landscape's ecological, cultural, and material productivity. The stories of Salishan convey legacies of timber harvesting, wild food gathering, in addition to the cultivation of memories. More recently, the Swan Creek Park Community Garden has become the largest in Tacoma and the mountain bike community has created course features and trail markers with downed logs and tree limbs (see figure 18 for context map). While the park does not express an aesthetic completeness

that accompanies a formal master plan, it has functioned as a productive testing ground for community based projects. This slow growth maintains a capacity for change and highlights the potential of community stewardship. [176]

figure 16 . Swan Creek passing through Swan Creek park

Puyallup Tribe

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For thousands of years, the Puyallup River and coasts of the Puget Sound have sustained our way of life by giving to us the salmon, shellfish, wild game, roots, berries, and cedar trees that are the foundation of our culture, traditions, and heritage. In spite of the many challenges we have faced, our spirits remain tied to this land, and our stewardship has ensured that the Puyallup Tribe will continue to enjoy the natural gifts we receive in exchange.[177]

Bill Sterud
Puyallup Tribal Council Chairman

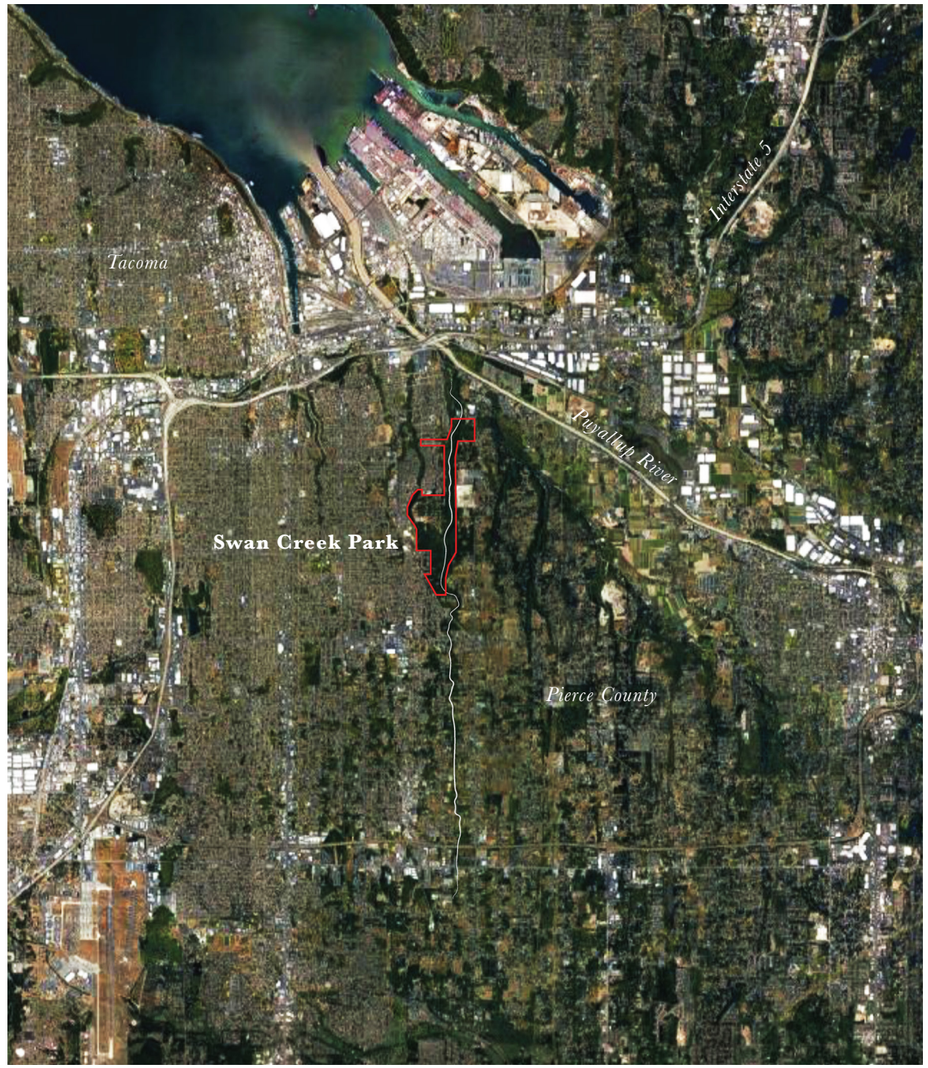

figure 17 . Swan Creek Park context within Tacoma and Pierce County

figure 18 . Swan Creek Park Site Plan and adjacency to Salishan neighborhood A. Community Garden B. Food Forest C. Mountain Bike Park D. Old Salishan Traces

an alternative model

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This project's design model imagines an additional path for future development. It is based on the site's history as well as the cultural need to diversify our relationships to forests. I propose three forms of infrastructure as armatures for incremental growth : landscape infrastructure, programmatic infrastructure, and community infrastructure. Each engage the site at a range of scales and as an extension of the surrounding neighborhood.

Forests are perennially productive and multi-generational. In the Pacific Northwest, multiple forest types can serve as a form of green infrastructure. Three forest types are imagined for the future of Swan Creek park. The first builds off of the existing upland forest. Currently, the upland forest is comprised largely of uniform Douglas-fir, *Pseudotsuga menziesii,* with an understory of salal, *Gaultheria shallon*, Oregon grape, *Berberis nervosa*, Pacific trailing blackberry, *Rubus ursinus*, Western sword fern, *Polystichum munitum*, and Indian plum, *Oemleria cerasiformis*. As the density of Douglas-fir decreases towards the forest edges, a more diversified plant palette emerges. Additional species become more prevalent such as Pacific madrone, *Arbutus menziesii*, Black cottonwood, *Populus trichocarpa*, Big leaf maple, *Acer macrophyllum*, Vine maple, *Acer circinatum*, Bitter cherry, *Prunus emarginata*, Beaked hazelnut, *Corylus cornuta*, and Mountain ash, *Sorbus aucuparia*. The forest infrastructure along the park's western edge would be a thinned Douglas-fir forest with a permeable but diversified understory. The western edge is proposed as an active border to Salishan, with a focus on accessible edible species and the potential for creative programming (see figure 26). The upland forest's eastern edge naturally transitions into the ridge top planting zone. The ridge top zone exhibits higher diversity of plant species than the upland forest. In conjunction with the park's ridge trail, the second form of forest infrastructure expands the ridge's planting zone to create a bio-diverse corridor for both human and animal movement that extends throughout the entirety of the park's western ridge (see figure 27). The plant palette here focuses on food producing species for people, birds, and mammals as well as materially productive species that could be coppiced, pruned, or selectively harvested. The third form of forest infrastructure creates variable test plots to slowly transition the park's lower field zone from being inundated with Scotch broom, Cystisus scoparius, to a more diverse landscape type. The first proposal is for a Garry oak woodland. Garry oaks, Quercus garryana, provide the primary structure of a bio-diverse regional landscape type that has historically relied on human stewardship. Garry oak woodlands and savannas have been managed for thousands of years by different tribes of Coast Salish peoples through frequent burns and transplanting acorns.[177] The woodlands and savannas attract over two hundred species of native wildlife and offer a host of ecosystem services from habitat to resource production.[178] Garry oaks can take as much as one hundred and fifty years to reach maturity.[179] Their slow growth and light requirements mean that they are easily over topped by faster growing species such as Douglas-fir. This ultimately leads to their die off. Planting Garry oaks is a long-term investment in bio-diversity and ecological resilience. Their ability to thrive in poor soils and tolerate summer droughts may make them strong candidates for climate adaptability. Garry oak woodlands and savannas have a diverse array of associated plants that also maintain food and material productivity for people and animals (see figure 28).

Each forest infrastructure involves a transition from the existing conditions to a diversified ecology. While ultimately this will be achieved through additional planting and management, the first stages of transition involve the removal of species or landscape conditions. Transitioning the upland forest to have a permeable neighborhood edge and to expand the ridge top zone will involve the removal of small diameter Douglas-fir (see figure 22-23). The transition of the field zone will involve clearing Scotch broom (see figure 23-24). The removal of each will allow for more diverse and resilient landscape types to form over time. Phased management will yield a continual material stream, which presents continuous opportunity to creatively explore the cultural value of these low-value byproducts.

The program infrastructures are physical armatures that link ecological health with the cultural use of the park. The paths are recreational, provide service access, and guide zones of management. The type of path is determined by the intensity of management required to transition the zones that are passed through. The utility and bike path accounts for larger degrees of variable density thinning along the upland forest's western edge (see figure 31). General hiking paths would target only selective tree removal in order to open up the canopy enough to release specific trees or diversify the plant palette (see figure 33). An on-site saw mill, wood yard, and compost facility are where site material can be deposited and processed. This resource could also be extended to provide service for a wider portion of the city or tree management across the Tacoma Parks District. The third program infrastructure is a moveable storehouse. The storehouse is an initial exploration of designing with small diameter timber and scotch broom as primary building materials (see

figure 37). Programmatically, it houses an array of wood working and landscaping tools in order to be a catalyst for future design | build projects that could further explore building with the materials yielded on site.

The community infrastructure considers how Swan Creek Park is a component of all the available open space in Salishan. In unison they form a network of public spaces that are an extension of the neighborhood (see figure 40). The conditions of Swan Creek Park today have been constructed through community based efforts. The Swan Creek Park Community Garden and mountain bike park are testaments to the effect of continual community investment and partnerships. The inactive state of the food forest reflects that sustaining long-term community momentum is essential to fully realize promising ideas. Long-term community partnerships are a way to connect community members with Tacoma Parks, the Puyallup Tribe, and disciplinary specialists such as foresters, arborists, loggers, artists, designers, and builders. Collaborative efforts present opportunities for residents of the neighborhood to participate and express their needs while also being an education opportunity around diversified forms of use and stewardship. Bi-annual neighborhood gatherings are proposed as a way to maintain discussion and awareness around the phased construction of Swan Creek Park. Integrating food, art, crafts, and music is a means to celebrate the existing sense of place in the neighborhood in addition to fostering regular community discussion around future park programming (see figure 41). Links have been demonstrated between informal types of engagement and cultivating a community's sense of ownership and vibrancy.[180] Bringing neighbors together that may not know each other or interact frequently is also a means to increase the community's social cohesion.[181] Rotating through the various open spaces of Salishan will allow for greater visibility, access, and highlight different areas of the neighborhood. Regular focused discussion around the park is an opportunity to share memories, perspectives on what is successful or not, and to reinforce the potential relationships that people can cultivate with the park as a productive landscape.

Together these three forms of infrastructure imagine how a park could grow incrementally over time. They begin to explore how social and ecological relationships could be renewed through treating an urban forest as a productive landscape for human use. As a design model, they form an ideological base oriented around three key points : Managing for ecological health and complexity in an urban forest will yield a material stream through the removal of invasive species, pruning and selective species removal, and larger scale ecological thinnings; exploring added-value end products for these materials may be an avenue to generate new intersections between culture and ecology; and community oriented management and design presents opportunities for people to cultivate new social and ecological relationships with their local landscapes.

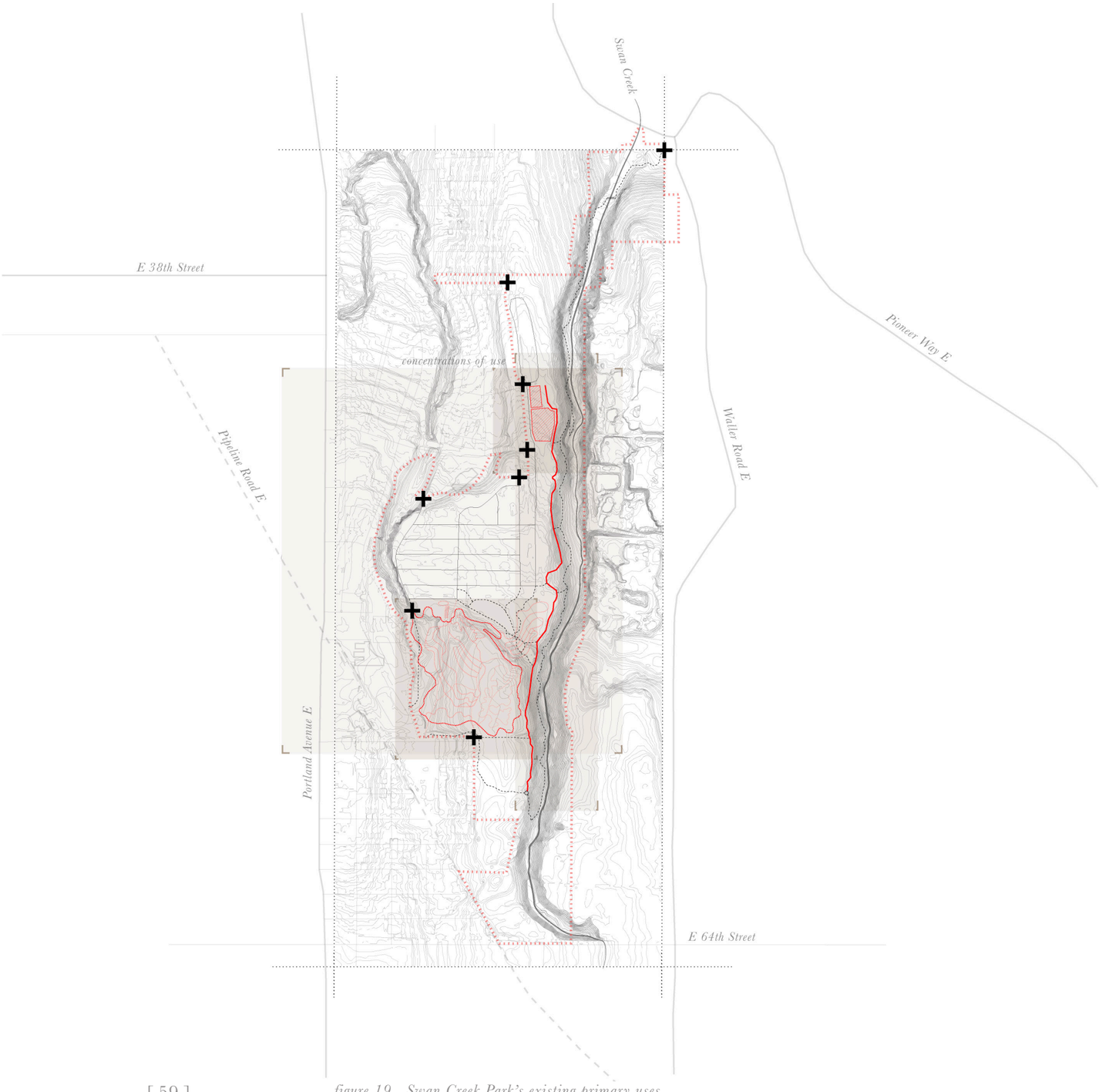

figure 19 . Swan Creek Park's existing primary uses

Existing Infrastructure

- *Park Entry*
- *Park Boundary*

Trail Network

Mountain Biking Trails :

- *Primary Trails*
- *Connector Trails*

Hiking Trails :

- *Ridge Trail*
- *Interior Trails & Canyon Trails*
- *Paved Road*

Food Production

- *Community Garden*
- *Food Forest*

figure 20 . Swan Creek Park's existing landscape communities

Existing Infrastructure

- *Park Entry*
- *Park Boundary*

Trail Network

Mountain Biking Trails :

- *Primary Trails*
- *Connector Trails*

Hiking Trails :

- *Ridge Trail*
- *Interior Trails & Canyon Trails*
- *Paved Road*

Landscape Zones

- *Upland Zone : Douglas-fir Forest*
- *Ridgetop Zone : Mixed Conifer - Deciduous Forest - Dry*
- *Canyon | Creek Zone : Mixed Conifer - Deciduous Forest - Wet*
- *Upper Field Zone : Mixed Grass Field*
- *Lower Field Zone : Scotch Broom Dominant Field*

Forest Infrastructure

Park Entry

Park Boundary

Trail Network

Mountain Biking Trails :

Primary Trails

Connector Trails

Hiking Trails :

Ridge Trail

Interior Trails & Canyon Trails

Paved Road

Forest Infrastructures

Thinned Upland Edge

Expanded Ridgetop Zone

Field transition to Oak Woodland

figure 21 . Swan Creek Park proposed forest management zones

figure 22 . Effect of planting density and crown size
figure 23 . Uniformity of planting and limited understory

small diameter timber

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The upland forest is densely planted and largely comprised of uniform Douglas-fir. Growing conditions have led to stunted growth, unhealthy canopy and crown ratios, and pose risks of fire.

figure 24 . Concentration of Scotch Broom in the lower field zone
figure 25 . Scotch Broom has formed in large monoculture stretches

scotch broom

Scotch broom maintains a presence in some quantity throughout the park's uplands. It is heavily concentrated in the lower field and has created monoculture conditions throughout the zone.

figure 26 . Thinned Upland Edge plant palette
A. Douglas-fir B. Pacific Madrone C. Apple
D. Beaked Hazelnut E. Thimbleberry F. Oregon Grape

Thinned Upland Edge

•

Douglas-fir, Pseudotsuga menziesii .

habitat, fast growing, limbs grow fairly straight and could be used in building while allowing for clear growth in subsequent years

Pacific Madrone, Arbutus menziesii .

middle canopy story habitat, berries are a food source for birds and mammals

Variety of Apple, Malus .

low canopy, fruits are a food source for people, birds, and mammals

Beaked Hazelnut, Corylus cornuta .

nuts are food source for people, birds, and small mammals woody stems can be coppiced and used for fine grain crafts such as weaving

Thimbleberry, Rubus parviflorus .

habitat, brambles are a primary food source for birds, berries are a food source for people, birds, and mammals

Oregon Grape, Berberis nervosa .

cover for small mammals and birds, berries are a food source for people, birds, and mammals, roots are used by people to make yellow dye, flowers attract hummingbirds and other pollinators

figure 27 . Expanded Ridge Zone plant palette
A. Bigleaf Maple B. Bitter Cherry C. Indian Plum
D. Salmonberry E. Salal F. Western Mountain Ash

Expanded Ridge Zone

•

Bigleaf Maple, Acer macrophyllum .

habitat, branches and boles support epiphytic growth, seeds are a food source for birds and rodents, leaves house insects that become food for birds, sap is a potential food source for people[182]

Bitter Cherry, Prunus emarginata .

Fruits are a food source for birds and small mammals, wood stems can be coppiced for fine grain crafts

Indian Plum, Oemleria cerasiformis .

Stone fruits are food source for both people, birds, and small mammals, flowers attract and are pollinated by hummingbirds, butterflies, native bees, and other insects

Salmonberry, Rubus spectabilis .

thicket forming habitat, berries are a food source for people, birds, and mammals, flowers attract Rufous Hummingbirds as they migrate north[183]

Salal, Gaultheria shallon .

berries are a food source for people, birds, and a range of mammals, foliage is used by people in floral arrangements and is a food source for some mammals, flowers attract hummingbirds

Western Mountain Ash, Sorbus scopulina .

berries persist through the winter and are food source for people, birds, and mammals

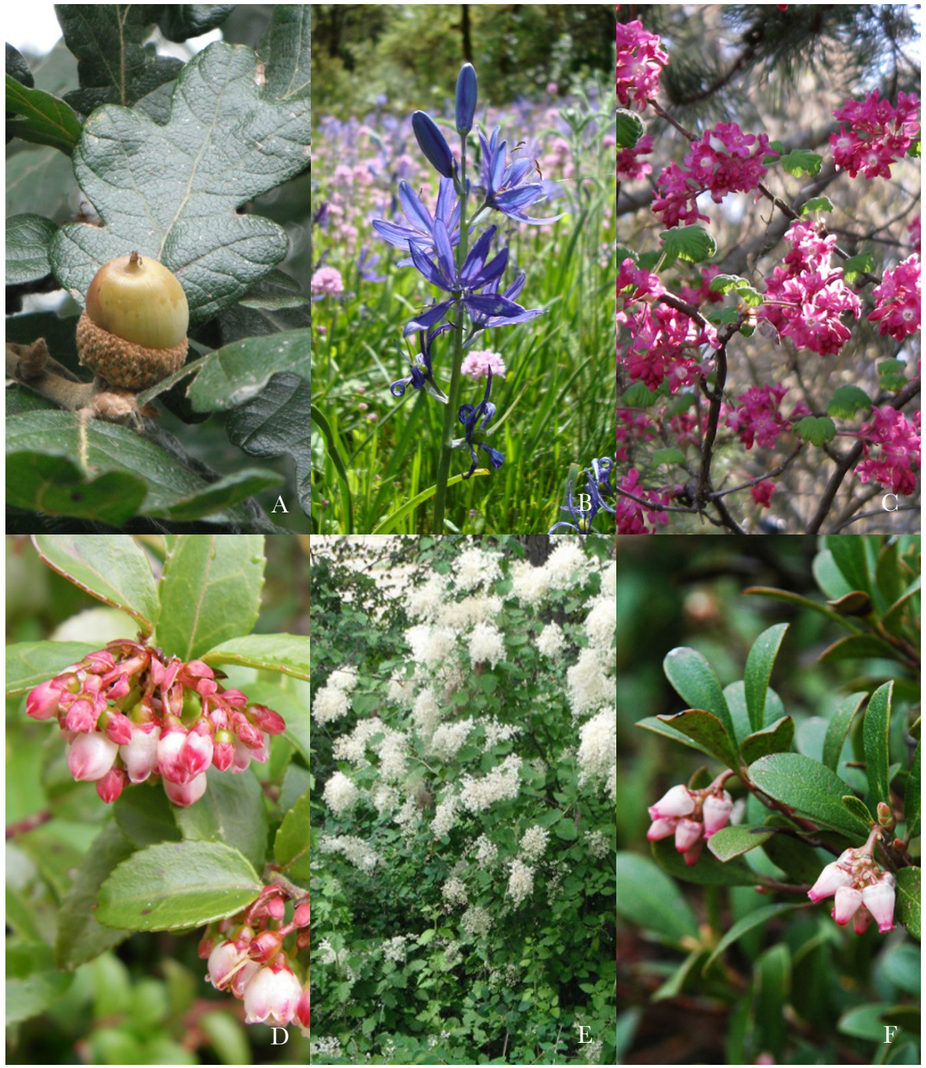

figure 28 . Oak Woodland plant palette
A. Garry Oak B. Common Camas C. Red Flowering Currant
D. Evergreen Huckleberry E. Ironwood F. Kinnikinnick

Oak Woodland

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Garry Oak, Quercus garryana .

habitat for a birds and small mammals, acorns and foliage are high protein food source for many birds and mammals

Common Camas, Cammassia quamash .

edible bulbs are a food source for people and small mammals, flowers attract a wide variety of pollinators, stalks can be used in crafts

Red Flowering Currant, Ribes sanguineum .

berries are a food source for variety of songbirds and small mammals, flowers attract migrating Rufous Hummingbirds and a range of insects, the foliage is eaten by butterfly larvae[184]

Evergreen Huckleberry, Vaccinium ovatum .

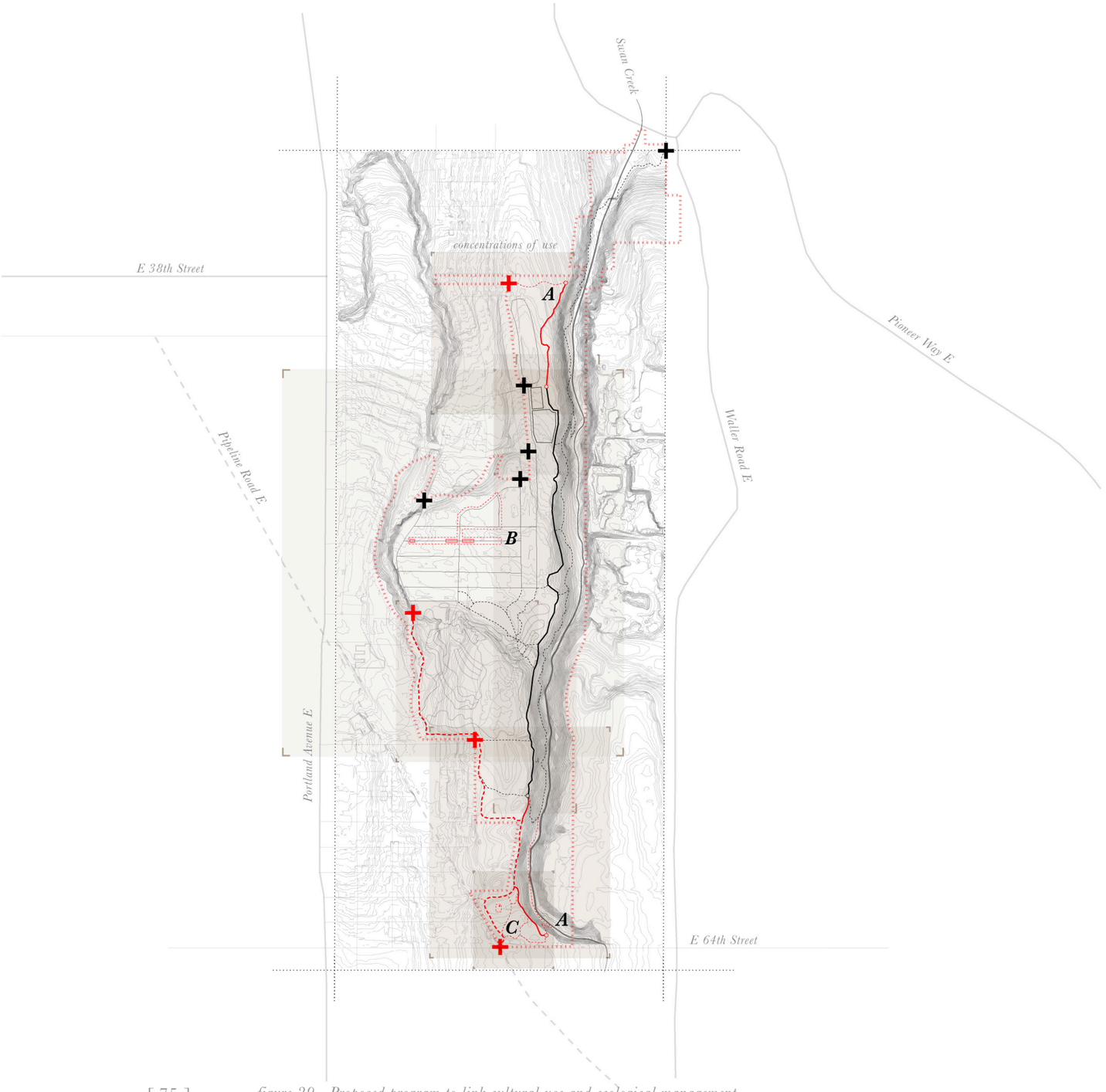
berries are a food source for people, birds, and small mammals, foliage is used by people in floral arrangements and is a food source for birds and mammals, flowers attract hummingbirds, butterflies, and other pollinators

Ironwood, Holodiscus discolor .

provides cover for birds and small mammals, wood is extremely strong and can be used in crafts and building

Kinnikinnick, Arctostaphylos uva-ursi .

provides cover for small birds and mammals, berries are a food source for song birds, flowers attract hummingbirds and other pollinators



Program Infrastructure

- *Park Entry*
- *New Park Entry*
- *Park Boundary*

Trail Network

Mountain Biking Trails :

- *Primary Trails*
- *Connector Trails*

Hiking Trails :

- *Ridge Trail*
- *Interior Trails & Canyon Trails*
- *Paved Road*

Program Infrastructures

A *Path Network :*

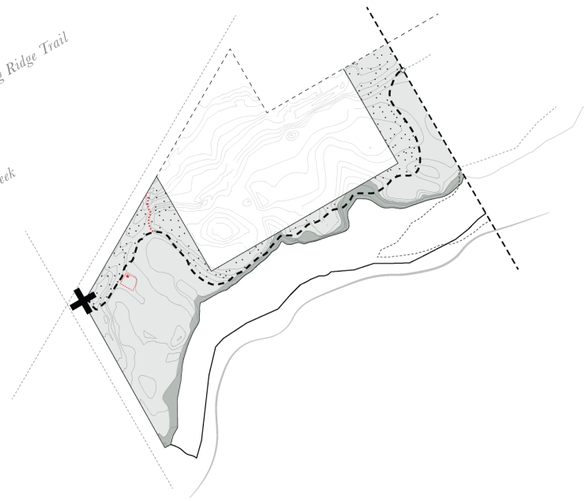
- *Ridge Trail Extension*
- *Utility and Bike Path*
- *Supplamentary Trails*

B *Wood Mill | Yard & Compost Processing*

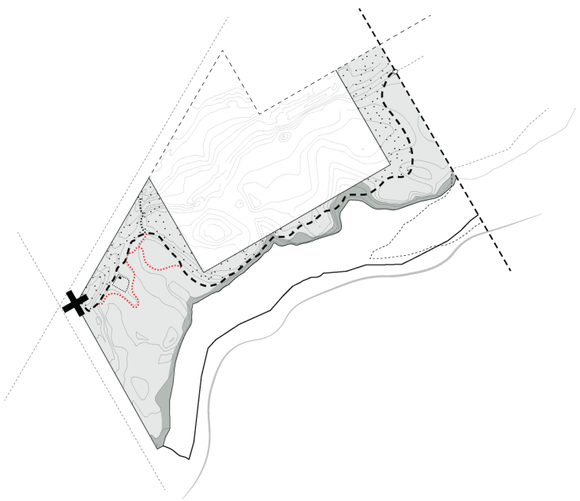
C *Movable Storehouse*

figure 29 . Proposed program to link cultural use and ecological management

Year One



Year Two



Year Three

Year Seven

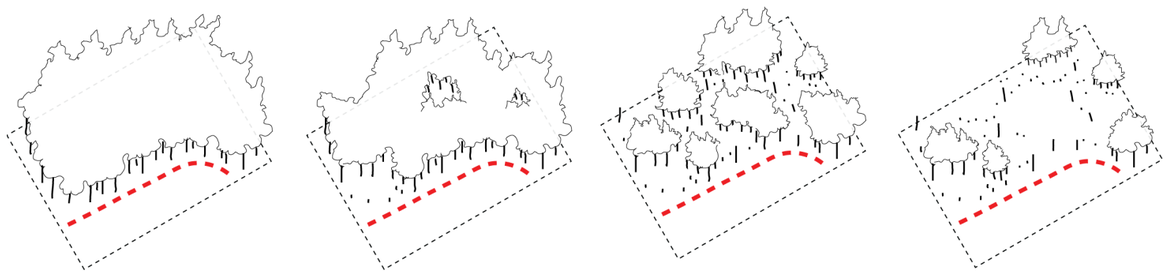
Year Eleven

Year Fifteen

Fifteen Year Phasing

Forest health and management reassessment every fifteen years. The design goal for the first cycle is to connect the ridge trail to all accessible portions of the park's uplands

figure 30 . Phasing of the southern portion of Swan Creek park



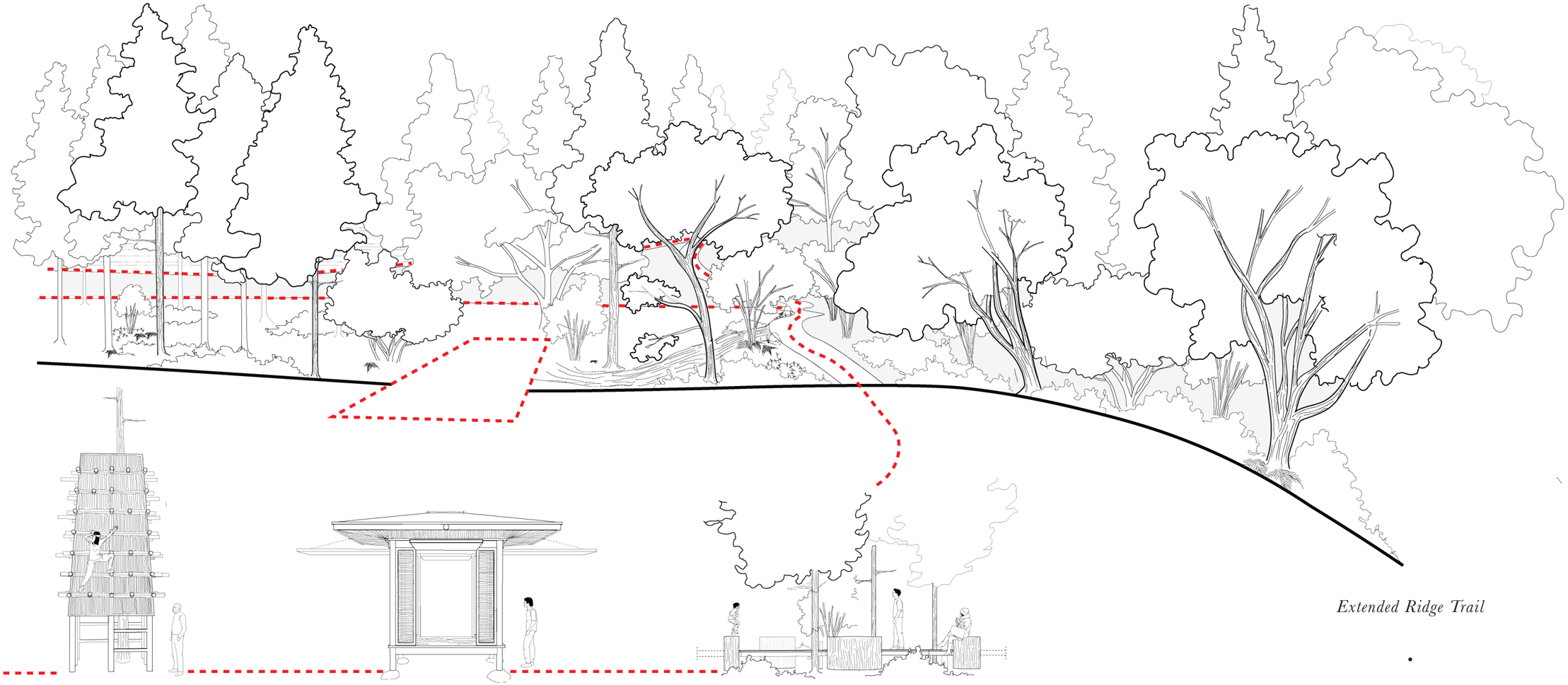
(e) uniform douglas-fir stand | moderate thinning | heavy thinning | gap clearing

variable density thinning along Pipeline Road E to create passable ground zone and different spatial programs

Utility and Bike Path

The utility and bike path is a twelve foot wide circulation path that connects the southern and northern portions of the site and also serves as utility access for forest management

figure 31 . Section of the thinned upland edge and recreation and service path
figure 32 . diagram of different density thinnings



Play Structures - Climbing Tower

Community Space - Outdoor Pavillion

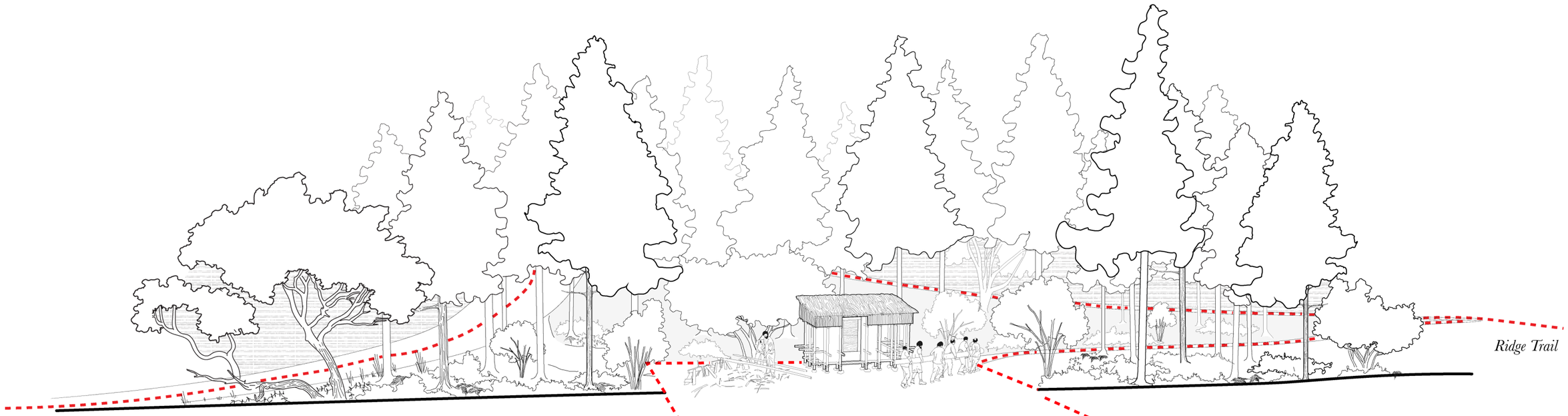
Trail Extension - Forest Walk

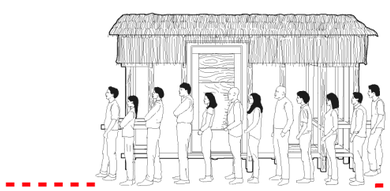
Extended Ridge Trail

Prototype Design | Build Programs

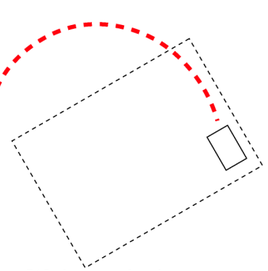
As Douglas-fir are selectively removed to extend the ridge top planting zone, additional spaces will open up that can become exploratory design | build sites

figure 33 . Section of the Ridge trail
figure 34. Diagrams of prototype structures to be built from site materials

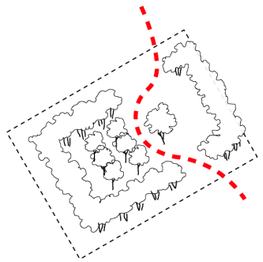




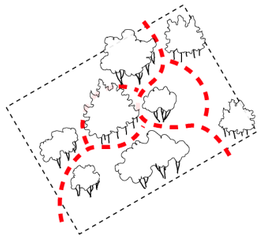
Move storehouse at the end of design | build phase



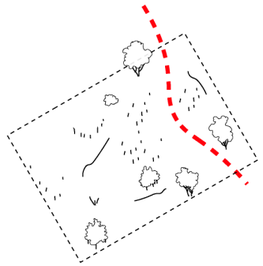
Work zone clearing



Ordered forest garden



Natural forest garden



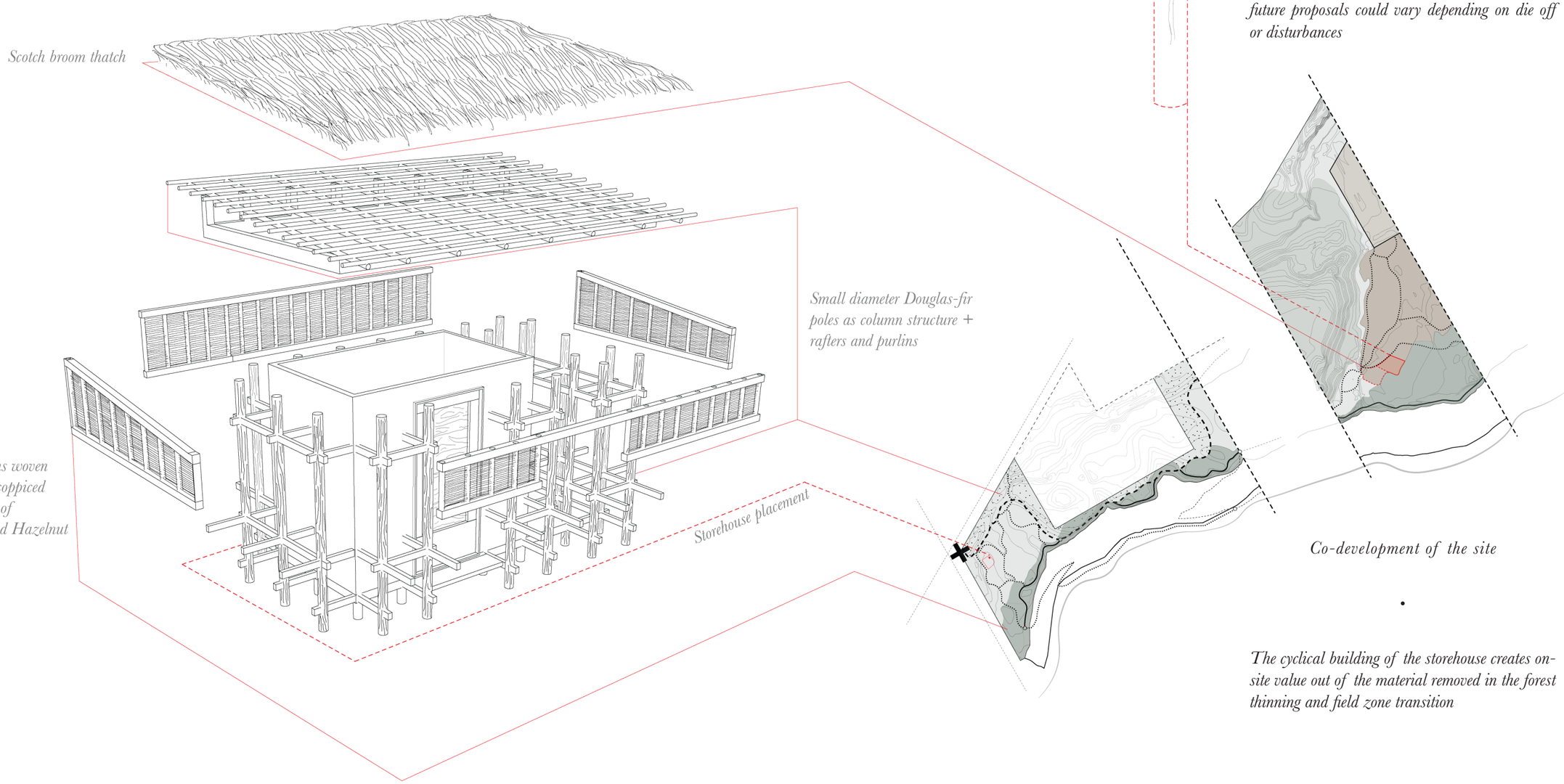
Succession

Work Zone Transition of Use

Storehouse and Work Zone

The storehouse is a tool shed and stocking area for small diameter branches, limbs, and poles. The associated work zone is a 25' x 50' clearing where design | build project components can be prefabricated to be assembled on site

figure 35 . section of temporary work zone clearing
figure 36. diagrams of programming potentials after storehouse has moved



Transition to Oak Woodland :

The lower field will be transitioned from a scotch broom monoculture in 1/2 acre parcels. This will ensure proper care and removal of the broom but also flexibility in future plantings. This first iteration proposes an Oak woodland, however, future proposals could vary depending on die off or disturbances

Co-development of the site

The cyclical building of the storehouse creates on-site value out of the material removed in the forest thinning and field zone transition

figure 37 . Diagram of forest transitions and the resulting material use

figure 38 . Community thatching with Scotch Broom in process
figure 39 . Scotch Broom thatching completed, participants noted the process of learning and building to be as important as the final product

highland thatching

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Scotch broom was the predominant thatching material in Scotland in the 19th Century. "Highland" thatching was historically a rotating communal activity and also frequently utilized heather, bracken, soft rush, marram grass, and oat straw in addition to broom.[182]5With regular maintenance, a Scotch Broom roof can be expected to last up to twenty years.[186]

figure 40 . Salishan's Open Space Network

Community Infrastructure

Park Entry

Park Boundary

Extended Park Boundary

Trail Network

Mountain Biking Trails :

Primary Trails

Connector Trails

Hiking Trails :

Ridge Trail

Interior Trails & Canyon Trails

Paved Road

Utility and Bike Path

Community Infrastructures

Lister Elementary Playfields

First Creek Middle School Playfields

Salishan Parks and Open Lots

Parking Lots

Neighborhood Streets

figure 41 . Neighborhood gatherings can celebrate the existing sense of place in Salishan by bringing people together to enjoy food, art, music, and dancing in addition to community design

community gathering + memory

•

Bi-annual neighborhood gatherings to discuss identity of place and to raise community design from a formality to an ongoing dimension of neighborhood growth

six . conclusions

6

looking together

•

This thesis began as an inquiry into wood as a building material. I was curious about the social and ecological relationships that enable its common use. Small diameter timber emerged as a point of focus because it's problematization today contrasts it's historical prevalence as a building material. It's traditional use in Korean and Coast Salish architectures indicate a broader set relationships between wood, trees, and forests. Traditional ecological knowledge illustrates how social and ecological resilience has been a product of these relationships and their ability to adapt across multiple generations.

New uses of small diameter timber may be able to have positive impact on how we manage for forest health and ecological complexity. However, it's material story is part of a larger trend of reducing the diversity of our relationships to productive landscapes in exchange for economic efficiency. As the world continues to urbanize, a city's public landscapes have a responsibility to facilitate positive relationships between people and nature. Historically, this has largely been as form of respite. Today, it is a vehicle for bolstering a site's socio-ecological restoration and resilience. As an addition to this, I advocate for the diversity of productive uses that urban parks may provide to local communities. The proposed design model facilitates small-scale interventions that are a result of materials yielded on site and that can amalgamate over time to form a larger park experience. By utilizing materials that are removed in transitioning a landscape to a more desired state, the projects are an opportunity to create new perspectives on low-value materials. The model also proposes a focus on community participation and flexibility to natural and imposed changes in the landscape. These shifts may be influenced by climate, biotic disturbances, ecological health, or new materials needs. The intention is to leverage parks as a public testing ground. The goal is to imagine this as a catalyst for forming enriched relationships between people and the landscapes we all share and inhabit.

This research has largely come through the lens of historical studies and academic literature. Collaborative inquiries would form meaningful next steps to further develop the ideas within this thesis. Learning from local indigenous leaders is essential to integrating ideas of traditional ecological knowledge into practice. Community engagement in Salishan would

provide the necessary cultural perspectives that would orient a design model around the neighborhood's actual growth. The design potentials that accompany forest management will become bolstered by greater collaboration with foresters, arborists, ecologists, and loggers. The economic costs and benefits of urban forests can inform and be influenced by management objectives of local park departments. Ultimately, imagining the futures of our cities, public landscapes, communities, and personal relationships is a collective effort. Through this work, my hope was to cultivate an earnest starting point to do so.

end notes

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