Plants, Tribal Traditions, and the Mountain
Practices and Effects of Nisqually Tribal Plant Gathering at Mount Rainier National Park

by

Greg Burtchard, David Hooper, and Arnie Peterson

forewords by

John C. Simmons & Jonathan B. Jarvis

United States Department of the Interior
National Park Service
Mount Rainier National Park

2024

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National Park Service
Mount Rainier National Park, Ashford, Washington

2024

Dedicated to the Memories of

Georgiana R. Kautz
1941 - 2020
and

Frederick F. York
1946 - 2020

Georgiana "Porgie" Kautz and Fred York were involved closely with creation of the 1998 Traditional Plant Gathering Memorandum of Understanding between the Nisqually Indian Tribe and Mount Rainier National Park. Their efforts began a process that helped to restore a long-dormant tradition at Mount Rainier and, ultimately, stimulated the study reported here. At the time, Georgiana was Natural Resources Director for the Nisqually Tribe. Fred was Pacific Northwest and, later, Pacific West Regional Anthropologist for the National Park Service. Working together, and with other tribal and National Park Service officials, Georgiana and Fred helped to craft plant gathering procedures and environmental protective measures essential to restoring tribal plant gathering rights at Mount Rainier that had been lost for nearly a century; and do so in a manner that preserved plant populations and associated habitats. Georgiana and Fred were dedicated to their causes, and to their professional and personal communities. Both shared a high level of professional competence and personal ethics. Those of us that knew them, and considered them friends, will long remember their contributions, their personal integrity, and the kind-hearted spirit that lay at the center of their beings.

Cover Art

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Acknowledgements

This book has been years in the making. In a sense, it began in 1998 when the Nisqually Indian Tribe approached Mount Rainier National Park to initiate a memorandum of understanding (MOU) to reinstate traditional plant gathering activities lost to National Park Service regulations in the 1930s. Park management agreed, and seasonal collection of a limited suite of plant materials guided by traditional, environmentally sensitive principles began again in 1999. The years that followed have seen remarkable park-tribal cooperation in carrying out the gathering process, responding to concerns as they appeared, and conducting ethnobotanical research to better understand how traditional gathering methods function to enhance sustainability while minimizing environmental impact.

So many people have participated in the effort through the years that it is nearly impossible to acknowledge the contributions of some without overlooking the efforts of others who participated along the way, but we will try. Our sincere apologies to those we overlook.

The beginning of the Nisqually-Mount Rainier plant gathering MOU was marked by exceptional cooperative effort between Nisqually Tribal and National Park Service officials. Together, they developed understandings that reinstated traditional plant gathering activities while helping to protect plant populations and associated habitats. Special credit in doing so goes to Georgiana Kautz (Nisqually) and Fred York (National Park Service) to whom this book is dedicated. They represented their respective positions effectively and fairly, and in the end, developed a Memorandum of Agreement that was effective and well thought-out. They did not work alone. Much credit also goes to Nisqually Tribal Natural Resources Department members David Troutt and Kathy Humphrey. Stephanie Scott, Nisqually Tribal Chair, signed the MOU on behalf of the Tribe. Mount Rainier National Park participants included John Krambrink, Gary Ahlstrand, Eric Walkinshaw, and Park Superintendent William Briggle. Our thanks to these, and others who demonstrated the willingness and courage to take on the virtually unprecedented task.

John Simmons succeeded Ms. Scott as Nisqually Tribal Chair. John worked to refine and defend the plant gathering MOU during its early years. Tribal Chair Cynthia Iyall signed and supported the subsequent Nisqually-Mount Rainier research agreement. Their support, as well as that of Mount Rainier National Park Superintendents Jonathan Jarvis, Dave Uberuaga, Randy King, Chip Jenkins, and Greg Dudgeon was invaluable during the years that followed.

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To these individuals and others unmentioned, we are more grateful than we can express. Your efforts have been of great value in improving the quality of this book. We have enjoyed working with you over the years. You deserve much credit for whatever success we have achieved here. The shortcomings are our own. Thank you for your help and your friendship.

Foreword: A Gathering Process for a Local Tribe

by

John C. Simmons
Chairman, Nisqually Indian Tribe 2000 - 2003
Nisqually Tribal CEO 2015 - 2017

I grew up between the Nisqually Indian Reservation and Parkland, Washington, where my paternal grandparents lived. I remember my mother, Blanche, and her interest in gathering plants, roots, and bark that she made into different kinds of tea. In fact, among the Nisqually people, she was regarded as their healing woman for all kinds of skin-related illnesses. Her skills were sought after by many American Indians from different reservations.

Blanche's sole purpose in gathering plants was to heal family and community members. Most of her plant gathering was done on the Nisqually Indian Reservation and Mount Rainier.

The plants she gathered included crab apple bark, white birch bark, and baby fern roots that grew in the crux of an oak tree. I climbed many trees to gather fern roots for her. I also peeled bark from the south side of the crab apple, and white birch bark trees. Blanche told me to never take bark from the north side of a tree because it would never grow back, and the tree would die.

Since a young girl, Blanche always gathered Indian tea from the water pools found along the Quinault Reservation. The leaves from these plants were boiled into a tea which she drank daily. While not proven by modern medicine, Blanche credited this tea for the fact that she did not develop problems with her heart, high blood pressure, or diabetes which other members of her family contracted. I still drink this tea daily.

Another extremely popular medicinal plant was the blackberry bush. We gathered young sprouts from this plant which were later used to solve stomach problems such as food poisoning.

It was not until one morning in 1997 that Blanche asked her daughter-in-law, my wife Norma Simmons, to drive her to Mount Rainier to look around. They drove up to the Mountain and, as they arrived, Blanche got out of the car and began to view the plants along the mountain-side. There, she spotted medicinal plants that could be used for healing.

When Norma saw Blanche looking at the plants, she reminded her that she could not pick the leaves of these plants in a National Park. Blanche's response was "I am American Indian, and I can pick anything I need for healing my community." But she waited for another time.

We discussed this later, hoping there could be a way for Indians in the Puget Sound area to, once again, gather their plants, roots, and bark without fearing reprisals from National Park Service personnel. Out of these meetings came a plan to start discussions between the Nisqually Tribe and Mount Rainier National Park. The meetings were organized by Georgiana (Porgie) Kautz who was the Nisqually Tribe Natural Resource Policy Manager at the time. Their purpose was to create a list of plants that the Nisqually people could gather for their personal use.

Eventually, tribe and park mangers developed a Memorandum of Understanding that outlined what plants could be gathered and how much could be taken. Yearly meetings were set to discuss how well the plan was working, and how it might be improved to protect the plants and the environment. This document was signed by the Nisqually Tribe's Chair, Stephanie Scott, on June 22, 1998.

Many years have come and gone since the tribe and park signed that initial plant gathering MOU. Much has been learned and much has been remembered anew. I am so happy that this book, with all its detailed information and historical events, has been written. As a child and a young man, I was not allowed to write any of the plant gathering information down on paper. I was to remember everything I was told as I heard it. But of course, I could not remember all the information my mother spoke to me about. This book helps me recall those days and learn more about why Blanche was so particular about the plants she gathered and the ways she gathered them.

I see some of the plant information that my mother spoke to me about sitting on the pages in this book. I know Blanche would be so happy to see the valuable plant information that she grew up with has found its way into a written document; a document that can help Indian and non-Indian people alike appreciate how American Indians used plants for healing and other purposes since time immemorial.

I realize that it has taken years to document the important historical events that took place with American Indians in Washington State's Pacific Northwest from the early 1800s into the 21st century, but it is worth it. The information contained in this book ranges from historical facts about Indian people and the big Mountain now known as Rainier, to specific details about traditional plants, habitat conditions, and common uses. These remind me of walking through the valleys, hills, and ponds on the Mountain as we did when I was a young boy.

I can easily understand how this book could become the "go-to" book for learning about traditional plants and plant-gathering processes used by tribes who occupied the Mountain during the gathering season. As I complete its reading, it is my hope that *Plants, Tribal Traditions, and the Mountain* will be used as a resource manual when local schools teach the history of tribes residing in the region –a long hoped-for curriculum made more likely by a bill (SB6262) introduced in the Washington legislature by Senator John McCoy of the Tulalip Tribe to teach local American Indian history to students of all nationalities.

In short, I very much recommend this book. I particularly recommend it to individuals who want to know more about the history of American Indians in the Mount Rainier area, the way they used (and continue to use) mountain plants, and how traditional gathering practices may be sustained over the years. The information the book contains is fascinating and the chapters are well-organized into different sub-categories, so it is amazingly easy to use. You will be able to find any topic or subject matter you may be looking for. I hope that you will give it a try.

Foreword: Persistence

by

Jonathan B. Jarvis
Superintendent, Mount Rainier National Park 1999-2002
Director, National Park Service 2009-2017

I was a product of the typical American public-school system in rural Virginia where we learned about Captain John Smith, Pocahontas, and Chief Powhatan. As far as I knew then, Native Americans were long gone, known only through the arrowheads I occasionally found, the television and movie depictions of cowboys and Indians, and the story of the first Thanksgiving. It was not until the early days of my career in the National Park Service that my contact with, and education by, Native American people began in earnest.

As the young park biologist at Crater Lake National Park, I would occasionally spot small offerings and prayer bundles tied into trees along the rim, signaling to me that the Klamath people were still practicing their connections to the earth spirits Llao and Skell. As the Chief of Resources at North Cascades National Park in Washington, I worked almost daily for three years with Skagit Tribal leaders to achieve fair mitigation for the impact to their traditional territories and damage to salmon runs from construction of three dams on the river that carried their name. These were my first lessons in the connections of Indigenous people and the lands now within the national parks.

In my first superintendency, at Craters of the Moon National Monument in Idaho, it struck me that, throughout our interpretive materials, we referred to the park's two types of lava as *a'a* and *pahoehoe*, terms in the language of Native Hawaiians. This seemed problematic since the Shoshone people would have witnessed the lava flows that had occurred every 2,000 years for the last 15,000 years. Surely, they had stories, perhaps even names for the lava fields that would be more culturally appropriate for staff interpretation. I reached out to the Shoshone Tribal council and asked for representatives to come to the park and spend some time with me and the staff. Several weeks later, three elder women came to the park, and I spent much of the day with them, taking them on a tour of the many sites. We walked the trails, and they told stories. But when I asked if they knew Shoshone terms for the lava, they said that as children, they had been removed from their families and sent to schools where, when they spoke their language, the teachers would wash out their mouths with soap. So, even though they thought there were names for the lava, they no longer knew them. This was my next lesson in the federal government's past effort to disassociate Indigenous people from their language and culture.

From Craters of the Moon, I moved to Wrangell St. Elias National Park and Preserve, a vast landscape and home to Native Alaskan people. In the establishment of these large parks and preserves under the Alaska National Interest Land Conservation Act of 1980, the United States Government tried to recognize, in statute, the relationship between Native Alaskans and these lands which had provided for them for thousands of years. As opposed to the parks of the lower 48 states, where Indigenous people had been removed, this was a new paradigm, and one I wholeheartedly embraced and supported.

As superintendent of Wrangell St. Elias, I made it a priority to check in regularly with the leadership of the Native Alaskans who have called this home for thousands of years. I had arranged a meeting with Roy Ewan, Native Alaskan elder and President of the Ahtna Corporation, the business side of the Indigenous people of the Copper River Region of Alaska. Accompanied by my park scientist, we explained that we would have to limit the subsistence hunt on a small caribou herd for a year because the wolves and bears had killed and consumed nearly all the young calves. Roy listened then said, "but the wolves got theirs, we need ours." In that simple reply, he revealed a world view that placed the needs of his people, not above or below, but on even ground with the wolf and the bear. This was my next lesson in how Indigenous people see themselves in nature.

In 1999, I became the superintendent of Mount Rainier National Park and soon learned of its traditional association with the Muckleshoot, Nisqually, Cowlitz, Yakama, Squaxin Island, and Puyallup peoples. I was deeply fortunate to have professionals like Greg Burtchard, Fred York and Stephanie Toothman as my guides as we began to build a relationship with the tribes, inviting them to return to their Mountain. Of particular interest to the tribes was the desire to be able to, once again, collect plant materials such as bear grass or spruce roots for traditional purposes. This was something that was perfectly legal in Alaska, but in National Parks of the lower 48 states was specifically illegal, codified in the Code of Federal Regulations. Mount Rainier had established an MOU to allow traditional plant gathering by the Nisqually Tribe, but it was being challenged by the environmental group Public Employees for Environmental Responsibility (PEER). While PEER was technically correct about the regulation, the prohibition ran counter to what I thought was fair and equitable to Indigenous people. Indigenous people had been practicing plant gathering activities on Mount Rainier for thousands of years and yet, we still found it met the quality standard for a National Park.

I tracked down the author of that regulation. He confided in me his opinion of the regulation; issues that he had to reconcile with another Tribe's tradition of plant gathering in another National Park. We vowed to change the regulation to permit this activity under an agreement such as we had between the Nisqually Indian Tribe and Mount Rainier National Park.

In 2002, I became the NPS Regional Director for the Pacific West Region, overseeing over 50 National Parks in Washington, Oregon, Idaho, Nevada, California, Hawaii and the Pacific Islands of Guam, Saipan and American Samoa. My education continued with smoke ceremonies with the Nez Perce; active participation (including wearing only a lavalava) in the traditional Hawaiian ceremony Hoʻokuʻikahi i Puʻukoholā; and in partnership with the Lower Elwha Klallam tribe to remove the two dams on the Elwha River in Olympic National Park. With support from other regional directors, I actively pushed for the regulatory change to the plant collecting prohibition, but was blocked repeatedly by entrenched resistance in Washington, D.C.

I suppose those who did not want the regulations to be changed never expected me to become the director of the National Park Service. I will not dwell on the sad narrative of why this took so long to complete, other than bureaucratic inertia and fear by the environmental groups that this was a slippery slope to eventually allow Indigenous people to hunt in the National Parks. PEER took this to a new level, unleashing direct attacks on me as Director, suggesting this proposal was a personal action, rather than a wrong that needed to be made right. Once confirmed by the Senate in 2009, I gathered the staff from the Regulations and Native American Liaison offices and directed them to get this regulation changed. I required them to report to me on progress and kept the pressure on. In July of 2016, fifteen years after I began this effort, the National Park Service published its final rule in the Title 36 Code of Federal Regulations, Part 2:

> The National Park Service is establishing a management framework to allow the gathering and removal of plants or plant parts by enrolled members of federally recognized Indian tribes for traditional purposes. The rule authorizes agreements between the National Park Service and federally recognized tribes that will facilitate the continuation of tribal cultural practices on lands within areas of the National Park System where those practices traditionally occurred, without causing a significant adverse impact to park resources or values. This rule respects those tribal cultural practices, furthers the government-to-government relationship between the United States and the tribes, and provides system-wide consistency for this aspect of National Park Service-tribal relations.

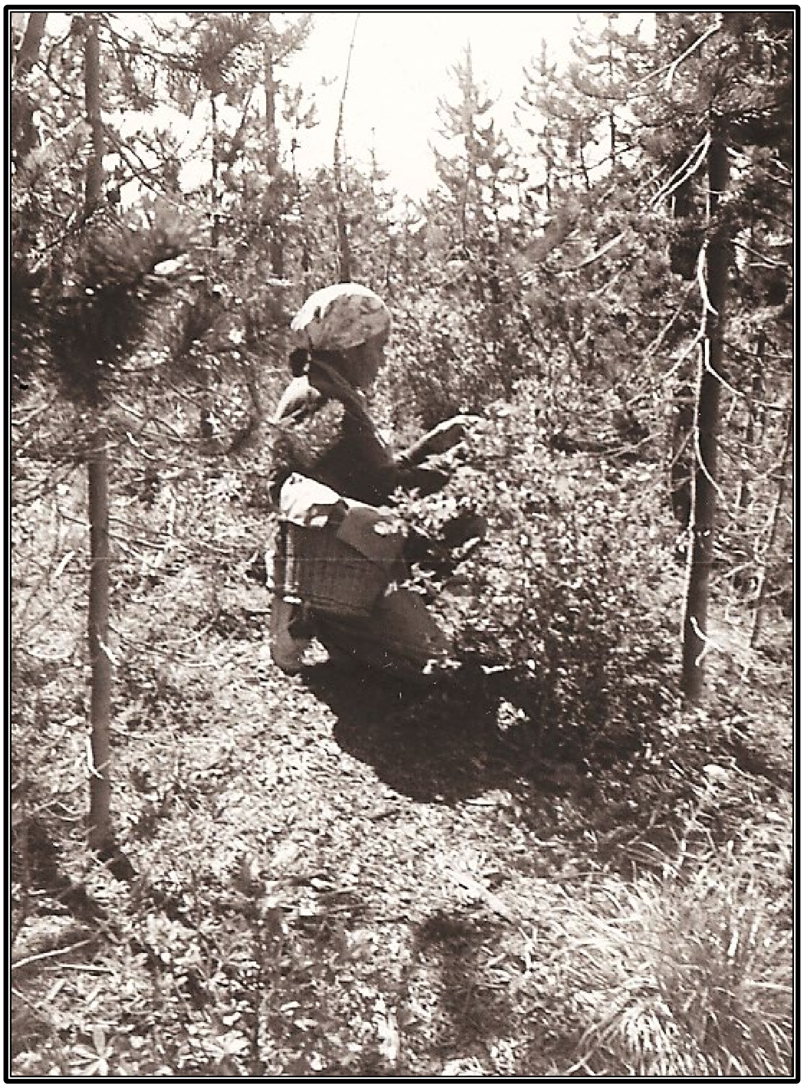
It is one of my proudest accomplishments from a 40-year career. One of many lessons I learned from Native people is to view time differently. Changing the regulation seemed to take forever, but in the view of those who have lived here for thousands of years, it was but the blink of an eye. This was my journey. I could not have completed it without the support of Native people met along the way, and by Greg Burtchard and others who share these values. Greg and his co-authors David Hooper and Arnie Peterson now extend that hand to you, the reader, to guide you to a deeper understanding and respect for those who see wolves and bears as fellow travelers.

Part I.

Understanding Long-term Indigenous Presence on Mount Rainier

by

Greg Burtchard



Alice Jackson Kalama Gathering Huckleberries and Beargrass in a Recovering Burn
Mt. Rainier Forest Reserve – Gifford Pinchot National Forest
(Photo courtesy Rick McClure and Cheryl Mack)

Chapter 1: Introduction to Indigenous Resource Use on Mount Rainier

Figure 1.1. *Takhóma Reflection.* Mount Rainier from Spray Park.
Subalpine parklands such as this are common between ca. 5,400 and 6,500 ft on Mount Rainier.
(Photograph by Greg Burtchard, August, 1995)

Despite long winters and deep snowpack, montane landscapes on Mount Rainier[1] support a variety of plant and animal communities during its summer through autumn seasons. Sandwiched between dense maritime forests below and persistent snowfields above, subalpine parklands and lower alpine tundra are habitats that support plant and animal populations particularly useful to Indigenous people. Indeed, for thousands of years, people came to these habitats to hunt such resources as mountain goats, elk, deer, bear, grouse, ptarmigan, and marmots;

[1] Known to Indigenous people by linguistic variants of *Takhóma*, the mountain was renamed *Mount Rainier* by Captain George Vancouver in 1792.

and to gather useful plants such as glacier and alpine lily bulbs, huckleberries, beargrass, Alaska yellow cedar, medicinal and fiber plants, and more (cf., Burtchard 1998:25-29; and 2009).

Even with dense forest canopy, lower elevation settings on Mount Rainier also provided resources important to Indigenous people. Taking advantage of disturbance events, some higher elevation plants and animals can also be found in more limited abundance at places lower on the mountain where forest cover has been suppressed temporarily by fire, landslides, and snow avalanches. Furthermore, the mountain's lower slopes and floodplains provide habitat well-suited for such economically useful species as western red cedar, devil's club, bracken fern, pipsissewa, elk, and deer. In years when snowpack is light and does not persist on the lower slopes, some of these resources can be accessed year-round.

Over the millennia, these seasonally abundant resources and the stunning beauty, and spiritual values of lands that eventually became Mount Rainier National Park, drew Indigenous groups residing on all sides of the mountain –from the moist Puget Sound lowlands on the west to the drier lands of the Columbia Plateau east of the Cascades. In their seasons, people visited the mountain for personal rejuvenation and for gathering food, medicines, and other materials of value to them. It is the long-standing traditional use of park lands as *hunting and gathering* grounds that is the primary focus of this book.

Expansion into the New World, Epidemic Diseases, Euro-American Expansion

Initial New World Colonization

Humans have inhabited North and South America for a very long time. While debate and refinement continue, most archaeologists believe that initial human entry into North America took place during the terminal Pleistocene epoch, associated with wasting of the Last Glacial Maximum between about 18,000 to 15,000 years ago. Existing evidence suggests that people in eastern Siberia moved east across then-dry shallow portions of the Bering Sea floor; migrating south via an ice-free corridor east of the Rockies and/or along exposed west-coast lowlands. Some argue for an even longer time-frame for human presence in the Americas. In any case, by about 15,000 years ago people were well established in North America. By 13,000 or so years ago, humans could be found throughout the entire Western Hemisphere from Bering Strait to Tierra del Fuego, and from Puget Sound to the Florida Keys.

As time progressed, human populations grew and expanded their presence widely throughout the hemisphere. They moved into such varied habitats as high-latitude tundra and boreal forests, temperate woodlands, tropical forests and savannas, mid-latitude prairies and semi-arid steppes, coastal and riverine margins, mountains, and more. As population density increased, so did organizational complexity as Indigenous societies adjusted to increasing demands on local resources. In some places, these processes contributed to development of socially, logistically, and architecturally complex systems such as those found in the Andes, Mayan Peninsula, central Mexico, southwestern United States, Mississippi and Eastern Woodlands, Pacific Northwest Coast, and more. In the process, most of these precontact[2] systems shifted from primary reliance on wide-ranging, mobile hunting and gathering economies, to more spatially constrained communities relying on agriculture, or some other form of mass-harvest and storage systems

[2] By *precontact* we refer to North and South American Indigenous social processes, archaeological sites, subsistence and settlement systems, and so on that took place prior to contact with European or Asian "old-world" people beginning in the late A.D. 1400s. The term is roughly synonymous with the term *prehistoric* used elsewhere.

capable of sustaining dense populations. In areas where reliable mass-harvest and storage techniques were not practical (e.g., deserts, extreme latitudes, and most mountainous areas), people tended to maintain sophisticated hunting and gathering systems coupled with social mechanisms adapted to sustaining resource abundance and perhaps limiting population density.

Expansion of Indigenous people throughout the Western Hemisphere, of course, included Pacific Northwest landscapes such as the Puget Sound lowlands, the Cascade Mountains, and Mount Rainier itself. Mount Rainier's archaeological record indicates human presence as early as 9,500 to 10,000 years ago, continuing, without apparent interruption, into the historic-period.[3] The record indicates primary focus on upper forest, subalpine, and low alpine habitats on all sides of the mountain where seasonally productive food, medicine, and material resources could be gathered and used by people residing in its vicinity.

Epidemic Diseases – The Great Dying

Human expansion throughout the hemisphere entered a period of abrupt retraction effectively beginning with the Columbus voyage of A.D. 1492, and exploration and colonization events that followed soon thereafter. After millennia of occupation and relatively unfettered use of habitats like those on and around Mount Rainier, Indigenous peoples and their long-established land-use practices were altered by fast-moving historical events beyond their control. Across North America, traditional Indigenous subsistence and settlement systems changed dramatically in the late 15th through 19th centuries; initially and most massively by abrupt population loss from epidemic diseases introduced by European explorers and colonizers (cf., Boyd 1975; 1990; and 1999; Ramenofsky 1987; Diamond 1999:197, 210-213; and others), and later by effects of the expanding new American nation.

In the Pacific Northwest, evidence of dramatic population loss from the effects of introduced diseases can be traced at least to the late 1700s (Boyd 1975; 1999). In May 1792, Captain George Vancouver sailed his flag-ship *Discovery* into what would later be called Puget Sound as part of his Pacific exploration mission; hoping, in part, to discover an inland water route across North America. Vancouver's observations were many, but among them were dire allusions to recent, massive, disease-related population loss. Noting deserted villages and cleared open spaces situated in close association with smaller temporary habitations along the Puget Sound shoreline "principally composed of crossed sticks covered with a few mats… [with] few surrounding neighbors," Vancouver (in Gibbs 1877:229-230) observed that

> …it may be somewhat premature to conclude that this delightful country has always been thus thinly inhabited; on the contrary, there are reasons to believe it has been *infinitely more populous* [emphasis added]. Each of the deserted villages was nearly, if not quite, equal to contain all the scattered inhabitants we saw [in 1792]… Not many years since, each of these vacant spaces might have been allotted to the habitations of different societies, and the variation observed in their extent might have been conformable to the size of each village, on the site of which, since their abdication or extermination, nothing but the smaller shrubs and plants had yet been able to rear their heads.
>
> In our different excursions, particularly those in the neighborhood of Port Discovery,[4] the skull, limbs, ribs, and back-bones, or some other vestiges of the human body, were found in many places promiscuously scattered about the beach in great numbers. Similar relics were also frequently met with during our survey in the boats; and

[3] Mount Rainier's archaeological, historical, and early ethnographic record is discussed more thoroughly in Chapter 2.
[4] Discovery Bay is situated on the south side of the Strait of Juan de Fuca between the present communities of Sequim and Port Townsend. Vancouver named the bay for his flagship.

> I was informed by the officers that, in their several perambulations, the like appearances had presented themselves so repeatedly and in such abundance as to produce an idea that the environs of Port Discovery were a general cemetery for the whole surrounding country. Notwithstanding these circumstances do not amount to a direct proof of the extensive population they indicate, yet, when combined with other appearances, they warranted an opinion that, *at no very remote period, this country had been far more populous than at present* [emphasis added]. …

Twelve years later, Lewis and Clark observed similar epidemic effects on local people as they returned up the lower Columbia River in the spring of 1806. When they entered *Nechocolee* –a 30 by 226 ft inhabited plank long-house and the ruins of several other large buildings near what is now Portland International Airport– they found it deserted. Elliot Coues (1893:925-927), in his edited edition of the expedition's history, noted:

> …On inquiring the cause of the decline of their village, an old man, the father of the guide, and a man of some distinction, brought forward a woman very much marked with the smallpox, saying that when a girl she was very near dying with the disorder which had left those marks, and that all the inhabitants of the houses now in ruins had fallen victims to the same disease. From the apparent age of the woman, connected with her size at the time of her illness, Captain Clark judged that the sickness must have been about 30 years ago, the period about which we have supposed that smallpox prevailed on the seacoast…

Assuming Clark's estimate was correct, and it clearly is consistent with Vancouver's 1792 observations, a compelling case can be made that smallpox (almost certainly occurring in association with other introduced contagious diseases) was present in the Pacific Northwest, in epidemic proportions, by at least 1775.

The most severe disease impacts persisted for almost a century. Hudson's Bay Company naturalist and surgeon William F. Tolmie (see Tolmie 1963; and this volume Chapter 2) describes continuing disease-related problems and discovery of newly abandoned villages up to about 1850. The region's earliest ethnographer, George Gibbs (1855; 1877; and this volume Chapter 2) also reported widespread devastation and inter-tribal population losses across the region. His estimates suggest population rebound (and hence, amelioration of the worst of the epidemic impacts) beginning sometime near 1865.

These observations are particularly important because they: 1) imply widespread occurrence of epidemic diseases, such as smallpox, very early in the historic-period; and 2) provide insight into the devastating impact of introduced diseases on aboriginal population density and lifeways –lifeways that were fully functional and supporting substantially higher populations than were seen by newly arriving colonizers in the mid to late 1800s.

National Expansion and Treaties

Devastating as epidemic diseases and associated social effects were, they were only the beginning of a series of fast-moving historical events that effectively separated Indigenous people from their previous lifeways. Vancouver, Lewis and Clark, and other late 18th and early 19th century expeditions were part of an expansion of European and American agricultural-industrial society across the continent. It was a process in which American and British interests and settlement continued to grow slowly through the first half of the 19th century. Hudson's Bay Company (HBC) was the most influential in the early days. HBC traded European products, including blankets and guns, for beaver pelts, salmon and other goods; altering traditional hunting patterns and creating a form of near-fort settlements that overlay traditional settlement patterns. Added to this were increasing numbers of missionaries, land-consuming settlers, and speculators.

The colonization process accelerated in the latter half of the century. In the 1850s and 1860s, Oregon became a state; Washington and Idaho became independent U.S. territories; and Indian treaties abrogated native claim to vast land areas, including Mount Rainier.

Still-functioning, if diminished, surviving Pacific Northwest Indigenous populations were poorly equipped to protect their interests within the emerging American nation-state. During the second half of the 19th century, Indigenous people were removed progressively further from established resource gathering territories by treaty restrictions, reservation-based resettlement, and land-consuming settlement and commerce associated with the rapidly expanding United States. Rather than gathering resources on traditionally used landscapes in traditionally accepted ways, people increasingly were forced to sustain themselves as adjunct members of the United States' market system; for the most part, adhering to laws and social patterns considered proper by that society rather than those deemed appropriate to their traditional systems only a few years earlier.

The United States promoted Indian treaties as part of the colonization process. Among other things, these treaties contained language that effectively separated Indigenous people from their previously extensive resource acquisition areas; fixed their geographic locations; and, in some cases, established the modern names of federally recognized tribes. Even so, the treaties contained clauses that provided for continuing access to fishery resources at accustomed locations, and to hunted and gathered terrestrial resources on open and unclaimed lands.

Consistent with his mission to diminish Indigenous land rights, Washington's territorial governor, Isaac Stevens, promoted most of the region's mid-1800s treaties. Three of the *Stevens Treaties* directly affected people residing in the vicinity of Mount Rainier. These include the *1854 Treaty of Medicine Creek* linked to current park-affiliated Nisqually (including the Meshal), Puyallup, Squaxin Island, and Muckleshoot tribes;[5] the *1855 Treaty of Point Elliott* which includes the Muckleshoot Tribe composed of Duwamish and Upper Puyallup people inhabiting the central Puget Sound;[6] and the *1855 Treaty with the Yakamas* involving the Yakama (including the Klikitat), and other tribes and bands east of the Cascades that collectively became the Confederated Tribes and Bands of the Yakama Nation.[7]

A fourth treaty was in the process of being prepared with the Cowlitz Indian Tribe (including the up-river Upper Cowlitz, or Taidnapam) occupying the southeastern flank of Mount Rainier. However, the American Civil War interrupted the process and the treaty was never ratified by Congress (Lane 2005). Initially, Cowlitz federal recognition also was withheld, but eventually confirmed in 2000 and reaffirmed in 2002. Figure 1.2 shows the basic array of the modern tribes noted above that are traditionally and presently associated with Mount Rainier National Park, as well as the distribution of ancestral precontact archaeological sites in relation to the mountain's major environmental zones.

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[5] The full signatory list included in the *1854 Treaty of Medicine Creek* includes the Nisqually, Puyallup, Steilacoom, Squawskin, S'Homamish, Stehchass, T'Peeksin, Squi-aitl, and Sa-heh-wamish tribes and bands occupying the lands lying round the head of the Puget Sound. [*Original treaty spellings throughout.*]
[6] Signatory to the *1855 Treaty of Point Elliot* are Dwamish, Suquamish, Sk-kahl-mish, Sam-ahmish, Smalh-kamish, Skope-ahmish, St-kah-mish, Snoqualmoo, Skai-wha-mish, N'Quentl-ma-mish, Sk-tah-le-jum, Stoluck-wha-mish, Sno-ho-mish, Skagit, Kik-i-allus, Swin-a-mish, Squin-ah-mish, Sah-ku-mehu, Noo-wha-ha, Nook-wa-chah-mish, Mee-see-qua-guilch, Cho-bah-ah-bish.
[7] The *1855 Treaty with the Yakama*, concluded at the Council of Walla Walla, was signed by representatives of Yakama, Palouse, Pisquouse, Wenatshapam, Klikatat, Klinquit, Kaw-was-say-ee, Li-ay-was, Skin-pah,, Wish-ham, Shyiks, Ochechotes, Kah-milt-pah, and Se-ap-cat confederated tribes and bands.

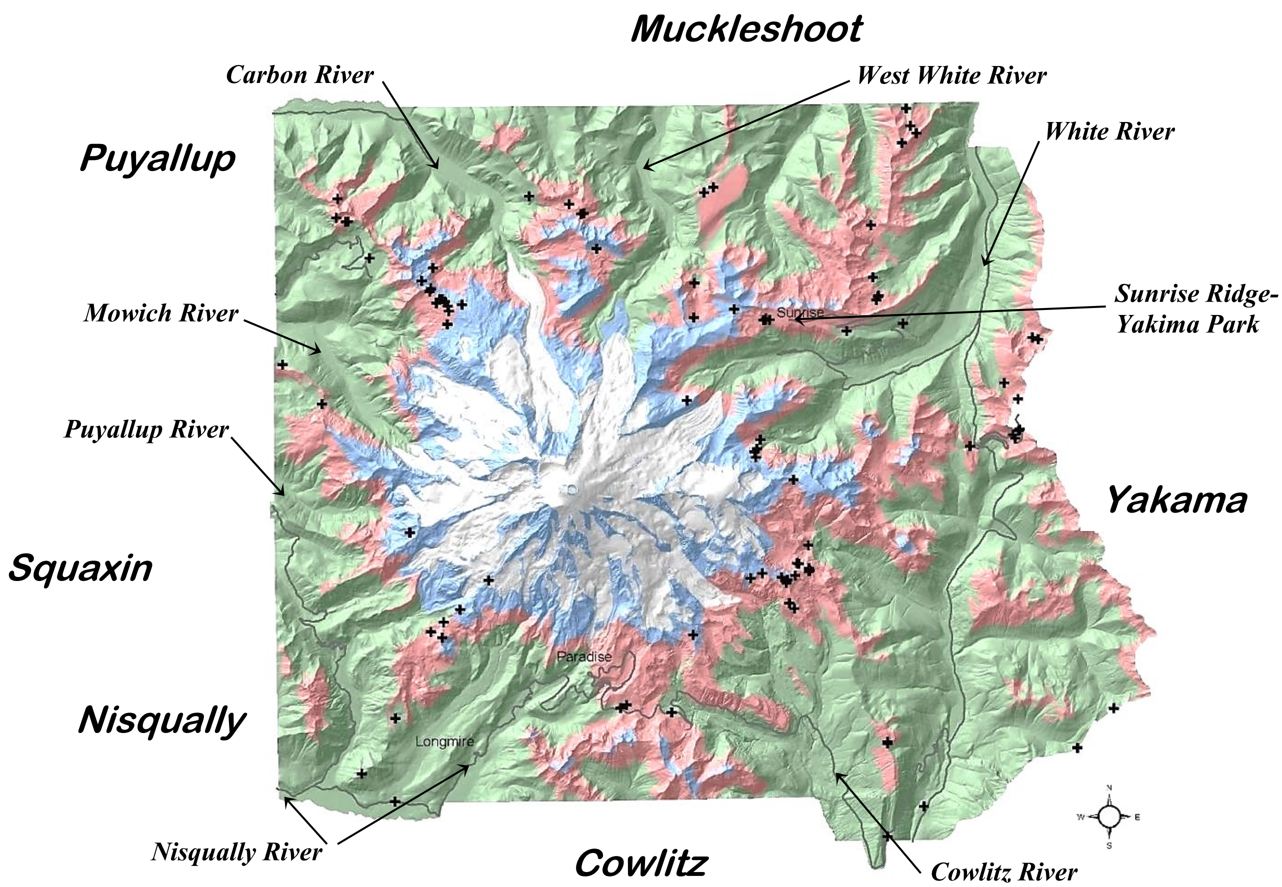


Figure 1.2. Mount Rainier Associated Tribes & Precontact Site Distribution Pattern. "+" indicates precontact archaeological sites. Maritime Forest Zone (green); Subalpine Zone (salmon); Alpine Zone (blue); Permanent Snowpack (white). Dark lines are modern roads. (Map showing current park boundaries adapted from Burtchard 2009c:6.)

Most elements of the Stevens Treaties diminished tribal territory and disrupted previous subsistence and settlement systems. That said, a single clause in each treaty provided for continued access to traditional fishery and terrestrial resources –*Article III* of the Treaty of Medicine Creek and the Treaty with the Yakama, and *Article V* of the Treaty of Point Elliott. Brief but powerful text included in Medicine Creek Treaty's *Article III* illustrates the continuing resource gathering provision. In slightly varying forms, it repeats in all Stevens Treaties. It reserves to tribal signatories:

> The right of taking fish, at all usual and accustomed grounds and stations, is further secured to said Indians in common with all citizens of the Territory, and of erecting temporary houses for the purpose of curing, together with the privilege of hunting, gathering roots and berries, and pasturing their horses on open and unclaimed lands: Provided, however, That they shall not take shellfish from any beds staked or cultivated by citizens, and that they shall alter all stallions not intended for breeding-horses, and shall keep up and confine the latter.

Because of its importance for hunting and plant gathering to traditional Indigenous subsistence practices, the reference to "open and unclaimed lands" in Article III warrants special mention. In the millennia prior to 1854 when the Medicine Creek Treaty was signed, Indigenous people had developed methods of recognizing land-use boundaries between different families, bands, and tribes. They also recognized their various responsibilities regarding resource uses and travel on and between them (cf., M. Smith 1944:23-32, A. Smith 2006:29-93, Burtchard 1998:135-155). The western notion of "open and unclaimed lands" had little meaning to the Indigenous signatories because, to them, the land was never truly "open" or "unclaimed" in the modern sense of those terms. Furthermore, national forests and national parks did not yet exist, so were not part of the understanding of *either* side. Differences in understanding associated with these terms continue to affect treaty interpretation to this day. But for a time, in accordance with Articles III and V, albeit with difficulty and conflict,[8] a semblance of traditional Indigenous lifeways continued on the rapidly shrinking reserve of unclaimed land in the Pacific Northwest.

Basic Indigenous subsistence patterns continued on off-reservation lands through the 1800s due, in large measure, to the expressly stated resource use provision included in the Stevens Treaties. Accordingly, traditional hunting and associated gathering practices continued in Mount Rainier National Park beyond its 1899 founding. Indeed, they continued until 1917 when park personnel intercepted and arrested a band of Yakama Indians hunting on Sunrise Ridge's Yakima Park under orders of the Superintendent of National Parks R.B. Marshall.[9] Traditional hunting practices have not been permitted at Mount Rainier since that time. Plant gathering activities continued, minus the hunting component, until prohibited by National Park Service (NPS) regulations in 1936.

Mount Rainier's Ethnography

Five of the six modern tribes shown on Figure 1.2 signed one or more of the three Stevens Treaties discussed above. These are the *Nisqually Indian Tribe*, the *Squaxin Island Tribe*, the *Puyallup Tribe of Indians*, the *Muckleshoot Indian Tribe*, and *Confederated Tribes and Bands of the Yakama Nation*. The sixth is the *Cowlitz Indian Tribe* for whom the treaty process was interrupted by the Civil War and never ratified. Treaty or no treaty, members of all six tribes routinely visited, used, and managed plant and animal resources on Mount Rainier when the National Park was established in 1899 and beyond. The most thorough published description of the relationship of these people with Mount Rainier National Park is an ethnographic report completed for the National Park Service in 1964 (A. Smith 1964) and published in 2006 (A. Smith 2006, *Takhoma, Ethnography of Mount Rainier National Park*).

In early1963, Washington State University (WSU) anthropology professor Allan H. Smith reviewed literary sources and interviewed Yakama, Nisqually and Muckleshoot elders regarding the importance and tribal uses of Mount Rainier National Park. As part of a combined project, Smith hoped his information would prove useful in guiding the park's first formal archaeological survey conducted later that year by his WSU colleague, Richard Daugherty.

[8] Conflict between the Territorial Militia and several Nisqually-Puyallup bands, in concert with other tribal people, soon erupted over perceived injustices in the Treaty of Medicine Creek. Sometimes called the Puget Sound Treaty War of 1855-1856, the conflict eventually ended with capture of two of the principal Nisqually leaders –Quiemuth, who was assassinated en route to Fort Steilacoom, and his brother, Leschi, who was twice tried under orders of Governor Stevens and hung in 1858 over the objection of the U.S. Military at Fort Steilacoom. Leschi was exonerated by an Historical Court of Inquiry in 2004 (cf., Wilkinson 2000:10-18; Carpenter 2002:170-172).

[9] Issues surrounding formal termination of tribal hunting in Mount Rainier National Park between 1915 and 1917 are discussed in greater detail in Chapter 3 of this document.

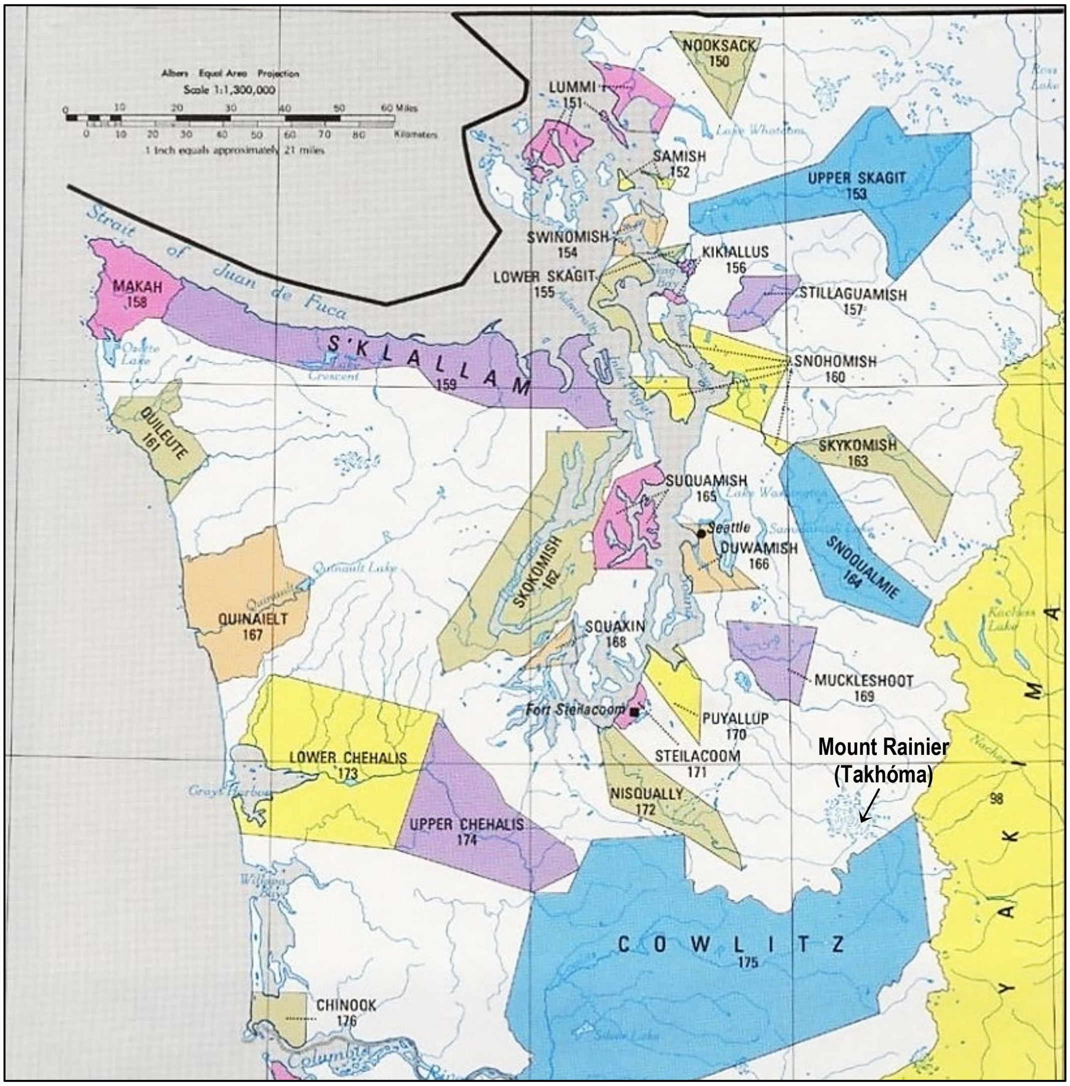
Far briefer than Smith's work, Daugherty submitted his *Archaeological Survey of Mount Rainier National Park* at the conclusion of his field survey in 1963. Smith submitted his report the following year as a typescript monograph titled *Ethnographic Guide to the Archaeology of Mt. Rainier National Park* (A. Smith 1964). Even though Daugherty and crew documented only two precontact archaeological properties at the time, the combined effort was one of the first of its kind; ultimately resulting in the most complete available ethnography devoted directly to Native American use of Mount Rainier National Park. As will be seen, Daugherty's two documented precontact sites proved to be harbingers of an exponentially larger number discovered later when the National Park Service began more intensive surveys in the mid-1990s.

Allan Smith's ethnographic report lingered in park archives with minimal distribution until it was edited and published posthumously in 2006 as *Takhoma, Ethnography of Mount Rainier National Park*. In it, Smith considers the role played by the mountain in regard to people who lived along lowland rivers originating on its slopes. Smith's (2006:10-11) basic premises were: (a) that the mountainous terrain of present-day Mount Rainier National Park was known and familiar to native Indian groups and was visited and used by them; (b) that the park area may have been claimed, in large or small segments, by as many as six aboriginal groups; and (c) that additional ethnographic and literary information (including his own) could establish aboriginal use patterns more definitively.

Smith (2006:167) subsequently restated his objective more directly "to determine by ethnographic and related techniques the extent to which the resources of the forests, ridges, alpine parks, and rocky crags of Mount Rainier National Park were known and utilized by aboriginal groups [*in the precontact past*]." This objective guided informant interviews with Yakama, Muckleshoot, and Nisqually tribal elders as well as his review of then-available literature related to Indigenous use of the mountain. Smith's book *Takhoma* reports his techniques and findings in a series of chapters devoted to: native toponymy (Indigenous place-names) as they relate to Mount Rainier and its vicinity; intra and inter-tribal identities and boundaries relevant to the mountain and surrounding region; then-known village sites on and in the immediate vicinity of Mount Rainier; economic value of Mount Rainier to Indigenous people in its immediate vicinity; and trails, travel and trade in the vicinity of the mountain.

Relying on data presented in the body of his ethnography, Smith (2006:167-176) concludes that during the proto-historic and early historic-periods, various tribes claimed portions of Mount Rainier and the present park area in which it is located –the Yakama, Upper Cowlitz [Taidnapam], Nisqually [including the Meshal], Puyallup, and Muckleshoot. These, plus the Squaxin Island Tribe, co-signatory to the 1854 Treaty of Medicine Creek, represent the six tribes with which Mount Rainier National Park maintains active relationships at the time of writing.

Figure 1.3 is a broader projection of western Washington tribes showing their general distribution relative to Mount Rainier National Park. We include the map to illustrate the general spatial relationship of Mount Rainier's six currently associated tribes among the wider array of named Pacific Northwest tribal groups as they appeared in the mid to late 20th century. It is important to recognize, however, that these boundaries *do not* reflect the much smaller size of Stevens Treaty reservations*; nor do they* reflect substantially broader land-use patterns that extended far more widely across the region in precontact and early historic-period times.



-**Figure 1.3. 1978 Judicially Established Indian Land Areas in the Pacific Northwest.**
(U.S. Geological Survey 1978)

Based on informant interviews, Smith concluded that several plant and animal resources were the primary economic drivers underlying repeated use of Mount Rainier during the precontact and historic-periods. Among these, he believed that huckleberries (*Vaccinium* spp.), which could be dried as an over-winter staple, constituted the primary attraction. He also recognized the value of beargrass (*Xerophyllum tenax*) for weaving, white bark pine nuts (*Pinus albicaulis*) for food, and at least one medicinal plant known to the Yakama as "a'i*v*n" (possibly *Claytonia* sp., or Gray's lovage, *Ligusticum grayi*), known to have been collected as a medicinal plant. While Smith saw hunting as secondary to huckleberry gathering (at least during the historic-period known to his informants), he also recognized that gathering and hunting were part of a unified process that maximized return for time and effort spent. In that regard, he suggested that the primary hunted resources sought during precontact and historic-period times included mountain goat (*Oreamnos americanus*), Columbian black-tailed deer (*Odocoileus hemionus columbianus*), elk (*Cervus canadensis*), black bear (*Ursus americanus*), hoary marmot (*Marmota caligata*), mountain beaver (*Aplodontia rufa*), and sooty grouse (*Dendragapus fuliginosus*).

Smith hoped his information would serve to guide acquisition of future archaeological data relevant to his conclusions. Unfortunately, he did not live long enough to witness accumulation of an archaeological record demonstrating how profoundly, and for such a long time-depth, his conclusions proved to be correct.[10]

Revived Interest in Traditional Plant Gathering

Traditional Indigenous hunting practices were curtailed abruptly in Mount Rainier National Park in 1917 when park staff arrested and expelled a party of Yakama tribal members hunting on Sunrise Ridge/Yakima Park. Since that time, Mount Rainier National Park, and the National Park Service (NPS) generally, have prohibited hunting by Indigenous people on park lands regardless of treaty status or traditional association. On Mount Rainier, traditional plant gathering continued until it too was prohibited consistent with NPS regulations published in 1936.

The movement toward liberalizing plant gathering regulations affecting Indigenous people on NPS administered lands gained momentum at Mount Rainier National Park and a few other parks in the late 1990s and early 2000s. Especially important in this regard was implementation of a 1998 Memorandum of Understanding between the NPS and the Nisqually Indian Tribe –a traditionally associated Medicine Creek Treaty tribe located along the lower Nisqually River and Nisqually Delta west of the park. Noting dwindling availability of certain plant materials due to urban expansion, the tribe sought to harvest a suite of traditionally used plants within park boundaries. The completed MOU was intended, in part, to alleviate the availability problem. Notably, it also re-established a bit of the traditional connection between the tribe and the mountain that had diminished during the 19th and early 20th centuries.

In essence, the 1998 Nisqually-Mount Rainier MOU permitted gathering, by the Nisqually Tribe, of limited amounts of plant materials from 11 plant species found on protected park lands. It was a permit-based program administered by the tribe and subject to annual park/tribe evaluation, modification, and renewal. We discuss the Nisqually-Mount Rainier MOU more thoroughly in subsequent chapters and include a copy of the original as Appendix A to this report. As will be seen, the character of the agreement soon shifted from a straight-forward plant gathering MOU to a cooperative traditional plant gathering research project.

Within a few years of its signing, several other associated tribes requested plant gathering agreements similar to the Nisqually-Mount Rainier MOU.[11] These requests were followed by statements of concerned opposition by environmentally-oriented groups –principally Public Employees for Environmental Responsibility (PEER). It was in this time of reassertion of tribal rights and traditional activities, that Mount Rainier National Park and the Nisqually Indian Tribe initiated the traditional plant gathering research reported here. Under terms of an annually-renewed research permit accompanied by appropriate National Environmental Policy (NEPA) documentation, the study addressed such issues as 1) what traditional plant gathering means; 2) how it is conducted at Mount Rainier; and 3) what effects might be expected for plants and associated habitats if continued over the long-term. The research was conducted in anticipation of

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[10] In the years since Smith's 1963 study, NPS archaeologists have identified over 120 precontact archaeological localities in Mount Rainier National Park –the number rising nearly every year. Testing at rockshelter site 45PI0043, identified by the archaeological survey that followed Smith's study, produced traces of mountain goat, mountain beaver, marmot, hazelnut shells (*Corylus cornuta*) and red elderberry seeds (*Sambucus* cf., *racemosa*) (Lubinski and Burtchard 2005; cf., Daugherty 1963; Rice 1965).

[11] These were the Muckleshoot Indian Tribe, the Puyallup Tribe of Indians, and the Cowlitz Indian Tribe.

modifications of park and/or NPS regulations to reestablish plant gathering privileges to tribes traditionally associated with Mount Rainier and other National Parks throughout the country.

Those changes finally arrived in 2016. Modifications to the Code of Federal Regulations (CFR) enacted that year allow plant gathering on National Park Service administered lands by members of Federally recognized Indigenous tribes with a traditional association with the park area under a written plant gathering agreement, provided such activities would not impair park resources and would not have a significant impact on the human environment.[12] The research reported in Part II of this book addresses the impairment issue by evaluating ecological effects of traditional Nisqually plant gathering practices on Mount Rainier. Combined with historical background provided in Part I, we believe the study improves our understanding of 1) how long, and in what manner, Indigenous people used plant and animal resources on and around Mount Rainier; 2) how traditional plant gathering practices were developed and how they function to sustain plant vitality; 3) how these practices have been carried out at Mount Rainier National Park; 4) what effects they have had on harvested plants and associated plant communities; and 5) how traditional plant gathering practices might be renewed in a manner that prevents impairment of park resources over the long-term.

Report Organization

This introductory chapter has emphasized the long-standing relationship between Indigenous people and the landscapes and habitats that are now a part of Mount Rainier National Park, the Pacific Northwest, and beyond. It has addressed expansion of Indigenous populations, and associated subsistence and settlement systems throughout the Western Hemisphere; the effects of severe population loss on Indigenous societies due to epidemic diseases; the impacts of Indian Treaties and continuing Euro-American expansion into the Pacific Northwest; and the loss of traditional hunting and gathering options that resulted from these events. It also has introduced Mount Rainier's culturally associated Indigenous tribes and the recently renewed interest in traditional plant gathering practices in Mount Rainier National Park.

Chapter 2 establishes the long-standing relationship between Indigenous people and Mount Rainier; emphasizing the importance of seasonally available plant and animal resources it provides. It begins with a consideration of Mount Rainier's archaeological record which indicates that people traveled regularly to the mountain for thousands of years continuing even beyond the periods of population loss and Euro-American incursion noted above. The chapter then presents summaries of early exploration, ethnographic, and historical climbing accounts from 1792 through 1899 to demonstrate how the mountain fit into traditional land-use patterns, and how these patterns changed as the region filled with non-Indigenous settlers.

Chapter 3 considers changing Indigenous presence and land-use practices following the 1899 founding of Mount Rainier National Park. Prominent among these are loss of hunting and gathering privileges in the early to mid-1900s, followed by an extended period of minimal overt involvement with park landscapes, to renewed interest in establishing a working relationship with the park and reestablishing traditional gathering practices regarding plant resources found there.

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[12] 36 CFR §2.6 –G*athering of plants or plant parts by federally recognized Indian tribes*– enacted in 2016 is discussed further in Chapter 9. The NPS Establishment Act of 1916 (39 Stat. 535; 16 U.S.C. §1 et seq.), as amended, mandates that park resources must be maintained in a manner that will "leave them unimpaired for the enjoyment of future generations." The National Environmental Policy Act (42 U.S.C. §4321 et seq.) requires federal agencies to assess the environmental effects of their proposed actions prior to making decisions.

Chapter 4 discusses more thoroughly Mount Rainier National Park's plant gathering MOU and research conducted cooperatively with the Nisqually Indian Tribe –one of six tribes presently recognized as traditionally associated with park lands. In it, we address the issue of why traditional plant gathering practices tend to be conservative in nature; origins of the original Nisqually-Mount Rainier plant gathering memorandum of understanding (MOU); formal objections to the MOU; initiation of ethnographic and joint Nisqually-Mount Rainier field research to better understand the effects of traditional plant gathering practices; and initiation of National Park Service changes to the Federal Code of Regulations that authorized resumption of limited traditional plant gathering activities.

Chapters 5, 6, and 7 focus on multiple years of traditional plant gathering research on three plant species harvested in the traditional manner by Nisqually tribal members in Mount Rainier National Park. All three chapters address plant natural history and ethnobotany; traditional harvesting practices; plant and plant collection monitoring procedures and results; and long-term sustainability of observed harvesting practices. Chapter 5 focuses exclusively on beargrass used principally for basketry and clothing. Chapter 6 discusses pipsissewa, or prince's pine, used primarily as a rejuvenating tonic. Chapter 7 presents research observations and recommendations regarding western red cedar, the inner bark of which is used for cordage, basketry, mats, and water repellent clothing.

Regarding these field studies, it will become clear that the authors have concerns about the effects of such issues as small sample sizes, natural variability across observation units, difficulty in maintaining consistent layout of those units, year to year variation in monitoring effectiveness, and statistical sensitivity due to the interplay of these factors. Nonetheless, we pursued the studies to the best of our ability, and describe them in detail, because we believe they provide insight into possible harvest effects, best potential harvest and management strategies, and a pathway forward to reinstating traditional plant gathering activities in a manner that recognizes the NPS obligation to maintain plant and animal communities in perpetuity. In all cases, we have striven to analyze results fairly and, in light of observation difficulties, offer conservative recommendations that we believe will sustain plant populations while recognizing the rights of affiliated tribal people to gather traditionally used plants in their traditional manner.

In Chapter 8, we isolate the common theme that unites traditional gathering practices in regard to the three plant species observed during the present study. We then employ that insight to develop recommendations for sustainable harvest of a wider range of plant species found in the park –plants for which there may, or may not, be surviving ethnographic links to the precontact past. While the list does not exhaust the range of plants traditionally gathered on the mountain, it provides insight into tailoring traditional gathering techniques to fit the biological requirements of a wider array of plants than we consider here and do so in a manner that will sustain plant and habitat vitality over the long-term.

Chapter 9 concludes the report with a consideration of foundations of the original 1998 Nisqually-Mount Rainier plant gathering MOU; components of the 2016 addition to the Federal Code of Regulations intended to provide clear legal authority by which to permit environmentally conservative plant gathering activities on National Park Service administered lands; and a brief review of the document as a whole. In the end, we hope our efforts will encourage tribes and parks to work together to strike a balance that provides for continuation of traditional Indigenous plant gathering practices while remaining consistent with NPS mandates to administer park lands and resources in a manner that maintains them unimpaired for generations to come.

Chapter 2: Indigenous People and Mount Rainier; The Beginning

...no legends ...explain how Indian people came to the North American continent or from whence they came. When the elders have been asked how and when they came to this continent, they have replied, "It really doesn't matter, we have always been here and we are still here." Cecelia Svinth Carpenter, Squalli-absch, 2002[13]

In a sense, Cecelia Carpenter and the elders have it right. Even though we have outlined what we believe to be the most probable scenario for human emigration into the Western Hemisphere, the important thing to understand is that Indigenous people have been here for a very long time –essentially *time beyond memory*. It is important to know this to fully appreciate the breadth of time that people have had to adjust to the many and varied environments that characterize the continent generally and the Pacific Northwest region specifically. It is equally important to understand that, during this time, people were fully capable of developing social systems fit to the environmental constraints of the regions in which they lived –systems with prescribed modes of behavior that, on balance, helped people sustain themselves successfully through time. Finally, it is important to know that people are not newcomers to Takhóma-Mount Rainier. Indigenous people using the mountain had ample time to develop strategies to use and distribute resources as needed, and to develop social mechanisms that reinforced behaviors serving to preserve and perpetuate long-term availability of those resources –the traditional hunting and gathering practices discussed throughout this volume.

In this chapter, we provide archaeological, ethnographic, and historical background to long-term Indigenous use of Takhóma and its surrounding region. We begin with the mountain's archaeological record that documents over 9,500 years of Indigenous use of its forested and upper elevation landscapes. The second section contains early exploration and ethnographic accounts from Vancouver's initial entry into Puget Sound in 1792 to the immediate post-treaty days of the 1850s and 1860s. These early historical accounts, we believe, are critical to understanding such issues as historic-period tribal distribution and subsistence patterns; the impact of introduced diseases on traditional land-use patterns; the origin of treaty-reserved fishing, hunting, and gathering rights; and the role of the mountain in tribal life. The third section summarizes mountain climbing, exploration, and tourist development accounts from 1852 to 1883 when completion of the Northern Pacific Railway dramatically accelerated settlement in the Pacific Northwest; heightening interference with long-standing Indigenous land-use systems. The fourth section documents further increase in non-Indigenous presence on Mount Rainier from the early1880s to Mount Rainier National Park's founding in 1899 to help understand continued Indigenous presence in the face of intense competitive uses of the mountain. A brief summary concludes the chapter.

[13] Citation from *The Nisqually, My People; The Traditional and Transitional History of the Nisqually Indian People* (Carpenter 2002:3). In *Images of America; Nisqually Indian Tribe,* Carpenter et al. (2006:7) note that the term approximately pronounced "Squalli-absch" in English (sq̓ʷaliʔabš in the Lushootseed dialect) is the traditional name for the Nisqually people, "the People of the Grass Country, the People of the River."

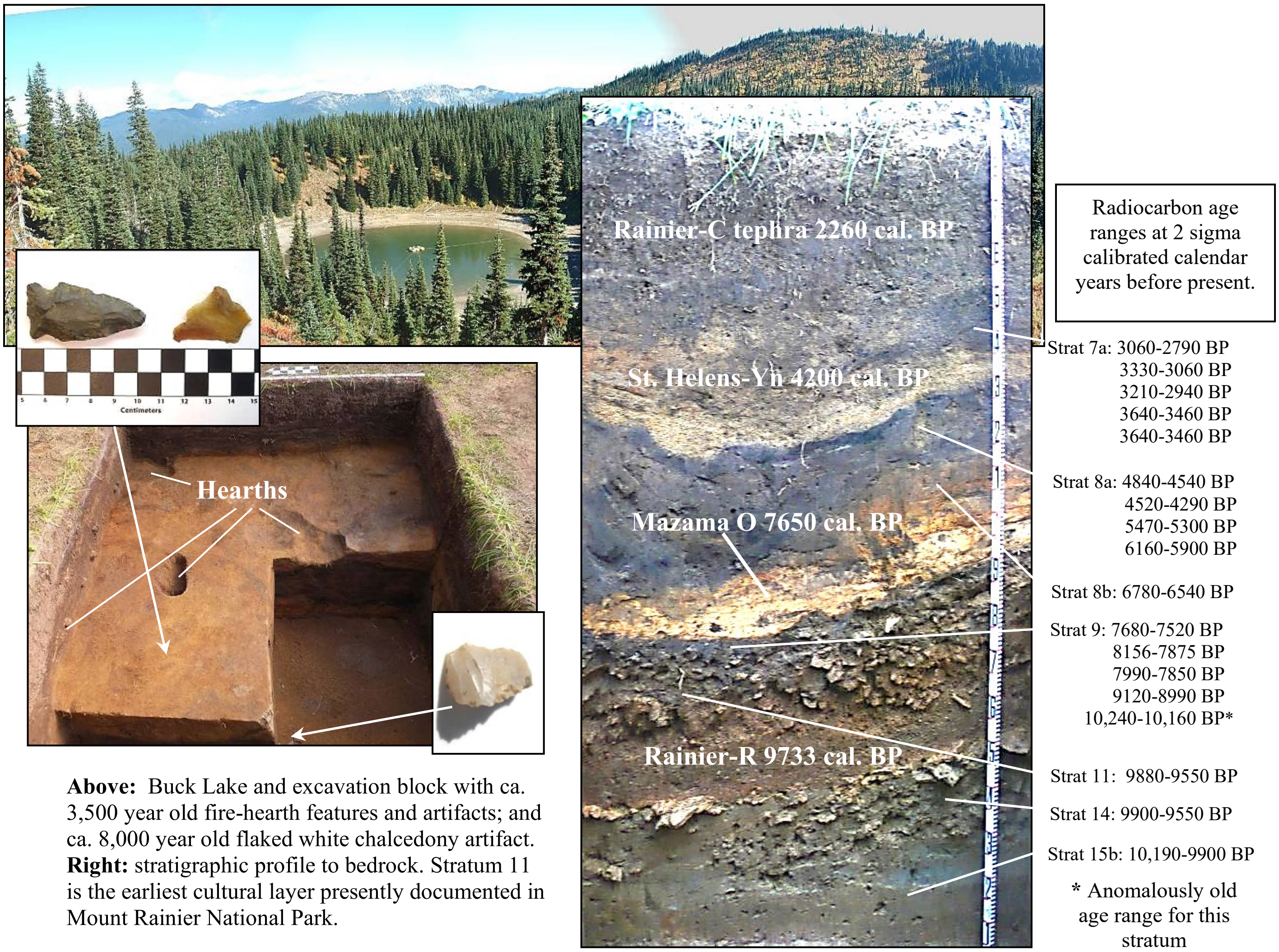
Indigenous Presence on Mount Rainier – The Archaeological Record

Human use of montane landscapes in the Pacific Northwest began early in the Holocene epoch. A substantial body of archaeological data attests to human presence on Mount Rainier and in Pacific Northwest mountains beginning over 9,500 years ago. Accumulating evidence indicates that not only were mountains incorporated into local subsistence and settlement systems at a very early date, montane land-use practices were widespread across the Washington Cascades, the Olympic Peninsula, and beyond (cf., Schalk 1988; Mierendorf 2009a; and 2009b; Mierendorf and Baldwin 2015; Mierendorf and Foit 2018; Mack, Chatters and Prentiss 2010; Burtchard 2007; and 2009a).

On Mount Rainier, radiocarbon-dated charcoal recovered below cultural deposits at Buck Lake archaeological site (45PI0438) situated at 5,400 ft on the mountain's northeastern slope suggest that much of the mountain's Pleistocene glacial ice mass had retreated by about 10,000 years ago[14] (Burtchard 2009b). Michael Hekkers, a Portland State University Geography Department graduate student, developed a glacial model for Mount Rainier that predicted an even earlier glacial minimum as early as 11,150 years ago (Hekkers 2010:65-89). In any case, it is clear that Pleistocene glacial ice retreated from Mount Rainier's mid-elevation landscapes in the very early Holocene. Loss of permanent ice permitted the establishment of plant and animal communities which, in turn, facilitated appearance of mobile human hunting and gathering populations (cf., Walsh et al. 2017). Composite Figure 2.1 shows Buck Lake, an excavation block with fire-hearth features, the site's intact stratigraphic layers, and its early through mid-Holocene radiocarbon date sequence. While not shown, chipped-stone tool-remains and other artifacts continue to the site surface; suggesting continuous seasonal use into late precontact times.[15]

The Buck Lake site, a seasonally used residential base camp (Burtchard 1998:112-113), was of key importance in establishing the time at which Indigenous people first began using Mount Rainier on a regular basis. Test excavations conducted from 2004 through 2009 in partnership with the nearby Muckleshoot Indian Tribe and International Archaeological Research Institute Inc. (office in Honolulu) establish a continuous sequence of cultural deposits sandwiched between intact, well-dated, volcanic tephra layers. The oldest Buck Lake artifacts consist of a bifacially worked chalcedony tool, chipped-stone tool debris, and bird gastroliths in a carbon-rich deposit *below* a volcanic ash layer from the eruption of Mount Mazama (Crater Lake) in southwest Oregon about 7,500 years ago. A series of four radiocarbon dates extracted from that pre-Mazama layer place it (and the artifacts it contains) between 9,120 and 7,520 years old. Further analysis suggests that an earlier stratigraphic layer dated to between 9,880 and 9,550 years ago also is cultural in origin (see Figure 2.1). At present, we believe the earlier 9,880 to 9,550 range best estimates the maximum age of the site. In any case, the Buck Lake site clearly demonstrates long-term human presence in mid-upper elevation context on Mount Rainier.

[14] Radiocarbon ages in this report are expressed in calibrated calendar years before present (cal. years BP). Most radiocarbon analyses and calibrations presented in this report were completed by Beta Analytic, Incorporated. Coral Gables, Florida.
[15] Because of heavy winter snow load at this elevation on Mount Rainier, we assume that most use of Buck Lake, and indeed use of all mid to upper elevation sites on the mountain was limited predominately to the late spring through mid-autumn warm season.



Above: Buck Lake and excavation block with ca. 3,500 year old fire-hearth features and artifacts; and ca. 8,000 year old flaked white chalcedony artifact. **Right:** stratigraphic profile to bedrock. Stratum 11 is the earliest cultural layer presently documented in Mount Rainier National Park.

Figure 2.1. Buck Lake, Test Excavation Block, and Stratigraphic Profile.
Mount Rainier (MR), Mount Saint Helens (MSH), and Mazama volcanic tephra layers separate cultural deposits.

Buck Lake is not the only early Holocene site on Mount Rainier. Radiocarbon and stratigraphically dated chipped-stone tool remains at Forgotten Creek site 45PI429 situated at 4,200 ft on the southwestern side of the mountain establish human presence at about 8,000 years ago or earlier (Burtchard 2011; Ferry 2015:10-11). In addition, recent research conducted by the senior author and park archaeologist Benjamin Diaz at the ca. 2,000 ft Ohanapecosh site complex on the mountain's southeastern slope also indicate human use by about 8000 years ago.

South of the park, cultural remains recovered from Beech Creek Site 45LE415 suggest human presence in the area as early as 9,000 years ago (Mack, Chatters, and Prentiss 2010). Furthermore, artifacts recovered in stratigraphic context at Cascade Pass in the North Cascades National Park Complex establish human presence in Pacific Northwest mountains over 9,000 years ago (Mierendorf 2009a; Mierendorf and Foit 2018). It is important to recognize that these sites and dates are among a growing number that 1) establish early Holocene onset of human activity on Mount Rainier; and 2) indicate early widespread use of Mount Rainier, and other

Pacific Northwest montane landscapes in general. Figure 2.2 shows the general location of early Holocene sites on, or near, Mount Rainier (in red) as well as the broader suite of precontact archaeological properties of various ages (green dots) documented in Mount Rainier National Park through 2015 –a count and distribution pattern that grows larger nearly every year.[16]

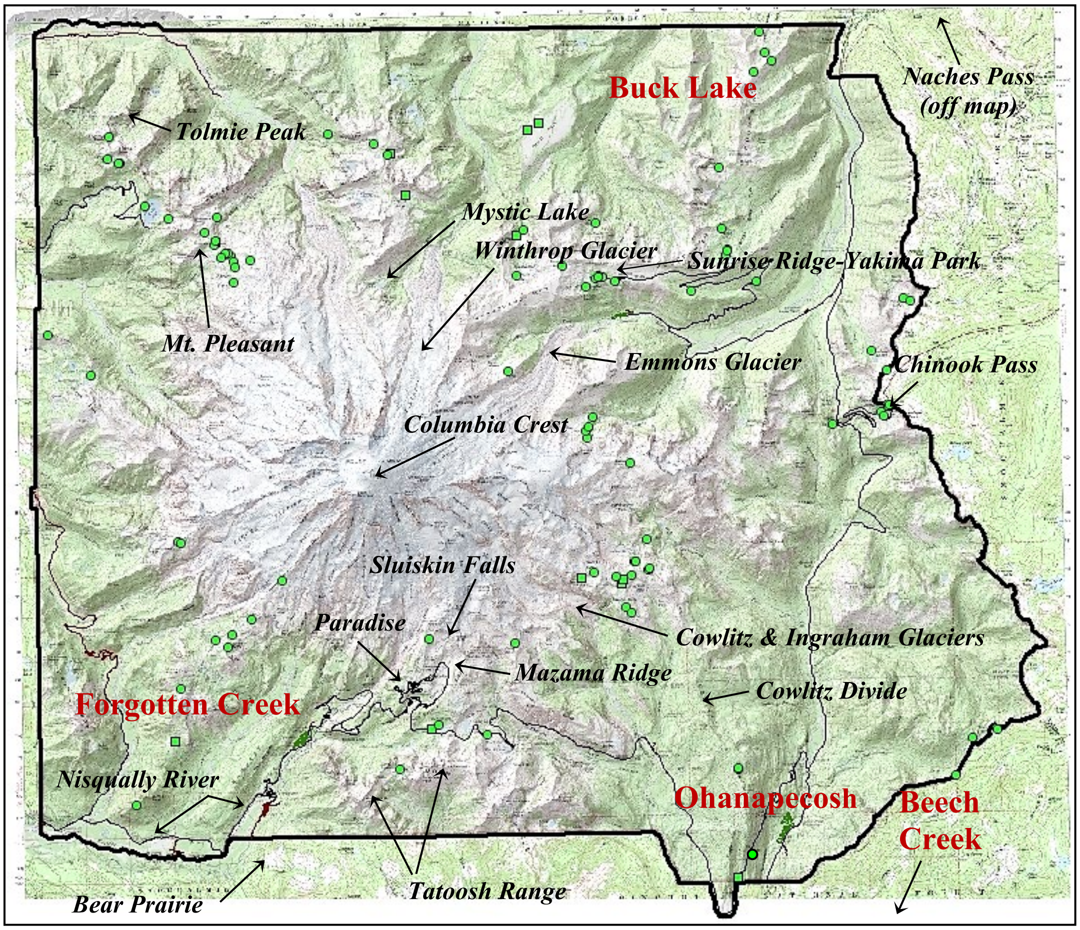


Figure 2.2. Mount Rainier Geographic Features and Early Holocene Archaeological Sites. Approximate locations of earliest known archaeological locations are labeled in red. The Beech Creek Site is located near Packwood, WA. Green dots show the general distribution of documented precontact sites. Italics indicate places discussed in historical accounts that follow.

The Early Historic-period: Colonization and Ethnographic Accounts

Indigenous use of Takhóma/Mount Rainier is not limited to the early through late Holocene archaeological record. Routine use of park landscapes and plant and animal resources, beginning over 9,500 years ago, continued into the early 20th century despite dramatic disease-related population losses of the 18th to mid-19th centuries. Allusions to Indigenous people on and around Takhóma can be seen in an assortment of exploration, ethnographic, and climbing

[16] For additional consideration of archaeology and long-term land-use patterns as they pertain to Mount Rainier see *Mount Rainier Sites* (Burtchard 2009a), and *Holocene Subsistence and Settlement Patterns: Mount Rainier and the Montane Pacific Northwest* (Burtchard 2009c).

accounts. Below, we summarize basic elements of notable historical accounts as they pertain to early historic-period use of Mount Rainier and nearby Pacific Northwest landscapes.[17]

George Vancouver, Puget Sound Explorations: 1792

Midshipman George Vancouver accompanied Captain James Cook on his second and third exploratory voyages to the Pacific between 1772 and 1780. In 1778, during the third Cook voyage, the expedition discovered and charted the Hawaiian Islands, traveled up the northwest coast of North America through the Bering Strait to the northern coasts of Alaska and Siberia, and returned to Hawaii where Cook was killed during a skirmish at Kealakekua Bay in February, 1779.

In 1791, Captain George Vancouver was given command of another expedition charged with exploring the Pacific –an expedition that included explorations of the northwest coast of North America. In early May 1792, Vancouver entered Puget Sound in his command ship *Discovery* hoping, in part, to discover a navigable inland waterway across the continent. On May 8, the crew first observed the huge mountain (Takhóma) that dominated the inland landscape from a point near the present city of Port Townsend (Morgan 1979:8). Unaware of, or disregarding, the Indigenous name for the mountain, Vancouver renamed the peak *Mount Rainier* after his friend British Admiral Peter Rainier. In general, linguistic variations of Takhóma continued to be used by Indigenous people throughout the region.

Anchoring *Discovery* in deep water south of Bainbridge Island to await arrival of its consort ship *Chatham*, Vancouver assigned Second Lieutenant Peter Puget and Master Joseph Whidbey to explore the sound and its inlets for a potentially navigable cross-continental waterway in the ship's more maneuverable and shallower-draft launch and cutter longboats. Accompanying Puget and Whidbey was botanist Archibald Menzies. Probably looking southeast across Dalco Passage south of Vashon Island toward Commencement Bay, Menzies (in Murray 1979:8) described Mount Rainier as:

> A most charming prospect [that] appeared close to us though at least 10 to 12 leagues off. The low land at the head of the Bay swelled out very gradually to form a most beautiful and Majestic Mountain of great elevation whose line of ascent appeared equally smooth & gradual on every side with a round obtuse summit covered two thirds of its height down with perpetual Snow as were also the summits of a rugged ridge of Mountains [the Cascades] that proceeded from it to the Northward.

From this location, or one near to it, expedition illustrator J. Sykes sketched what we believe to be the first illustration of Mount Rainier shown in Figure 2.3. The locations of Dalco Passage and Commencement Bay can be seen on the map in Figure 2.4.

During their time in Puget Sound, Vancouver expedition members observed and interacted routinely with Indigenous people, including Puyallup-Nisqually people, encountered digging clams just inside the eastern entrance to Wollochet Bay southwest of Tacoma Narrows (Murray 1979:9). They also observed profuse human skeletal remains and abandoned villages that they attributed to catastrophic effects of epidemic diseases only a few years prior (see Chapter 1). Even though they did not explore inland terrain near Mount Rainier directly, their observations provide a base-line account of Indigenous life in and around the Sound as it appeared in the late 18th century.

[17] We focus on accounts that we believe are most directly relevant to Indigenous presence on and near Mount Rainier. Such accounts are not limited to those presented here. We encourage interested readers to consult cited references for greater detail, and to delve more deeply into prehistoric and historic-period Indigenous use of Mount Rainier and the greater Pacific Northwest.

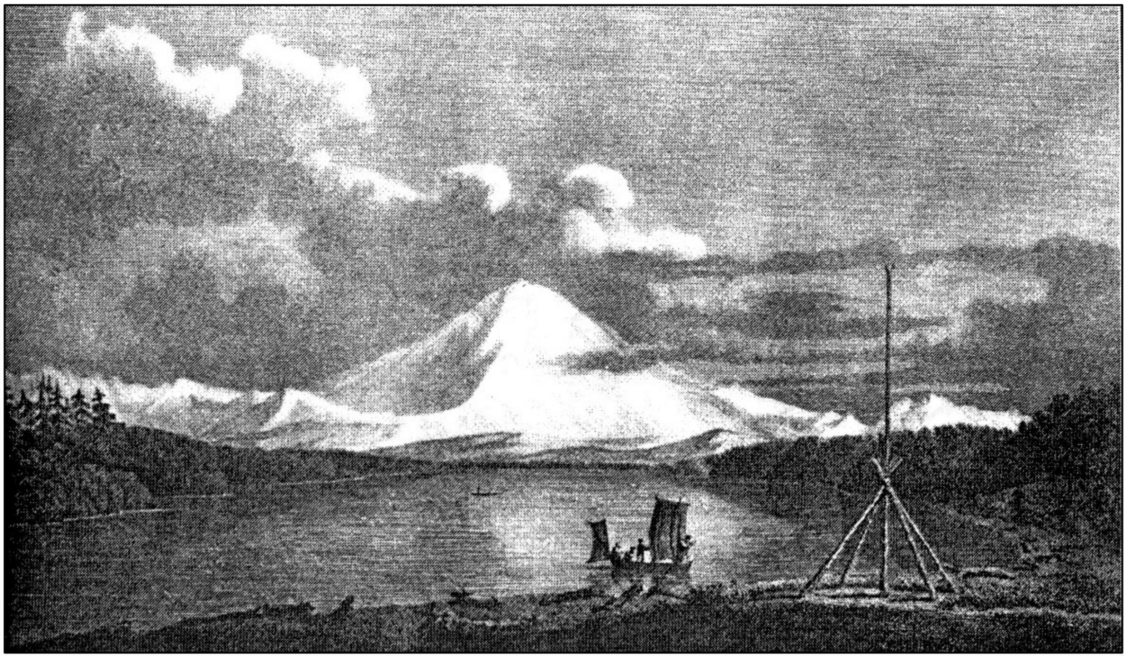


Figure 2.3. Mount Rainier Viewed from Puget Sound in 1792.
(Engraving by J. Landseet in Meany 1916. Public domain reprint by *Scholar Select*)

Relevance to Indigenous People and Mount Rainier

George Vancouver's 1792 explorations in Puget Sound provide us with, among other things, the modern name of Mount Rainier, the first detailed maps of the Sound itself, and insight into the lifeways of the Sound's Indigenous residents at the time. Importantly, by drawing attention to abandoned villages, deserted culturally-modified landscapes, and profuse burial remains as described in Chapter 1, Vancouver offered remarkably prescient inferences regarding the substantially higher population density and complex social systems in place only a few years prior to his arrival in the Pacific Northwest. Such a "far more populous" context would certainly have been associated with more complex and intense land-use practices across Pacific Northwest than observed by Vancouver and those that followed thereafter.

William Fraser Tolmie, Plant Collecting Excursion to Mount Rainier: 1833

William Tolmie, a naturalist with studies in medicine and botany, arrived in the Pacific Northwest in early 1833 as a Hudson's Bay Company (HBC) employee (Bagley 1915:181). En route to Fort McLoughlin in British Columbia, he spent several months at Nisqually House north of the Nisqually River Delta (Figure 2.4) to tend to an injured HBC employee. While there, he made the first known approach to Mount Rainier by a non-Indigenous person. His journal entry for August 27, 1833 notes intent to collect botanical samples (as done throughout his career), and to gather medicinal plants to aid local Indigenous people suffering from a variety of introduced diseases.

> ...Obtained Mr. Herron's consent to making a botanizing excursion to Mt. Rainier, for which he has allowed 10 days. Have engaged two horses from a chief living in that quarter, who came here tonight, and Lachalet is to be my guide. Told the Indians I am going to Mt. Rainier to gather herbs of which to make medicine part of which is to be sent to Britain & part retained in case Intermittent Fever [malaria] should visit us–when I will prescribe for the Indians. (Tolmie 1939:11-12; Tolmie 1963:230; Meany 1916:6).

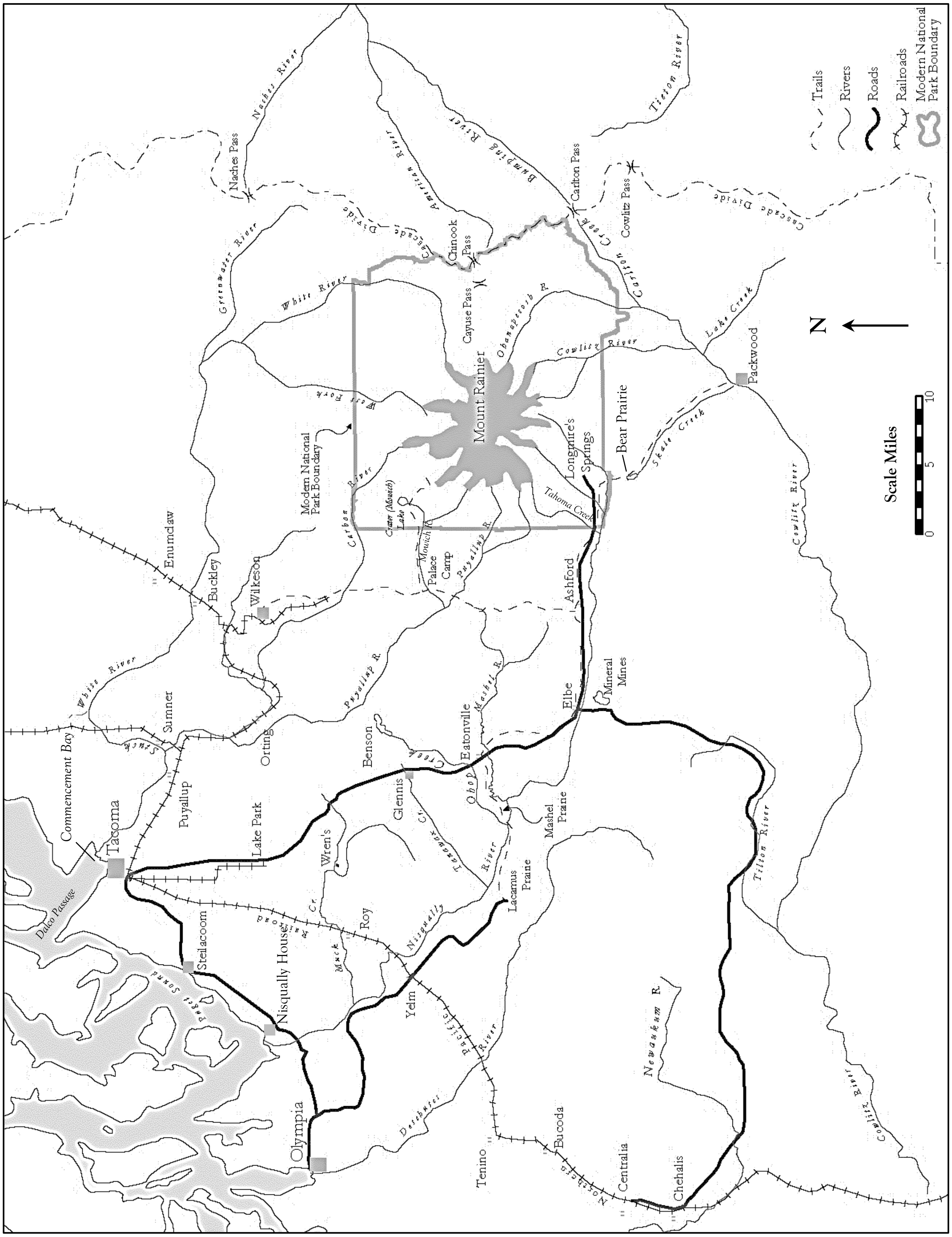


Figure 2.4. Mount Rainier-Puget Sound Region in 1895. U.S.G.S Map adapted from A.L Haines, *Mountain Fever, Historic Conquests of Mount Rainier*, Oregon Historical Society, 1962; and A.H. Smith, *Takhóma, Ethnography of Mount Rainier National Park*, Washington State University Press, 2006. (Image courtesy Washington State University Press.)

Tolmie engaged several Nisqually and Puyallup tribal members to guide and accompany him. These included Lachalet, a Nisqually hereditary chief, as his lowland guide; Lachalet's nephew Lashima; Nuckalkut, a Puyallup he believed was familiar with the mountain; and Nukalkut's relative Quilniash.[18] Tolmie offered blankets and ammunition in payment for their services but noted that his companions/guides were even more caught up in the "great hopes of killing elk and chevreuil [deer], and Lachalet has already been selling and promising the grease he is to get nearby" (Tolmie 1939:13; Tolmie 1963:230; Meany 1916:7; Haines 1999:4).

The party departed for the high country on August 29; traveling north across the prairie on horseback and on foot until they reached the home of Nuckalkut's father situated in an oak grove about eight miles north of Nisqually House. After a drizzly wet night, the group continued northeast across the prairie, stopping about 1:00 pm at the temporary camp of three "Tekatat" [Klikitat] families who shared with them a stew of stored elk meat. The Indians gorged on the meat and broth; Lachalet explaining that "…it was the Indian custom to eat a great deal at once and afterwards abstain for a time (Tolmie 1939:14; Tolmie 1963:231; Meany 1916:8)." Later, they continued through increasingly dense vegetation and uneven ground to the bank of the Puyallup River somewhere near the present town of Orting (see Figure 2.4). Crossing the river and turning upstream to the south, they passed a deserted Indian house,[19] and camped on a dry Puyallup River gravel bar about five miles south of Orting (Haines 1999:216; Footnote 7).

On the morning of August 31, the group breakfasted on two salmon trout (probably steelhead or bull trout) caught in the Puyallup River. They marked the spot by sticking the gills and sound (air bladder) on a spit before the fire to let others know that fish could be caught there. They then continued on foot, traveling upstream southeast through dense vegetation. That night, they endured another rainy camp on the wooded bank of the Puyallup about 12 to 13 miles further upstream.[20] In continuing rain, they again proceeded upstream on September 1; turning east-northeast along what is now known as the Mowich River (Figure 2.4). That night, they camped in the shelter of an undercut bank on the Mowich River floodplain not far below the newly fallen late-August snowline. Along the way, Tolmie exchanged his wool blanket wrap for a capot (hooded cape), finding it superior for the rainy conditions. They ate dried meat and berries (probably salal, *Gaultheria shallon*) boiled in a "cedar bark kettle," –a technique used by mobile hunter-gatherers worldwide to boil food by inserting heated stones into tightly-woven containers.

On September 2, the group continued up the Mowich River three miles to a point "where it was shut in by an amphitheatre of mountains and could be seen bounding over a lofty precipice above" (Tolmie 1939:18; Tolmie 1963:232; Meany 1916:10). Haines (2011:7, 216-217; Endnote 13) suggests that this was at, or near, the forks of the North and South Mowich Rivers. Working upslope along the North Mowich, Crater Creek, and Lee Creek, the group set up camp in the subalpine amphitheater formed by Fay Peak, Mt. Pleasant, and Hessong Rock. Tolmie, Lachalet,

[18] Tolmie's spellings of Nisqually-Puyallup names approximate Indigenous pronunciation.
[19] This may have been a cedar plank longhouse typically used for winter residence, and often abandoned during summer season hunting and gathering rounds. More likely, it may have fallen into disuse during the general population collapse of the period.
[20] Distance estimates are based on the work of Aubrey Haines who, with Eugene Fauré, retraced Tolmie's route in 1955 based on Tolmie's notes. Primary references for the account presented here are Haines' *Mountain Fever* (Haines 1993:3-8); typed transcriptions of Tolmie's original diary notes (Tolmie 1939); his published version of these notes in *The Journals of William Fraser Tolmie, Physician and Fur Trader* (Tolmie 1963); and Meany's (1916:6-12) *Mount Rainier, a Record of Exploration*.

and Nuckalkut continued in ankle-deep snow to the Mt. Pleasant summit[21] where they collected 42 plant samples along Lee Creek, the ridgeline SW of Mt. Pleasant, and its summit (Tolmie 1939:23-24; and 1963:232-234). Figure 2.5 shows Spray Park and Mount Rainier facing SE from the Mt. Pleasant-Hessong Rock ridgeline. Map Figure 2.6 shows Tolmie and party's most probable route within park boundaries, and, while less-certain, their likely camp location and plant collection area. It also shows the location of Mt. Pleasant where Tolmie made his collections and another peak in the NW corner that now bears Tolmie's name even though it was not his actual 1833 destination. Figure 2.7 is the reverse view of Mt. Pleasant and ridge facing NW from Spray Park.

Figure 2.5. Mount Rainier Facing SE from the Mt. Pleasant-Hessong Rock Ridgeline. Spray Park in the foreground. (Photo by Greg Burtchard)

September 3, 1833 broke clear and frosty. Taking advantage of the good weather, Tolmie and Quillilash climbed Mt. Pleasant to recheck bearings toward Mount Rainier and improve Tolmie's description of its northwestern face shown above. Later, the full party began the downslope return, camping that night on a wooded island in the Puyallup River. Retracing their path, the group returned to Nisqually House on the evening of September 5. In the following days, Tolmie packed the samples (along with bird skins for the Andersonian Museum in Glasgow) for shipment to W.J. Hooker at the Royal Botanic Gardens in London. Tolmie makes no further mention of using these, or any, plants for medicinal purposes except for a September 16 entry noting use of a poultice made from "the shallon berry" (salal, *Gaultheria shallon*) applied to a lanced, suppurating tumor on the lower jaw of "old Kasket" (Tolmie 1963:235). While several of the species collected on the excursion to Mt. Pleasant/Mount Rainier in 1833 have genuine medicinal qualities (see Peterson and Burtchard, Appendix C), it is not clear which of these, if any, were used to treat Indigenous people residing near Nisqually House at the time.

[21] While named after W.F. Tolmie, Tolmie Peak and Tolmie Creek northwest of Mowich Lake are not the route and peak that Tolmie and the Nisqually-Puyallup group ascended. Tolmie's descriptions fit the route described here, with the summit ascended in 1833 being Mt. Pleasant and its conjoined ridgeline with Hessong Rock as described by Haines (1999:6-8) and restated by Molenaar (2011:49-51).

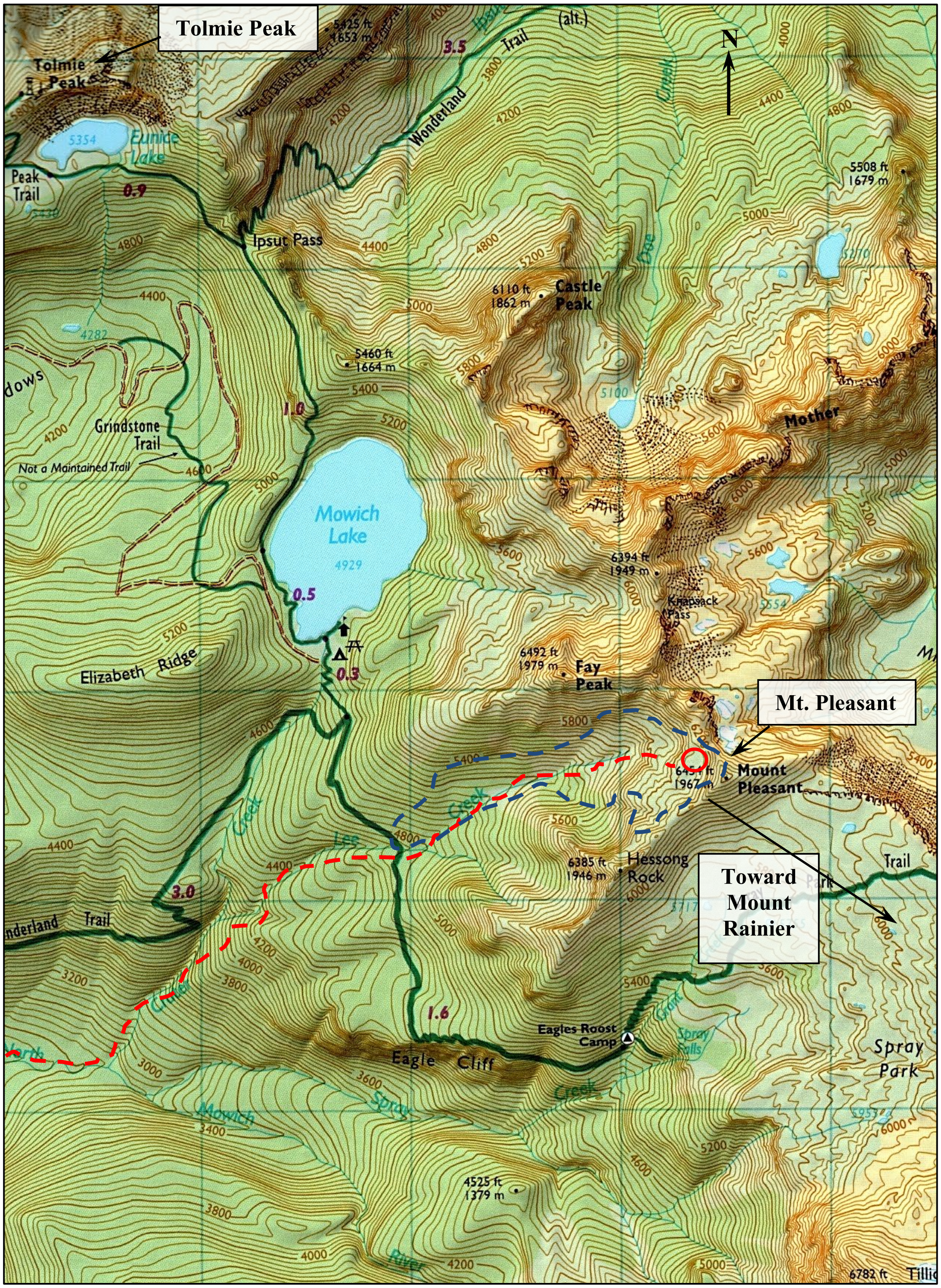


Figure 2.6. Inferred Tolmie & Companions Approach to Mount Rainier/Mt. Pleasant, 1833. Dashed red line approximates most probable route; red circle marks a likely camp site; blue dashed line is Tolmie's approximate plant collection zone on and west of Mt. Pleasant. Note location of "Tolmie Peak" above Eunice Lake at the map's upper NW corner.

Photo left shows Hessong Rock and ridgeline to Mt. Pleasant in October 2003. Fay Peak in the background.

Photo above shows the continuing ridgeline slope and Mt. Pleasant peak in July 2003.

Figure 2.7. Hessong Rock and Mt. Pleasant Facing NW from Spray Park.
Crew in foreground recording chipped tool-stone site 45PI0994, one of about 15 precontact archaeological sites now documented in the Mt. Pleasant area. Tolmie, and his Nisqually and Puyallup companions camped on the opposite side of the Hessong-Mt. Pleasant ridgeline shown above on September 2, 1833. (Photos by Greg Burtchard)

Some of the plant specimens referenced or collected on Tolmie's excursion to Mount Rainier have not been found. However, at least 13 of the collected samples survive. These have been identified taxonomically and are curated in three botanical collections. Eleven specimens are stored in the Royal Botanic Gardens, Kew, in London where Tolmie sent them originally; one at the New York Botanical Gardens; and another at the Harvard University Herbarium. The fate of the remaining collected specimens is unknown. Even so, we can identify nine additional plants from comments included in Tolmie's journal during his journey to Mount Rainier and his time at Nisqually House immediately thereafter. In total, then, we presently can identify 21 of the plants collected, consumed, or otherwise used by Tolmie and his Native American companions on their journey to the northern slope of Mount Rainier/Mt. Pleasant in the late summer of 1833.[22] These are listed in Table 2.1 below. Further information, including curation locations, photographs, and potential medicinal applications are included in Appendix C of this report.

Table 2.1. Identified Mount Rainier Plants Collected by Tolmie and Companions in 1833

Taxa	Common Names	Comments
Arnica latifolia	Mountain Arnica	Collected specimen
Campanula sp.	Harebell	Journal identified & collected specimen
Carex interrupta	Sedge	Collected specimen
Gaultheria shallon	Salal	Journal entries, not collected; berries eaten; poultice used to treat *suppurating tumor* at Nisqually House.[*] Salal is widely available in both lowland and upland settings.

[22] Coauthor Arnie Peterson completed much of the research required to identify botanical samples and curation locations. Peterson and park volunteer Crow Vecchio also deciphered a number of Tolmie's original handwritten accounts related to these collections.

Taxa	Common Names	Comments
Gentiana calycosa	Mountain Bog Gentian	Collected specimen
Gnaphalium sp.	Cudweed or Everlasting	Journal identified & collected specimen
Haplopappus alpigenus	Aster, Alpine Goldenweed	Collected specimen
Vaccinium sp.	Huckleberry	Journal entry & collected specimen: eaten raw & dried for winter storage.* Mountain huckleberries were widely gathered, dried, and winter-stored in the Pacific Northwest.
Lupinus latifolius	Arctic Lupine	Collected specimen
Luzula arcuata ssp. *unalaschensis*	Curved Woodrush	Collected specimen
Pedicularis contorta	Coiled Lousewort	Journal entry & collected specimen
Pedicularis ornithorhynchos	Bird's-beak Lousewort	Journal entry & collected specimen
Pedicularis racemosa	Sickletop Lousewort	Journal entry & collected specimen
Penstemon tolmiei	Tolmie's Penstemon	Collected specimen
Phyllodoce empetriformis	Pink Mountain-heather	Collected specimen
Pinus monticola (poss. *Abies lasiocarpa*)	White or Whitebark Pine (poss. Subalpine Fir)	Journal entry & collected specimen; Possibly white-bark pine or subalpine fir common to Mt. Pleasant. (Tolmie does not reliably distinguish pine from fir species.)
Potentilla flabellifolia	Fan-leaved Cinquefoil	Collected specimen
Sedum spathulifolium	Broad-leaved Stonecrop	Collected specimen
Sibbaldia procumbens	Creeping Sibbaldia	Journal identified & collected specimen
Thuja plicata	Western Red Cedar	Journal entry only, not collected: cedar bark kettle for boiling dried meat.* Cedar bark also used for a variety of rain-resistant clothing; split planks for lowland housing; logs for canoes.
Xerophyllum tenax	Beargrass	Journal entry & collected specimen: hats made from leaves.* Also used for baskets and other woven items.

*Comments included in Tolmie's journal (Tolmie 1939:11-26). Also see Appendix C, this volume.

<u>Relevance to Indigenous People and Mount Rainier</u>

Tolmie's account establishes Indigenous seasonal and/or permanent residence northwest of Mount Rainier at least as far inland from Puget Sound as South Prairie in the vicinity of the modern town of Orting. Tolmie's use of Nisqually and Puyallup guides suggests that he knew local Indigenous people were familiar with travel routes to and from the mountain in the precontact past. Tolmie is the first non-Indigenous person known to venture to Mount Rainier. His expressed intent to collect medicinal plants implies that he learned of the presence of these plants from people in the vicinity of Nisqually House where he resided at the time. This implies further that precontact Indigenous people were familiar with, and used, medicinal plants available in the high country near the mountain. Importantly, because he shipped the plants to Britain, because some of those specimens still exist, and because he recorded some of the species in his journal, we know the identity of roughly half of the of the plants gathered by Tolmie and his

Nisqually and Puyallup companions in 1833 (see Table 2.1, and Appendix C for photographs, curation references, and description of potential medical applications).

In addition to these considerations, William Tolmie also passed on valuable information regarding Indigenous land-use practices. These include 1) stone-boiling cooking practices in light-weight flammable containers; 2) the efficacy of cedar and cedar bark for making containers and other applications; 3) the speed at which Indigenous people could move on-foot across the landscape; 4) Indigenous eating habits while moving through terrain with uncertain hunting-gathering options; 5) presence of high-value anadromous fish in the mid-upper Puyallup River watershed; 6) the practice of marking productive fishing locations for others; 7) presence and importance of salal and huckleberries; and 8) the high value of deer, elk, and associated fat (grease) that could be obtained on and near the mountain. Finally, presence of Klikitat people (more commonly associated with the Cascades and inland terrain to the east) residing on the upper Puyallup River sheds light on the high mobility and cooperative interaction between socially and linguistically distinct Indigenous people at the time –a phenomenon to be observed again by Lieutenant Johnson with the Wilkes Expedition eight years later.

Wilkes Expedition: Lt. Johnson's Trip through Naches Pass, 1841

Charles Wilkes commanded the United States Exploring Expedition (aka the Wilkes Expedition) to the Pacific and Pacific Northwest between 1838 and 1842. In 1841, the expedition reached Puget Sound and established headquarters at Hudson's Bay Company's Nisqually House.[23] From there, Wilkes dispatched Lieutenant Robert E. Johnson to cross the Cascade Mountains via an established Indigenous route over Naches Pass to explore and map the inland area that is now eastern Washington to Fort Colville and back, passing the northern and northeastern flank of Mount Rainier in the process (Meany 1916:13-33).

The Johnson party of four, soon joined by two French Canadians, a Hudson's Bay Company guide and his multi-lingual companion, left Fort Nisqually (Nisqually House) on May 19, 1841 headed east. On May 21, they camped at the confluence of the Puyallup and Carbon Rivers (Figure 2.4) near a large split-cedar long-house[24] occupied by four people who were waiting for the return of a salmon-fishing party. A short distance up the Carbon River, the party passed a salmon fish-weir probably constructed by occupants of the long-house. At some point northwest of Mount Rainier, probably South Prairie Creek, the party turned northeast, arriving at the White River on May 23 in the company of about 13 Indigenous people met along the way.

The now-enlarged party continued east along the White River north of the modern Mount Rainier National Park boundary to the Greenwater River confluence (Figure 2.4) near the present town of that name. From there, they continued via the Greenwater route southeast, diverging upslope east to the snow-clad Cascade Divide (Naches Pass), then downslope south-southeast to the Middle Fork of the Little Naches River which they reached on May 29, 1841.

[23] Americans considered the southern Puget Sound to be British territory in 1841. The Oregon Treaty of 1846 established that the US, not the UK, had the right to "treat" or make treaties with Indigenous tribes south of the 49th parallel (the border between Canada and U.S.A. today). Neither country had "control" of the region at the time and recognized that this could only come about via treaty with Native sovereigns.
[24] Well-constructed split-cedar longhouses were a typical component of semi-permanent over-winter villages in the Pacific Northwest for the last 3,500 years or so. These villages commonly relied on mass-harvested salmon and camas staples supplemented by a variety of plant and animal resources harvested nearby, as well as at more distant locations such as Mount Rainier.

In the days that followed, Lt. Johnson's party continued down the Naches (Figure 2.4); encountering a party of Yakama Indians and a small Yakama camp subsisting primarily on camas and salmon. On June 1, after the departure of some of the tribal members, the party branched off to the east, met Naches people digging more camas, and continued explorations eastward onto the Columbia Plateau.

Over the summer, Lt. Johnson continued the expedition to Fort Colville in northeastern Washington. On the return trip, the group eventually reached the Yakima River, followed it past the location of the modern city of that name, and on to its confluence with the Naches River. In late summer, they retraced their original route upstream along the Naches. On the way, the party passed the site of the Yakama camp briefly visited the previous spring. Here, a Yakama elder met during the spring visit "determined to accompany them to Nisqually, taking with him his son and lending them several horses" (Meany 1916:32). Continuing on to Naches Pass and beyond, they noticed seasonal changes to the Cascade environment: the streams were low; huckleberries were beginning to ripen; previously wet meadows were choked with tall, rank grass; and the snow was gone save for a few patches on the western slope. On August 13, they re-crossed the White River, and returned to Fort Nisqually on August 15, 1841 with collected botanical samples and expedition notes eventually to be included in the multi-volume record of the Wilkes Expedition.

<u>Relevance to Indigenous People and Mount Rainier</u>

The Wilkes-Johnson expedition across Naches Pass was the first documented exploration of the inland area that would become the Oregon Territory; their route passing in near proximity to Mount Rainier. It added to our understanding of regional plant and animal communities and provided insights into subsistence and settlement patterns of Indigenous people encountered along the way. Importantly, it confirmed the presence of a semi-sedentary village (probably Puyallup or Klikitat) at the confluence of the Puyallup and Carbon Rivers in the general area observed by William Tolmie eight years earlier. This location provided relatively easy access to Mount Rainier using established routes, such as that followed by the Tolmie party, to acquire medicinal plants, huckleberries and other non-medicinal plants, and animal resources not readily available in lowland settings.

The expedition also established the presence of resident populations dispersed across the northern flank of Mount Rainier, as well as east of the Cascade crest. Indigenous people joined and departed the group repeatedly, suggesting general familiarity with the region and existence of social ties that allowed them to interact with other groups on both sides of the Cascades.

Finally, the presence of established trails, like that over Naches Pass, suggests that horse and foot travel was common and extended over substantial distances. Readiness of the Yakama elder to accompany the Johnson party to Nisqually is consistent with the general pattern of joining and departing the expedition, willingness to travel substantial distances on short notice, and presence of social mechanisms permitting movement into and out of socially distinct tribal areas.

George Gibbs, Pacific Northwest Ethnographies: 1854 and 1865

Dr. George Gibbs' involvement with western Indigenous tribes in the 1850s and 1860s provides insight into the state of 19th century Indigenous life in the Pacific Northwest, particularly as impacted by U.S. expansion into the territory during that time. As such, his work helps illuminate tribal distribution patterns, population trends, and lifeways at a time when these were rapidly changing and poorly understood.

Indian Tribes of Washington Territory

In 1853, Capt. George B. McClellan hired George Gibbs to serve as an ethnologist-geologist-naturalist for the Northern Pacific Railroad Survey between Puget Sound and the Spokane River in eastern Washington Territory. In 1854, McClellan forwarded Gibbs' report for inclusion in a larger Findings and Recommendations document for consideration by the U.S. House of Representatives. Now known as *Indian Tribes of Washington Territory* (Gibbs 1855), the report divided the territory's Indigenous tribes into two major geographic groups: 1) those residing in the relatively *dry interior plateau* east of Mount Rainier and the Cascade mountains; and 2) those inhabiting the *moist western landscapes* and Puget Sound area between the Cascades and Pacific Ocean –the area where most of the new immigrants were settling.

In his report, Gibbs addressed the extent to which Indigenous populations could best be "managed" in a manner that would minimize interference with and by U.S. regional settlement. For both eastern and western regions, he recommended creation of *treaty-based reserves to concentrate tribal settlements while allowing continued fishing, hunting and gathering rights in remaining unsettled areas.* For the less populated east, he believed that the most effective reservation system should consist of relatively few, large, socially inclusive reserves. West of the Cascades, however, he recommended a larger number of smaller reserves to accommodate what he believed to be greater intertribal variability and somewhat less extensive use of space. After substantial tribal pushback, Stevens adopted Gibbs' recommendations in the ensuing 1850s and early 1860s treaties introduced in Chapter 1.

While mentioning several tribes linked to lands on and/or near Mount Rainier (e.g., *Yakima* and *Klikatas*, *Cowlitz* and *Taitinapam*, and *Squalli-ah-mish* or *Nis-qually*),[25] Gibbs made no effort to clarify the role played by the mountain in the lives of its nearest neighbors. Even so, his early work provides the most complete list then available of Washington's tribal societies divided into two environmentally distinct territories. Perhaps Gibbs' most salient contributions lie in simply bringing those societies to light to non-Indigenous people; his review of available census-population estimates; repeated reference to the ravages suffered from introduced epidemic diseases; and allusions to social-cultural disruption from sudden population loss, land loss, and competition with accelerating non-Indigenous settlement.

Despite clear ethnocentric bias, Gibbs' emphasis on preserving the remains of tribal society through treaty protections influenced the content of a series of treaties by Washington's first governor, Isaac Stevens. Faced with strong opposition to large consolidated multi-tribal reservations by western Washington tribes, Stevens ultimately accepted Gibbs' recommendation to create multiple small reservations supplemented by more extensive treaty-reserved fishing, hunting, and gathering rights and privileges. These clauses would prove critical to resolving legal challenges a century later.

Tribes of Western Washington and Northwestern Oregon

In 1865, Gibbs submitted his best known, and most thorough, ethnographic account to J.W. Powell, chief geologist of the U.S. Geographical and Geological Survey. After Gibbs' death in 1873, Powell forwarded the account to the Department of the Interior (DOI), Office of Indian Affairs for inclusion its first volume of *Contributions to North American Ethnology* (Gibbs 1877). It builds on Gibbs' earlier work but provides a more complete account of people residing closer to Mount Rainier.

[25] Gibbs' spellings of tribal names.

In *Tribes of Western Washington and Northwestern Oregon,* Gibbs grouped the western Washington tribes into three subdivisions: Columbia River, Northwestern Oregon-Washington Coast, and Puget Sound; including people living in inland Puget Trough prairie country south of the Puyallup River and north of the Cowlitz River (see Figure 2.4). He considered each of these subdivisions in general discussions of a variety of cultural issues such as tribal organization and inter-tribal relations; comparative population levels; primary food, material, and medicinal resources; and a number of other social and material issues.

In this work, Gibbs attempted to develop an inclusive list of western Washington tribes and bands, dialects, and intertribal relationships. In doing so, Gibbs captured the sense of inter-group social complexity that characterized western Washington tribal societies. A tribal distribution map created in 1936 by anthropologist Leslie Spier (Figure 2.8) displays much of the complexity first recognized by Gibbs. It is important to recognize, however, that inter-tribal boundaries were fluid and not so territorially rigid as implied by the heavy lines of Spier's map.

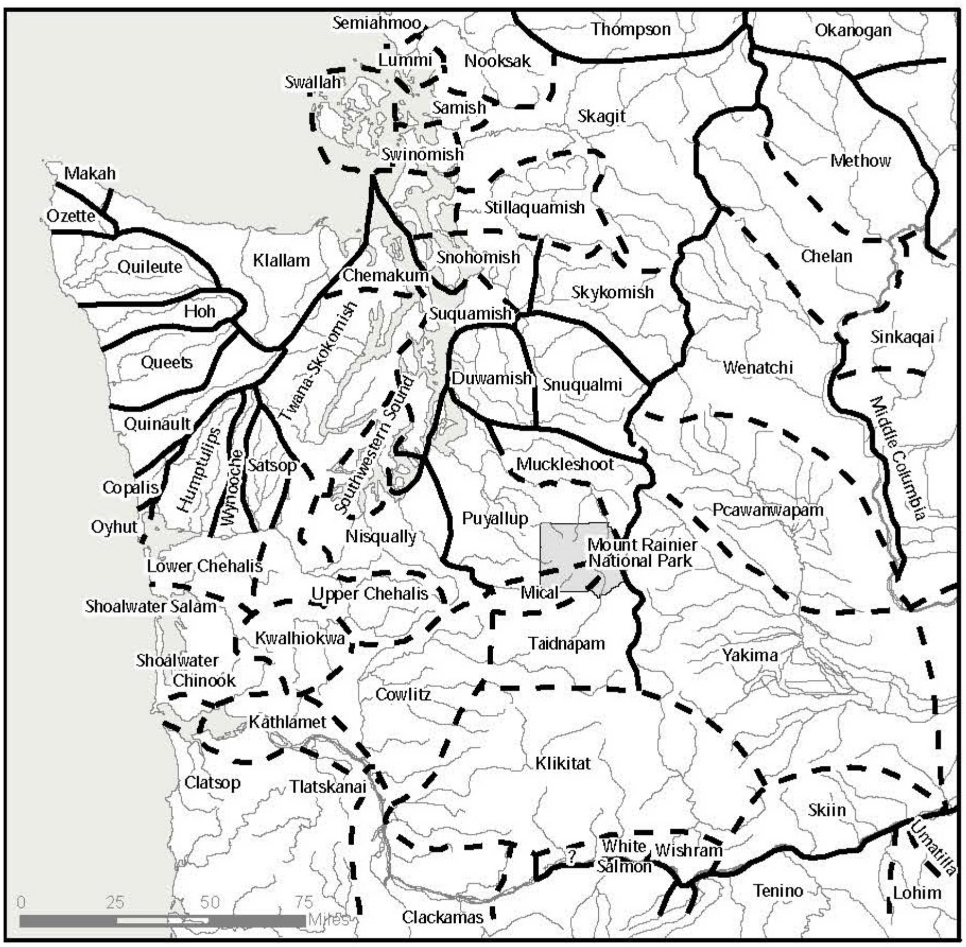


Figure 2.8. Western Washington 1800s Tribal Distribution and Mount Rainier.
(after Spier 1936:42-43 and in A. Smith 2006:9)

Gibbs' (1877:225-236) ethnography also includes a detailed account of observations made during the Vancouver expedition as early as 1792 as well as references to Robert Gray, Lewis and Clark, and others who ventured into the area in the late 18th and early 19th centuries. Finally, he closes with a comparison of intertribal vocabularies with an extensive dictionary of the language group he believed to be common to the most inclusive tribal group(s) in the region surrounding Mount Rainier –Nisqually Salish.

Taken as a whole, Gibbs' (1877) work remains the most complete account of Indigenous circumstances available from the early historic-period in the Pacific Northwest. Particularly relevant to the present account are his references to population trends; primary food and medicinal resources; and material resources necessary for housing, clothing, utensils, and maintenance tasks. These are summarized briefly below.

Food

Gibbs (1877:193-97) cites fish, roots, berries, and hunted game as the principal food staples of Indigenous people west of the Cascades, with less emphasis on game. In regard to game, however, he lists mountain goats, elk, and deer taken primarily by people living near the mountains. Valuable for their warm, water-repellent wool, mountain goats were particularly useful to Pacific Northwest Indigenous people. Mount Rainier, because of its height and breadth, provided mountain goat and elk habitat unequaled in the Cascades –a factor that enhanced the mountain's attraction to people residing in its vicinity.

Among plant resources, Gibbs lists wappatū (*Sagittaria latifolia*) and kamas (principally *Camasia quamash*) as principal root-crop staples –the former found in ponds, the later harvested in seasonally wet lowland prairies common to the Puget Trough. Other root-foods include sunflower (Gibbs may have been referring to balsamroot, *Balsamorhiza* sp.), fern (probably bracken fern, *Pteridium aquilinum*), and a third unnamed root. He also lists acorns as a storable food in areas where Garry oak, or Oregon white oak, (*Quercus garryana*) grows abundantly. Gibbs lists a variety of berries such as strawberry (*Fragaria* spp.), salmonberry (*Rubus spectabilis*), raspberry (*Rubus* spp.), and others not suitable for drying that were consumed at once. Huckleberry species (*Vaccinium* spp.), and salal (*Gaultheria shallon*) were dried and stored for winter's use. Among these, huckleberry and salal were valued most highly because of their food and medicinal value (salal). Berries were available in a variety of low and upland settings, but huckleberry grew best in higher elevation settings like Mount Adams and Mount Rainier.

Salmon (*Oncorhynchus spp.*) was critically important to sustain most non-coastal village populations in the 1800s, including those in the vicinity of Mount Rainier. The value of salmon lies in the extraordinary quantities that migrate up many Pacific Northwest rivers from spring through late autumn. Gibbs (1877:194) suggests that late season runs, typically captured in cross-stream seines or weirs, were most valuable as an over-winter food source because their reduced fat content made them best suited to drying and storage.[26]

In his discussion of food resources, Gibbs exhibited substantial insight by attributing the high mobility and dispersed character of Pacific Northwest Indigenous societies to the need to acquire and distribute a variety of dispersed critical food resources at different times of the year. As Gibbs (1887:197) put it:

> To the necessity of seeking the different articles of food at different times is to be attributed chiefly [to] the constant locomotion of these tribes. Not only do they at one time frequent the prairies or marshes for roots, at another the forests for berries, and gain the sounds and rivers for fish, but they have particular points at which they seek the last at

[26] Archaeologist Randall Schalk (pers. com. 1996) suggests that late season capture also helped to minimize warm-season storage spoilage loss.

> various seasons; and although they have their permanent villages where their winter residence chiefly is, ...they are seldom to be found all gathered there together except on special occasions.

Medicine and Diseases

In the mid-1800s, Indigenous people throughout the Pacific Northwest were continuing to cope with a plethora of introduced diseases. In this second work, Gibbs (1877:207-209) addressed the most common ailments at the time and cites several plant and treatment remedies. The most devastating, and continuing, of the introduced diseases was smallpox, the introduction of which, he placed at about 1780. He also noted the continuing presence of measles, congestive fever (malaria or intermittent fever), consumption (tuberculosis), and yaws (with skin eruptions common to the face and throat). For these, there were few effective remedies.[27] For treating other maladies, Gibbs offered a limited list that includes an emulsion of Oregon grape (*Berberis aquifolium*) as a tonic and for treatment of venereal infections; decoctions of death camas (*Toxicoscordion venenosum*) as an emetic; cucumber vine (*Sicyos Oregonus*, now *Marah oregana*) as an emetic and cathartic; root of an unnamed fern (possibly licorice fern [*Polypodium glycyrrhiza*]) growing among damp moss-covered maples, and other trees, as an expectorant and treatment for gonorrhea; interior bark of skunk-wood (probably stink currant [*Ribes bracteosum*]) as a poultice for burns, cuts, and scrapes; and colt's foot (*Petasites frigidus* var. *palmatus*) as a fomentation for bruises and sprains. Slow-healing sores were cauterized. Suction was used as a topical remedy for reduction of localized pain. Broken bones were bandaged and bound with strips of wood. Sweathouses were used widely among Pacific Northwest societies for cleansing, and for a variety of physical and emotional healing purposes.

Other Resources

Gibbs (1877:214-221) cites a limited array of other gathered resources of particularly high importance to Indigenous life at the time. Foremost among these was cedar (western red cedar, *Thuja plicata*). Wedge and maul-split planks made from mid-sized trees had been a critical construction component of cedar pole-framed longhouses characteristic of lowland villages for about 3,500 years. Large cedar logs were the primary material for river-going dug-out canoes, as well as for bigger, elevated-prow canoes capable of rough-water and limited open-sea travel. Inner bark from younger trees was harvested for woven mats, light weight water-repellent clothing, baskets, and cordage.

Gibbs also notes clothing and robes made from deerskin and a variety of smaller fur-bearing animals. Particularly valued was wool from mountain goats and mountain sheep. Though not mentioned by Gibbs, goats were (and remain) most readily available at Mount Rainier, mountain sheep in the nearby Cascades. Other clothing fibers include woolly hair from a dog raised specially for the purpose and woven in with other materials such as bird down, goat wool, and the inner-bark of young cedar trees.

While not offering an exhaustive list of other maintenance resources and utilitarian items, Gibbs draws attention to the presence of woven conical hats and a wide variety of baskets – including watertight stone-boiling baskets –typically made from tough, fibrous grasses (prominently beargrass, *Xerophyllum tenax*) found inland and in upland settings like Mount Rainier and the Cascades to about 5,000 ft. Cordage for a variety of purposes including nets and seines was made from twisted grasses which Gibbs (1877:220) believed was imported from east of

[27] William Tolmie cites use of a salal poultice to treat a lanced "suppurating tumor" on an Indian patient in 1833 (Tolmie 1939:11-26 and account above). This may have been yaws.

the Cascades. He also notes that cattail (*Typha latifolia*) and tule (*Schoenoplectus acutus*) were collected, woven or lashed into mats, and used for a variety of purposes, such as lining canoes, making bedding, covering goods, and making temporary huts. Gibbs emphasized that "...an Indian's roll of mats is his constant traveling companion." Non-woven vessels and implements were made from carved wood, mountain sheep and goat horn.

Population Decline, Rebound, and Land-use Implications

The grievous and widespread effect of introduced epidemic diseases is a common thread in both of Gibbs' 1855 and 1877 accounts. Beyond the personal tragedies inflicted on Indigenous people by these 18th and 19th century epidemics, the extreme population losses that resulted from them made it difficult for survivors to organize their use of the landscape and its resources as effectively as they had only a short time before. It is important to recognize that what we see in the ethnographic record reflects but a shadow of a substantially more vigorous, more organizationally sophisticated past. Landscapes that appeared to be nearly empty to new settlers in the late 1800s were *not empty in the past*. Accordingly, Gibbs' (1877:181) 1865 population estimate of 5,242 for Puget Sound and Trough tribal people (those roughly in eyesight of Mount Rainier), while exhibiting a rebound from 2,698 estimated by Tolmie in 1833 (in Gibbs 1855), still vastly underrepresented population densities that subsisted successfully on locally available resources for thousands of years in the precontact, pre-epidemic past.

Despite population loss and the subsequent minor rebound, it is reasonable to suggest that resources obtained and distributed among Indigenous people, as reported by Gibbs, reflect long-standing land-use patterns in the Pacific Northwest. We should be aware, however, that pressures to develop social mechanisms to conserve long-standing viability of those resources would have been even greater in the precontact past, when it was necessary to support more elevated population densities. That is the period during which we can expect ecologically sound resource gathering techniques to have been developed and socially enforced as part of a process we later refer to as conservation-oriented *Traditional Ecological Knowledge* (TEK).

<u>Relevance to Indigenous People and Mount Rainier</u>

Though incomplete and ethnocentric by modern standards, Gibbs' 1855 and 1877 works are the earliest, and most thorough, accounts of Indigenous tribal distribution, population, and lifeways in Washington Territory and northwestern Oregon available to us. Of special note are his references to the severity and pervasiveness of introduced diseases on Indigenous populations across Washington Territory beginning about 1770 to 1780 and persisting through the 1800s. Importantly, his efforts to secure reasonable population estimates over an extended period also allow us to approximate when population levels reached their nadir and began to rebound at about 1850 to 1860 despite the continued presence of these illnesses among Indigenous people.

Gibbs' resource lists summarized above imply a special importance of Takhóma-Mount Rainier for inland groups in its vicinity. Of particular importance was the mountain's seasonal abundance of mountain goats, huckleberries, elk, and beargrass. For these resources, especially mountain goats, Takhóma simply had the largest expanse of suitable high-elevation habitat available in the mid-Washington Cascade area. Abundant, seasonal presence of these resources, among others, attracted Indigenous people to the mountain for millennia.

In addition, Gibbs' efforts to assemble a Nisqually dictionary is also of lasting value. The dictionary is the earliest and most complete of its kind. While not directly germane to Mount Rainier, it is of some value in preserving remnants of the language through time.

Finally, Gibbs' observations and recommendations to the U.S. Congress, and to Governor Stevens with whom he consulted, underlay creation of the large number of small reservations west of the Cascades relative to those on the eastern plateau. His awareness that spatially expansive Indigenous subsistence systems *could not be sustained* within those restrictive confines contributed to inclusion of a subsistence clause in all Stevens Treaties. In the treaties, that clause retained continued fishing rights at usual and accustomed locations; as well as hunting and gathering privileges in traditionally used areas outside of reservation boundaries, so long as those areas remained open and unclaimed for settlement –a situation that Gibbs believed would not happen to an appreciable degree in the foreseeable future. As will be seen, that clause has proven to be of critical importance to the resurrection of Pacific Northwest tribal fishing rights, tribal sovereignty, cultural awareness, plant collecting rights, and much more, over a century later.[28]

The Middle Period: Mid-1800s Climbers, Explorers, Indians, and Mount Rainier

At about the time George Gibbs was beginning his first ethnographic survey of Washington Territory with Capt. McClellan in the early 1850s, the first serious historic-period climbers were turning their intention to the huge white mountain that dominated Puget Sound country to the east. The earliest recorded attempt by a non-Indigenous person to summit Mount Rainier took place in 1852 under general guidance of Olympia resident Sidney Ford.[29] Subsequent attempts followed at infrequent intervals, typically aided by Indigenous guides familiar with approach routes to the mountain's upper elevation slopes.

These early climb attempts, infrequent as they were, seem to have had little impact on established Indigenous hunting and gathering practices already affected by population loss and the intrusion of new settlers into the region. Indeed, their accounts offer insights into game abundance, Indigenous trails, the Puget Sound Treaty War, and ambivalent attitudes toward the mountain and its new interlopers at a time when these excursions were relatively rare. As will be seen, the period did not last long; in essence, coming to a close about 30 years later with completion of the Northern Pacific Railroad and the immigrant flood that followed.

The Ford Party: 1852[30]

Interest in establishing a cross-Cascade wagon route from the southern Puget Sound to inland Washington ran high in the mid-1800s. In 1852, Olympia residents Sidney Ford, John

[28] Please note that other anthropological accounts related to Mount Rainier and affiliated tribes have been written in the century and a half since Gibbs completed *Tribes of Western Washington.* Aside from the Allan Smith's (2006) *Takhoma, Ethnography of Mount Rainier National Park* discussed in Chapter 1, interested readers may wish to consult (among other sources) Haeberlin and Gunther's (1930) *The Indians of Puget* Sound; Marion Smith's (1940) *Puyallup-Nisqually* ethnography; Eugene S. Hunn's (1991) *Nch'i-Wána* "The Big River", a mid-Columbia-Yakama ethnography; Cecelia Carpenter's (1994) *Where the Waters Begin, The Traditional Nisqually Indian History of Mount Rainier;* Astrida R. Blukis Onat's (1999) *Review and Assessment of the Ethnographic Literature of Mount Rainier National Park,* and her (2006) *Tahoma Legends: History in Two Voices;* Adam Nickels' (2002) *History Under Fire: Understanding Human Fire Modification of the Landscapes at Mount Rainier National Park;* Samantha Nemecek's (2014) *Resource Sovereignty: The Indigenous Value of Mount Rainier within Activities of Traditional Resource Harvesting;* and David Hooper's (2015) *Cultural and Ecological Relationships between the Nisqually Indian Tribe and Plants of Mount Rainier National Park.*
[29] Recall that in 1833, William Tolmie, and his Puyallup and Nisqually guides, climbed only to the summit of Mt. Pleasant, immediately northwest of Mount Rainier proper.
[30] After Schullery 1987:7-8 and Haines 1999:10-13.

Edgar, Robert Bailey, and Benjamin Shaw shared an interest in mountain climbing, and in locating a practical route to the east via passes south of Mount Rainier. In mid to late August, 1852, they attempted to gain information relevant to such a route by means of a high-angle view from the upper slopes of Mount Rainier. The only known account of their attempt to do so is the brief article "Visit to Mt. Ranier" [*sic*] published in the *Olympia Columbian*, September 18, 1852. The article does not describe the route precisely, but Hubert Bancroft (1890, in Haines 1999:10) suggests that the party approached via the Nisqually River Valley to what the *Columbian* article called "back-bone ridge" by which they worked their way upslope to some point on or near Columbia Crest. After their near-ascent, the party retreated to their highest camp where they remained for two days before returning to Olympia. They did not locate a specific wagon route, but referred to "several passes at intervals through the mountains, which …gave satisfactory evidence that a good route could be surveyed, and a road cut…"

It is tempting to suggest that the "back-bone ridge" mentioned in the article refers to the ridge of the same name situated on the southeastern edge of the mountain. At the time, this route was in regular use by Indigenous people residing east of the Cascades to access the upper mountain. It would have been an obvious and relatively easy access trail *if* the Ford party had traveled that far east and been able to find it. However, their description of table lands with "beautiful lakes –from a half to a mile in circumference…" and clear views of Puget Sound suggests that they climbed a more westerly ridge; perhaps Mazama Ridge where Puget Sound would have been in view, as well as relatively large Louise, Reflection, and Bench Lakes.

<u>Relevance to Indigenous People and Mount Rainier</u>

The *Columbian* account makes no mention of the use of Indigenous guides. Perhaps the most interesting observation relevant to Indigenous use of the mountain (aside from the lingering possibility that the party followed the more easterly Backbone Ridge-Cowlitz Divide Indigenous trail) lies in their reference to bounty of the subalpine table lands where "they fared sumptuously on the game which they found very numerous, in the shape of brown bear, mountain goat, deer, etc., with an endless variety of the feathered genus; the side of the mountain was literally covered with every description of berries, of most delicious flavor." Such bounty was a critical element underlying repeated use of the mountain by Indigenous people in the precontact past. Furthermore, the subalpine setting is consistent with the archaeological record of that use. In 1852, these animal and plant communities remained relatively untouched by non-Indigenous people. Unfortunately, the Ford excursion marked the beginning of the end of Takhóma's isolation. By the mid-1880s, a virtual flood of explorers, adventurers, and unregulated hunters had diminished game productivity to a shadow of its precontact past, reducing Indigenous hunting and gathering success, and affecting the National Park Service decision to ban hunting altogether in the early 1900s.

Yakama Chief Sluskin's Account of a North-side Ascent: ca. 1855[31]

Sluskin (aka Saluskin, Sluse-cum, Salooskin, Shu-lu-skin, or Sluiskin) is a long-established extended family name among the Yakama people. The name appears repeatedly in Mount Rainier history beginning with this account of the first known non-Indigenous ascent of the mountain, again in 1870 as a guide for the Stevens-Van Trump ascent, and yet again in 1915 and 1917 in regard to Yakama hunting parties on Mount Rainier's Sunrise Ridge (Yakima Park). Name similarity and redundancy has caused substantial interpretive confusion over the years. These men, however, were two distinct individuals linked by the same family name and tribal

[31] After McWhorter 1917; Splawn 1958:341-345; Haines 1999:16-18; and Molenaar 2011:52.

affiliation. The present, and earliest, Sluskin account was given as an elderly man to Luculus McWhorter in 1916, regarding events that took place when he was a boy in the summer of 1855.[32]

In May and early June of that year, young Sluskin attended the Treaty Council of Walla Walla to look after Yakama Chief Owhi's horses.[33] About sixty years later, McWhorter interviewed him regarding that event and his service as a guide for an ascent of Tahoma's (Mount Rainier's) northern face that took place later that summer or a few years thereafter.[34] Because of the precision of the events and places described, Sluskin's favorable reputation for honesty, and the meticulous nature of McWhorter's work, we believe that the account truly details the earliest known summit ascent of Mount Rainier by non-Indigenous people, even though the names of two climbers guided by Sluskin remain unknown.

According to McWhorter's (1917) account, sometime after the 1855 Walla Walla council, Sluskin and his people were camped a few miles northeast of the present city of Yakima when they were approached by two "King George men" (white men) in search of a guide to Tahoma, the "White Mountain." The men identified themselves as employees of Governor Stevens who were working on reservation lines established at Walla Walla. At the urging of elders, Sluskin, who had learned the route(s) from his father, agreed to serve as their guide.

With pack and saddle horses, Sluskin and the two men camped the first night at the mouth of the Tieton River, probably at its confluence with the Naches River northwest of the present town of Naches, Washington. Sluskin remarked that they caught "lots of trout –plenty of fish" at that location. The next day, they continued up stream, camping in the Tieton Basin about three miles northeast of Goose Egg Mountain and Rimrock Lake Dam, just off modern US Highway 12. Here, they again caught more trout.

From Tieton Basin, the group traveled northwest through what is now the William O. Douglas Wilderness to camp at Fish Lake at the head of Bumping Creek east of Carlton Pass. On the fourth day, they "went on [a] big ridge near the head of Naches River and camped." This is the approximate route of the Pacific Crest Trail between Carlton Pass and the Chinook Pass-Tipsoo Lake area on Mount Rainier National Park's eastern boundary between Naches Peak and Yakima Peak. In the 19th and early 20th centuries, this route linked Mount Rainier to Yakama country east of the Cascade Divide (see map Figure 2.2). The location offered a clear view of the "big White Mountain" as the men used a glass (telescope) to "look all around" (McWhorter 1917:98).

On the fifth day, the men worked their way down the Klikitat River drainage that separates Mount Rainier from the geologically older Cascade Range; crossing the turbid White River near the terminus of White River (Emmons) Glacier which, at the time, extended to within a mile of the park's present-day White River Campground. Climbing the river's northern slope, the group came onto Sunrise Ridge-Yakima Park's (map Figure 2.2) patchy grassland. They camped that night at what probably was Shadow Lake (*Wah-tum*) and ate deer (*yamis*) shot while crossing White River.

[32] It is almost certain that this Sluskin returned to Mount Rainier many times throughout his life, and is the person who, in 1915 with a band of Yakama hunters, was intercepted by park rangers; setting into motion a chain of events that ultimately led to the prohibition of Indigenous hunting in the park, and indeed, in the National Park Service generally.
[33] The Council established basic parameters for three treaties related to inland Washington and Oregon Indian bands and tribes –the 1855 Treaty with the Nez Perce, the 1855 Treaty with the Yakima, and the 1855 Treaty with the Walla Walla, Cayuse, and Umatilla.
[34] Sluskin was uncertain if the event took place in 1855 or a year or two later. Mount Rainier climbing historian Aubrey Haines (1999:15 and 218) believes the year was indeed 1855.

Sluskin noted abundant presence of mountain sheep or goat (*wou* or *wau*)[35] on the eastern slope of Burroughs Mountain, and/or on Sourdough Ridge.[36] Complaining that the big goats were "too wild" when not with young, Sluiskin refused to attempt to catch one despite urging and promises of payment by the King George men.

On the sixth day, the men walked west across the mountain's northern slope; passing though upper Berkeley Park, over the saddle between Burroughs and Skyscraper Mountains, and across the toe of Winthrop Glacier before camping at Mystic Lake (Figure 2.2) shortly after noon. The next morning, the two King George men surveyed the mountain's northern slope with a telescope and asked Sluiskin if he could take them to the top. Sluskin declined saying he did not know the trail and was wary of "too many splits" (crevasses) in the ice. He denied fear of bad spirits (a presumption that later became a popular explanation for Indigenous reluctance to guide white climbers to the summit), suggesting "Maybe that is all lie" (McWhorter 1917, 98). They remained that night at Mystic Lake preparing to climb the mountain in the morning.

The next day, Governor Stevens' unnamed surveyors appear to have climbed Mount Rainier; probably heading up-slope on Winthrop Glacier to Columbia Crest (Figure 2.2) on the northeastern side of the summit.[37] McWhorter's (1917:199) account describes Sluskin's version of the story.

> Next morning I saw them put lunch in pockets and leave camp. …they start up the mountain. They put on shoes to walk on ice …shoes with nails in two places like this [heel and toe]. They started early at daylight and came back after dark same day. I stayed in camp all day and thought they fell in ice split and died. At night I saw smoke go up from top of mountain, and I heard it like low thunder (probably an avalanche on Willis Wall).
>
> The white men told me they went on top of mountain and looked with glass along Cascades toward Okanogan and British Columbia, Lake Chelan and everywhere. They said 'We find lines.' They told me they set stick or rock on top of mountain. …They said 'Ice all over top, lake in center, and smoke [or steam] coming out all around like sweat-house.'

Following the climb, on the ninth day out from Yakama, Sluskin accepted payment gifts and began his return-trip, retracing his steps in two and a half days. Presumably, the surveyors returned to Olympia, but Sluskin did not hear from them again.

Additional Thoughts about the Elder Sluskin and Mount Rainier

Despite the lingering anonymity of the two "King George men" surveyors, we believe that detailed information relayed in Sluskin's account of the 1855 expedition attests to the overall accuracy of the event, truly documenting the earliest known expedition to the mountain's Columbia Crest summit by non-Indigenous people.

[35] Various accounts appear to refer to *wau* interchangeably as mountain goats or mountain sheep. These are most likely mountain goats common to rugged mid to upper elevation landscapes on Mount Rainier. While found in parts of the Cascade Range to the east, mountain sheep have never been observed unequivocally on Mount Rainier proper.
[36] Because Sluskin called the landform *Sum-sum* (sharp ridge), Sourdough Ridge seems most likely.
[37] While the Liberty Ridge route above Carbon Glacier is also possible, the ridge is treacherous even for well-equipped modern climbers. Furthermore, the views from the top described in Sluskin's account are more consistent with the Winthrop Glacier route further east.

Equally interesting are Sluskin's answers to McWhorter's inquiries about other strangers visiting "White Mountain" in the early days. Soon, "not many snows" after guiding the surveyors (presumably in late 1855 or early 1856), he reports hearing of four white men in the Cowlitz (river drainage southeast of Mount Rainier) searching for a mine reported by another Yakama –Poniah. Among them was James Longmire who was involved with the subsequent Hazard Stevens, P.B. Van Trump climb in 1870 (see below) and went on to become a major figure in Mount Rainier history. Sluskin also clarified errors in earlier newspaper account of the 1855 events. Responding to further questions by McWhorter (1917:100) he emphasized that:

> I did not think either of the men I took to Tahoma were sons of Governor Stevens. They only worked for him. …I did not know their names. They did not tell me.
>
> There were no white people living here when I guided to the white mountain. We saw lots of deer, lots of sheep and plenty of *yeet-tah* [goats].
>
> The name of the white mountain is Tahoma. It was called that before the white people came. It was Tahoma, standing up to the skies. We sometimes called it the White Mountain.
>
> We met but two persons, Indian boys… Met them this side of Tieton Basin (on the second day out from Yakama).

Sluskin also tried to clarify confusion surrounding his trip in 1855 versus the Stevens-Van Trump expedition in 1870. He states that:

> I am no relation to the *Sluiskin* …with the crippled hand [guide to Stevens-Van Trump expedition]. He was half-brother to my wife on the father's side. He used to live at Thoppenish …about six miles below *Mool-mool* [Fort Simcoe]. He went to Cowlitz and married two sisters, daughters of Poniu (Poniah). …His little finger on right hand was gone. He was drowned in the Yakima River several years ago.[38]

With this statement, Sluskin hoped to staunch disbelief regarding his 1855 journey to the mountain, and to end continuing speculation that it was he, and not his wife's brother, Sluiskin, that guided Hazard Stevens and P.B. Van Trump to the south side of Mount rainier 15 years later.

<u>Relevance to Indigenous People and Mount Rainier</u>

Aside from documenting what probably was the first non-Indigenous ascent of Mount Rainier, Sluskin's account offers several insights into precontact Indigenous land-use practices on the mountain. First, Sluskin's reference to learning the route from his father indicates, not surprisingly, that mountain use was established prior to historical contact with non-Indigenous people. We also learn of another established trail linking the mountain to people east of the Cascades that lay south of the Naches Pass route traveled by Lt. Johnson in 1841. Furthermore, Sluskin alludes to food resources that could be procured along the way –trout in rivers and lakes east of the Cascade Crest, and deer and mountain goats on Mount Rainier proper. His reluctance to attempt to catch adult mountain goats when not encumbered with young implies that Indigenous people had established hunting practices for this important resource geared toward early summer when kids were still part of the herds. As with Tolmie's 1833 account, Sluskin's story shows direct use of Mount Rainier as a travel *destination,* rather than simply as a point on routes connecting people and places in lowland settings on either side.

[38] McWhorter's interview took place in 1916, so the elder Sluskin's wife's half-brother Sluiskin probably drowned ca. 1910 to 1913. Chief Sluskin, subject of the present account, died December 30, 1917 (Haines 1999:15).

Augustus Kautz-Wapowety Ascent: 1857[39]

In 1857, Lieutenant Augustus Kautz was stationed at Fort Steilacoom, a U.S. Army post inland east of Puget sound (map Figure 2.4), west of the present town of Lakewood, Washington, and north of Joint Base Lewis-McCord. At that time, Leschi, a Nisqually tribal leader involved in the Puget Sound War of 1855-1856, was imprisoned at the Fort awaiting what would be his eventual execution in 1858.[40] Lt. Kautz, who was planning an ascent of Mount Rainier at the time, consulted with Leschi about knowledgeable guides and routes to the mountain. Leschi recommended a route adjacent to the Nisqually River on the southwestern side of the mountain. He also recommended Nisqually tribal member Wapowety as a guide for the expedition.

The Kautz mountaineering party of five left Fort Steilacoom on July 8, 1857 traveling south to the eastern margin of the "Nisqually Plain" (probably near the modern town of Yelm shown on Figure 2.4) where they met their guide, Wapowety, at the Nisqually Indian Reservation. From there, they traveled southeast along an established trail; observing along the way *Pawhtummi* and *Koaptl* camas prairies used seasonally by Indigenous people to collect the valuable, and storable, subsistence resource. The party camped the second evening at Mashel Prairie (Figure 2.4) near the modern town of Eatonville. Kautz notes that, on patrol 15 months earlier, he had found a small group of Meshal-Nisqually Indians camped at the fork of the Mashel and Nisqually Rivers. These were survivors of indiscriminate killing during the Puget Sound War by Washington territorial volunteers. At the time, the Indians were building in-stream salmon traps while hiding from further reprisals.

Moving on from Mashel Prairie, Lt. Kautz and party continued around steep Nisqually waterfalls, then up the Nisqually River terrace/floodplain to the toe of the Nisqually Glacier on Mount Rainier. From there, they climbed to the glacier's surface and continued upslope, making camp on the glacier's lateral moraine at upper tree-line (krummholz). The next day, deviating northwest onto Wilson and Kautz Glaciers, Kautz, Wapowety,[41] surgeon Robert Orr Craig, and Pvts. William Carrol and Nicholas Douge continued their climb toward the summit, probably climbing the upper margin of Kautz Glacier below 14,158 ft Point Success. In the afternoon, Wapowety and Pvt. William Carrol returned to camp. Climbing higher, Kautz and Douge, with Dr. Craig lagging behind, passed onto the broad saddle between Success Point and the southwestern edge of Columbia Crest's east crater. Kautz continued on alone for about 15 minutes then turned back to rejoin Douge and the Doctor. Kautz considered the broad, low gradient terrain of the ca. 14,000 ft high saddle effectively to be the mountain's top, though he alluded to "higher points yet" (Meany 1916:86).[42] At about 6:00 pm the party began their descent. After spending another night at their krummholz camp, the group returned to Fort Steilacoom about 12 days after their departure on what Kautz had planned to be a six-day trip.

Relevance to Indigenous People and Mount Rainier

The Kautz and Wapowety journey to Mount Rainier clearly demonstrates Indigenous knowledge of the mountain's southern and western landscapes and access routes. It also brings to our attention the territorial militia massacre of Nisqually people (sq̓ʷaliʔabš) near Mashel Prairie –a tragic event that nonetheless shows familiarity with, and use of, inland terrain on the Nisqually River drainage well inland of the Puget Sound. Furthermore, Kautz' observations hint at the

[39] After Meany 1916:73-93; Haines 1999:20-28; and Molenaar 2011:53-55.
[40] The Puget Sound War of 1855-1856 had its origins in Indian grievances related to Washington Territorial Governor Isaac Stevens' 1854 Treaty of Medicine Creek.
[41] Wapowety Cleaver just west of this route is named for Kautz' Nisqually Indian guide.
[42] Probably the southern and western edges of Columbia Crest's east and west craters.

importance of camas, salmon, and hunting-based subsistence practices. While he did not report observing Indigenous people, other than Wapowety, on the mountain proper, the reported presence of trails and knowledge of the area imply that Takhóma was incorporated into broader Indigenous subsistence practices prior to catastrophic population loss to introduced diseases, treaty-based territorial restrictions of the mid-1800s, and draconian military practices of the Puget Sound War.

Hazard Stevens-P.B. Van Trump Ascent: 1870

Hazard Stevens, son of former Washington Territorial Governor Isaac Stevens,[43] returned to his family's home in Olympia, Washington at the close of the U.S. Civil War. P.B. Van Trump also lived in Olympia at the time, where he worked for the territorial government. Both men were fascinated by the magnificence of Mount Rainier which they referred to by the local Indigenous name of *Tak-ho'ma* or *Ta-ho'ma* (Meany 1916:95-134). In August 1870, Stevens, Van Trump, and Edmond Colman –a Victoria-based artist and alpinist– traveled to Elkane Longmire's home on Lacamas Prairie southeast of Olympia (Figure 2.4). There, they were joined by Elkane's father James who had previously agreed to guide them to the southern flank of Mount Rainier, via the overgrown Nisqually-Cowlitz trail, where they planned to hire an Indigenous guide for the remainder of what they believed would be Takhóma's first ascent.

Initially, the party hiked with pack mules up the Nisqually River bottom, confused by fallen timber and "bewildering tracks of Indians," to a river-fording place opposite a tall sand and gravel bluff (Meany 1916:101). Climbing the bluff via a zig-zagging trail, the group eventually reached Mashel Prairie where they camped in the general vicinity of Lt. Kautz' camp thirteen years earlier. Following the Mashel River the next morning, Longmire relayed, like Kautz, the story of the Mashel massacre of 1856 (Meany 1916:103):

> …On that tree, Maxon's company hanged two Indians in the war of '56. Ski-hi and his band, after many depredations upon the settlements, were encamped on the Mishell, a mile distant, in fancied security, when Maxon and his men surprised them and cut off every soul except the two prisoners whom they hanged here.[44]

After two days of difficult travel along the Nisqually's northern shore, and passing an abandoned Indian residence, the group camped at Copper Creek –now a popular café and resort area near the park's southwestern corner. From there, they continued to flank the Nisqually River, crossing Goat Creek and Tahoma Creek before re-crossing the Nisqually and deviating to the south, eventually reaching Bear Prairie, a seasonally inundated wet-meadow that still exists adjacent to Skate Creek south of the park (map Figures 2.2 and 2.4). Coleman remained at Bear Prairie while Stevens and Longmire continued down the Skate Creek trail to its confluence with the Cowlitz River where they hoped to find a guide among a band of Indians that "usually made their headquarters at this point" (Meany 1916:106).

Stevens and Longmire found the Cowlitz River village deserted save for a small temporary shelter occupied by a man identifying himself as "Sluiskin," his wife, and two children.[45]

[43] Isaac Stevens was Washington's first Territorial Governor 1853-1857. He also served as Washington's Territorial Delegate to the U.S. House of Representatives 1857-1861. Isaac Stevens was killed during the Civil War at the Battle of Chantilly in 1862. His son, Hazard Stevens was wounded in the same battle.
[44] Nisqually oral history also records the massacre thanks to survivors not mentioned by Longmire.
[45] This is Sluiskin "with the crippled hand" mentioned by Sluskin, the Yakama guide to the north-side ascent 1855, during his interview with Luculus McWhorter (1917:100). The extended family name and his dress, described by Stevens as "buckskin shirt and leggings, with a striped woolen breech-clout, …" are consistent

Sluiskin, who claimed to have hunted mountain sheep [mountain goats][46] on Takhóma's upper elevation snowfields, agreed to guide the party and pledged to meet them at Bear Prairie the following day. He did so, and on the day after, Sluiskin, Stevens, Van Trump, and Colman set out to cross through, and over, the Tatoosh Range separating Bear Prairie from Mount Rainier proper. Longmire returned to Yelm. Sluiskin's family remained at Bear Prairie.

That night, Sluiskin, Van Trump, and Stevens spent the night in a "well-sheltered grassy hollow in the mountain top" where Sluiskin had often camped in the past –probably Lookout Mountain south of the modern park boundary due east of Bear Prairie (cf., A. Smith 2006:64-65). Mr. Colman lost his gear en route and turned back on the first day. Continuing north-northeast the next morning, the crew scrambled across the Tatoosh ridgeline (Figure 2.2), gaining, by mid-day, their first unfettered view of Mount Rainier from the Tatoosh Range's "highest crest." [47] After several hours more, they reached a saddle with "a lofty peak …on either side"[48] that provided a descent route into the upper Paradise River valley separating Takhóma from the Tatoosh Range to the south. After descending, the three began climbing again up one of the ridge-lines on Mount Rainier's southern slope –almost certainly Mazama Ridge (Figure 2.2)– until gaining the subalpine-upper forest ecotone where they camped in "an aromatic grove of balsam firs" (Meany 1916:113-114).

Sluiskin, who until this point appears to have doubted Stevens and Van Trump's determination to climb Takhóma, exhorted them to discontinue the quest. Noting the many perils of a climb fraught with unstable rock, avalanches, and crevasses beyond the capabilities of even mountain goats, he urged them to turn back. In support, he cited the adventures of his Yakama grandfather who climbed nearly to the summit, but after seeing a "fiery lake and the infernal demon [that dwells on the summit]… he fled down the mountain, glad to escape with his life" (Meany 1916:114-115, 133-134). Heedless of Sluiskin's warning, they moved camp to the head of Mazama Ridge near to what is now Sluiskin Falls where Sluiskin agreed to wait for two (or three) days before traveling to Olympia to inform friends of Stevens and Van Trump's deaths.

Stevens and Van Trump did not die, but rather managed to reach Takhóma's summit after 11 difficult hours of climbing –a climb that included scaling Point Success before cresting the mountain's west crater. Being too late to return to Sluiskin's camp, the pair found the west summit crater replete with "numerous jets of steam and smoke." There, they found an ice cave in which they built a small rock shelter around a steam jet and survived the night.[49] The following day, Stevens scrambled up a mound of rocks on the east side of the crater that they called "Crater Peak" where he left an inscribed brass plate. After returning to the crater, the pair began their descent; essentially, except for Point Success, retracing their route downslope. Stevens and an injured Van Trump[50] returned to camp late in the afternoon. Sluiskin, who believed they had died

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with Yakama tribal affiliation east of the Cascades; suggesting relatively free movement among people living on both sides of the Cascade crest –a pattern observed by Lt. Johnson in 1841.

[46] Stevens appears to refer to *mountain sheep* and *mountain goat* interchangeably in his account.

[47] Probably 6,231 ft Wahpanayo Peak located within park boundaries south of Mount Rainier.

[48] The saddle between Lane and Denman Peaks is the first landform meeting this description that the party would have encountered. The second option, a saddle between Denman or Plummer and Pinnacle Peaks would have provided a comparable descent opportunity. We feel that the first encountered Lane-Denman saddle best fits Stevens' description, though climbing historian Aubrey Haines (1991:42), whose opinion we very much respect, favors the latter.

[49] Believing they could ascend and return in a single day, Stevens and Van Trump unwisely left behind their heavy coats and blankets. Note that the account of multiple steam vents is consistent with the reports from Sluskin's "King George men" of their north-side summit experience in 1855.

[50] Van Trump was injured in a fall onto jagged rocks not far from camp.

on the mountain, was away hunting and considering how to report their demise. In Sluiskin's absence, they found and roasted marmot meat that Sluiskin had collected nearby.[51] After his return, Sluiskin reunited with the clearly not-dead Stevens and Van Trump later that evening.

The following day, the party began their return to Bear Prairie. Descending Mazama Ridge to "Clear Creek" (Paradise River or more likely its Tatoosh Creek tributary) first crossed four days past. Here, Van Trump was left to nurse his wounds while Stevens and Sluiskin followed, against Sluiskin's wishes, Tatoosh-Paradise/Clear Creek downstream to the main stem of the Nisqually River.[52] After following the river several miles, they veered south (probably in the vicinity of the park's present Longmire administrative center) toward Bear Prairie. Now convinced that he could not persuade them to reuse the Tatoosh route, Sluiskin took the lead, guiding Stevens to Bear Prairie camp in about six hours.[53] There they met Colman and Sluiskin's family. Bringing two horses, Sluiskin and his son retrieved Van Trump the next day and returned with him to camp now moved to the Nisqually River trail to shorten Van Trump's journey. Stevens, Van Trump and Colman spent three more rainy days at Nisqually camp while Sluiskin took the horses back to Bear Prairie where the grass made better forage. On the second morning, Sluiskin returned Stevens' horse, and, noting the absence of adequate food at Bear Prairie, returned to the Cowlitz with his family. After another night, Stevens, Van Trump, and Colman began their return to Olympia via the rain-swollen Nisqually River and Yelm Prairie route, stopping at Elkane and James Longmire's farms on the way.

<u>Relevance to Indigenous People and Mount Rainier</u>

Hazard Stevens account of the Mount Rainier expedition provides the earliest overarching description of the mountain's topography, glacier, and river patterns as viewed from high elevation. His account also notes some of the natural resources (e.g., mountain goats, marmots, game-birds, and huckleberries) that could be obtained on the mountain. Importantly, Sluiskin's critical involvement in the event helps us understand Indigenous use of the mountain, as well as attitudes toward white settlers in the late 1800s. First, it clearly demonstrates Indigenous awareness of mountain terrain, travel routes, and resources –knowledge certainly not limited to Sluiskin alone. Stevens believed that Sluiskin's reluctance to guide them via the shorter and easier Nisqually River-Clear Creek route demonstrated reluctance to share this information with, and possibly discourage use by, white settlers that were increasingly dominating the region. It also may have reflected Sluiskin's reluctance to deviate from what Allan Smith believed to be generally accepted Upper Cowlitz/Taidnapam territory into Nisqually territory west of the Tatoosh ridgeline (A. Smith 2006:62, 66-67), implying multi-tribal use of the mountain within roughly defined, but generally understood, territorial boundaries.

Possible territorial concerns notwithstanding, Sluiskin, almost certainly a Yakama dwelling in Taidnapam traditional territory and traveling, albeit reluctantly, into Meshal-Nisqually territory further demonstrates the logistic and social mobility of Indigenous people who were able to range widely across the region despite social and linguistic differences among them. Indeed, Sluiskin's mobility conforms to experiences of Lt. Johnson thirty years earlier when Indigenous

[51] Though unsuccessful, Sluiskin also had hunted mountain goat, tracks and wool of which were common on the lower snowfields.
[52] Sluiskin attempted to redirect the route back onto the Tatoosh ridgeline, the original ingress route, now resisted by Stevens.
[53] It is not clear why Sluiskin used the more difficult Tatoosh route in the first place. Stevens believed it was to discourage exploration of as-yet-uncharted Indian country by white settlers, but he also may have been trying to avoid trespass on what he considered to be Nisqually territory.

people joined, departed, and rejoined his Wilkes Expedition party during its 1841 round-trip journey across Naches Pass to eastern Washington.

Stevens Mount Rainier account also provides glimpses into some of the plant and animal resources available on the mountain. Losing part of their food due to Colman's retreat on the first day, the party ate berries (huckleberries), quail (probably grouse or ptarmigan), and marmot all shot by Sluiskin. Sluiskin also alluded to past excursions to Takhóma to hunt mountain goats, and indeed attempted to do so while Stevens and Van Trump made their final ascent. Goats were valued by Indigenous people especially for their hides and wool which were water repellent, warm, and long-lasting.

Finally, Sluiskin's warning to Stevens and Van Trump (see Meany 1916:132-134 for Stevens Transcription), suggests that Indigenous people summited the mountain prior to the arrival of Euro-American settlers. Sluiskin's account of his grandfather's climb with observations regarding hazards after an easy beginning (e.g., bitter cold, avalanches, furious summit winds, and a demon-inhabited fiery lake) are remarkably similar to conditions described by Stevens –given some dramatic license for description of the fumaroles and steam vents in the summit crater in which Stevens and Van Trump spent the night. In any case, now knowing that Indigenous people have used Takhóma's upper elevation landscapes for over 9,500 years, it is reasonable to assume that they climbed to its summit periodically, perhaps frequently, during that extended period of time.

S.F. Emmons-A.D. Wilson Ascent: 1870[54]

Just two months after Stevens and Van Trump climbed Mount Rainier, two U.S. Geological Survey employees duplicated the effort, albeit by a different route up its lower slopes. After completing a survey of the 40th Parallel for the U.S. Corps of Engineers, Geological Survey, S.F. Emmons and A.D. Wilson were sent north by their director, Clarence King, to collect data on volcanism (Haines 1999:51-52). After meeting with Hazard Stevens in late September, the pair determined to climb the mountain to collect topographic and geological data on Mount Rainier which they referred to by a version of its traditional name, *Tachoma*.

On September 27, with guidance by a reluctant James Longmire, Emmons and Wilson set out for the mountain retracing essentially the same Yelm Prairie-Nisqually River route to the Nisqually crossing below Bear Prairie. Rather than proceeding on to Bear Prairie, however, they attempted to reach Paradise Valley via the Nisqually River floodplain. Encumbered by pack animals laden with heavy equipment, they could not broach rockslides where the canyon narrows between Eagle Peak and Ricksecker Point (Haines 1999:53). After a brief visit to the Nisqually Glacier snout on foot, they retreated back to camp, then headed east, via Longmire's re-blazed old Indigenous trail past Bear Prairie to the Yakama encampment on the upper Cowlitz River visited two months earlier by Longmire and Stevens. Here, they found a group of Indians, presumably Yakamas, living in cedar slab lean-tos.[55] While Sluiskin and family were absent, Emmons and Wilson engaged two people to guide them to Takhóma. Rather than taking them back to Bear Prairie and up Sluiskin's torturous Tatoosh route, the guides headed directly north-northwest via Backbone Ridge and Cowlitz Divide that separate Ohanapecosh and Cowlitz drainages (Figure

[54] After Haines 1999:51-57 and Molenaar 2011:64-65.
[55] A common form of short-term, tent-like, shelter.

2.2). The route afforded relatively easy going, allowing the group to set up camp at a point overlooking Cowlitz Glacier 1,500 ft below (Haines 1999:53).[56]

Believing that Clarence King would join them, Emmons and Wilson spent several days exploring the mountain's upper eastern and southeastern terrain and laying out a baseline for subsequent mapping. They continued until a storm forced them to shelter for four days.[57] After the storm cleared, the pair moved to a high camp west of Cowlitz Glacier where a dead tree was found for firewood. The next day, October 17, they reached the summit via Cowlitz Cleaver, around the western edge of Gibraltar Rock, up the narrow chute above Nisqually Glacier climbed by Stevens and Van Trump two months earlier, and on to the northeast rim of Columbia Crest. On the crest, they observed the large northeast-trending White River Glacier passed by the elder Sluskin and his two "King George men" 15 years earlier. This was the glacier that would later be re-named in Emmons' honor.

After two hours on the summit, Emmons and Wilson descended to camp at the base of Cowlitz Cleaver. The next day they descended to the base of the mountain presumably via the same Cowlitz Divide-Backbone Ridge route they had used for the ascent. Fearing that they could not duplicate the return to Olympia without Longmire's guidance, and also finding themselves on the southeastern margin of the mountain near Carlton and Cowlitz Passes over the Cascade Crest (see Figure 2.4 and A. Smith 2006:155), Emmons and Wilson worked their way east across the Cascades to the Yakama Indian Agency at Fort Simcoe.

<u>Relevance to Indigenous People and Mount Rainier</u>

Emmons and Wilson's efforts provided the first accurate map of Mount Rainier's summit, set basic parameters for subsequent topographic work, and described the mountain's most prominent glaciers. The expedition, in concert with subsequent archaeological work, also extends our understanding of the wide-spread character and long history of Indigenous use of the mountain. Emmons and Wilson's Yakama guides followed a route that began at the Ohanapecosh-Cowlitz River confluence, continuing up Cowlitz Divide to Cowlitz Park and beyond –a route now known to be scattered with precontact archaeological sites dominated by varying densities of chipped-stone tools.

The Cowlitz Divide archaeological sites indicate repeated travel to, and use of, upland habitats on Mount Rainier during the precontact past. Importantly, sites tested by U.S. Forest Service archaeologists at Beech Creek near Packwood (Mack, Chatters, and Prentiss 2010), and by Greg Burtchard, Benjamin Diaz, Eric Gleason, Jacqueline Cheung and other NPS archaeologists at Ohanapecosh Campground, suggest that such practices have gone on for 9,000 years or more. It seems clear that Emmons and Wilson's Native American guides followed a well-known route passed down to them through thousands of years –use that continued into the late 1800s.

[56] If the description is accurate, it is likely that the party camped somewhere on the western margin of Cowlitz Park at about 6,000 to 6,500 ft. It is important to note, that Cowlitz Divide provides rapid access to Mount Rainier uplands on its southeastern side. Archaeological sites documented near the present town of Packwood, WA, in the park's Ohanapecosh Campground, higher along the Cowlitz Divide, and in Cowlitz Park indicate long-term, repeated, use of this route to access montane highlands during the precontact past. It is not surprising that Indigenous people guiding Emmons, Wilson, and Longmire were aware of this route.

[57] Longmire and the remaining Indian guide returned down-slope to avoid the storm (Haines 1999:54).

Northern Pacific Railroad-Bailey Willis Explorations: 1870-1883[58]

During the 1870s, the Northern Pacific Railroad Company was constructing its transcontinental line across the northern tier of the United States between the Great Lakes and the Pacific Northwest. When complete, the line would permit rapid transport of goods and people across the northern U.S. and into the region in much the same manner as had been anticipated by the search for the mythical *Northwest Passage* watercourse that, in part, stimulated Captain George Vancouver's Puget sound explorations in 1792.

While not yet linked to its eastern line, by 1873, the western portion of the Northern Pacific Railway had completed its line between the Columbia River and the growing city of Tacoma on the Puget Sound about 40 miles northwest of Mount Rainier. By 1877, the company had extended a spur southeast to Wilkeson about 20 miles northwest of Mount Rainier to service newly-discovered coal fields in the area (see Figure 2.4). About this time, the Northern Pacific hired young geologist Bailey Willis to determine the extent of the coal fields northwest of the mountain, and to explore and map the forested landscapes on its western and northern slopes. Based on his early work, Willis mapped its principal glaciers.[59] By 1881, he had built a trail south from Wilkeson to the Mowich River (then mapped as the northernmost fork of the Puyallup River) where he constructed a large log building from which he continued to conduct his coal-prospecting and exploration activities.

Beyond coal extraction, Willis and Northern Pacific Railroad executives recognized the tourist-attracting potential of the beautiful high-elevation parklands on Mount Rainier's northwestern slopes (e.g., Spray Park, Mist Park, and Seattle Park). To ease access through this heavily forested and deeply dissected terrain, Willis, on behalf of the Northern Pacific, opened a spur trail to Spray Park (Figure 2.5) in 1883 in the hope of encouraging travel to the area. He also wrote an article for *Northwest Magazine* recounting some of his observations and extolling the rugged beauty of the area.[60] Furthermore, Willis advocated for renaming the mountain *Tacoma* to honor Indigenous terminology and the city of the railroad's northwestern terminus. By this time, too, Willis had joined the U.S. Geological survey; later surveying Mount Rainier glaciers more thoroughly, and actively advocating for the creation of Mount Rainier National Park.

<u>Relevance to Indigenous People and Mount Rainier</u>

Willis' contributions toward exploring and developing the northwestern margin of Mount Rainier, impressive as they were, tell us more about the changing political and economic climate than about Indigenous land-use patterns uses *per se.* Indeed, his work was directly associated with expansion of national interests (especially Northern Pacific Railroad Company interests) into lands that would later become Mount Rainier National Park. Indigenous uses of the mountain and its surrounding region continued in an increasingly restricted manner in competition with rapidly expanding agricultural, tourist, mining, and other commercial and residential activities.

The Late Period: Late 1800s Tourism, Climbing, and Mount Rainier National Park

Following Emmons and Wilson's 1870 expedition, and Bailey Willis' work notwithstanding, Mount Rainier experienced only limited use by non-Indigenous people through the remainder of the 1870s. Portents of things to come, however, lay in completion of the

[58] After Meany 1916:142-149; Haines 1999:58-59; and Catton 1996.
[59] Willis' map appeared as part of a geological report in the Tenth Census of the United States in 1880 (Haines 1999:58-59, 222).
[60] A reprint of the article is available in Meany's (1916:142-149) *Mount Rainier; A Record of Exploration.*

Northern Pacific Railroad Company's trans-continental line and coincident completion of Bailey Willis' trail to Spray Park as described above. On September 8, 1883, A ceremonial "golden" spike was hammered into place at Gold Creek, Montana, formally connecting eastern and western sections of the Northern Pacific line. Almost immediately, the gradually increasing flow of people and goods from the east became a virtual torrent –a flood that dramatically accelerated changes to land-use and social patterns that had begun less than 100 years earlier.

Mount Rainier was not immune to these processes. Substantial increases in the rate and scope of climbing and scientific excursions, mining and timber ventures, recreation and other western-oriented ventures took place throughout the final two decades of the 19th century; all combining to interfere with Indigenous land-use practices that had been developed over the preceding several thousand years. Aubrey Haines (1999:80) captures the process succinctly:

> The Northern Pacific Railroad made Mount Rainier accessible, but that was not the whole of its effect. Railroad and steamship company advertising in the East and Europe, during the decade prior to Statehood, resulted in population growth unequalled anywhere else in the United States. Many of the new settlers were not satisfied with what they found in the towns, on the prairies, and along the rivers, where lay the loose web of settlement about Puget Sound. They pushed out into remote valleys and penetrated the foothills of the Cascades in search of homesteads –forcing the wilderness to retreat before winding dirt roads and the little towns that followed them. [61]

Accounts related to some of these activities included information related to continuing use by Indigenous people; but most focused more directly on their own objectives rather than on the increasingly marginalized Native American presence on "White Mountain" and its surrounding landscapes. Here, we draw attention briefly to selected events that took place at Mount Rainier during this period so that readers may better understand changes that were taking place as traditional Indigenous land-use practices were subsumed by the expanding United States' industrial-agricultural-recreational system throughout the region.

Trails, Tourism, and Competition with Indigenous Land-use Patterns: the 1880s

Indigenous use of Mount Rainier landscapes, already hindered by population loss and relocation, came under additional pressure from commercial and recreational uses by the growing non-Indigenous population throughout the decade. New rails and trails improved access to the mountain while reducing the need for Indigenous guides. Lax hunting regulations permitted shooting for sport rather than subsistence, diminishing game reserves. Cumulatively, the changes set the stage for more dramatic changes to come in the final decade of the century.

<u>P.J. Flint and party Little Tahoma Excursion: 1881</u>

Perhaps the first recorded sightseeing venture to Mount Rainier involved a party of eastern Washington cattlemen and friends traveling from Union Gap to Mount Rainier under the leadership of P.J. Flint and guidance of an unnamed Yakama Indian (McIntyre (1952, 21). Aubrey Haines (1999:222) summarizes McIntyre's account, noting that "the group traveled up the Tieton River and Indian Creek to Cowlitz Pass, then followed Summit Creek and the Ohanapecosh River to the point of Backbone Ridge, up which they passed to the Cowlitz Divide and Cowlitz Park. …"

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[61] Also see continuing discussion by Haines (1999:80-81) regarding the 1884-1885 construction of Longmire's trail from Yelm to his Medical Springs at 2,700 ft on Mount Rainier; the 1885 Kernahan Ranch homestead at the base of the mountain; the origin of "Camp of the Clouds" at 5,400 ft Paradise Park in 1886; and Ingraham's unsuccessful 1886 attempt to climb the mountain from the north by way of the trail built by Bailey Willis.

Apparently, horses were taken across Whitman Glacier to the base of Little Tahoma Peak on Mount Rainier's western flank without attempting to climb the mountain.

Please note that the route taken was nearly identical to the Indigenous-guided mid-mountain route followed by Emmons and Wilson in 1870. Reuse of the route further confirms the long-standing presence, and routine use, of this trail to the mountain's upland parks (e.g., Cowlitz Park, Indian Bar, and Ohanapecosh Park) during the precontact and proto-historic past.

G.B. Bayley, P.B. Van Trump, James Longmire, William Ewing, Sutulic Ascent: 1883[62]

Inspired by a trip to Spray Park via the new Bailey Willis' trail, mountain climber George Bayley determined to ascend Mount Rainier, albeit by a route less hazardous than those visible from Spray Park. Accompanied by P.B. Van Trump, James Longmire, William Ewing, and Sutulic (a Klikitat/Meshal Nisqually Indian also known as *Indian Henry*), Bayley completed the venture in late summer 1883. As trail guide, Sutulic took the party on a route up the Nisqually River and through what would later become Longmire Springs and Paradise Camp to set up a base camp at about 5,800 feet. Here the guide stayed while the remainder continued on to set up a high camp near what would later become Camp Muir. Bayley, Van Trump, and Longmire topped the rim of the eastern Columbia Crest crater via Cowlitz Cleaver and upper Ingraham Glacier on August 16. After overnighting in the crater, the three returned to high camp and base camp the next day. Retracing their earlier route, the group returned to Yelm on August 21, 1883.

Even though a few settlers such as Van Trump and Longmire were becoming familiar with mountain travel, most climbers at this time continued to rely on Indigenous guides to Mount Rainier. That reliance was about to end. Indeed in 1884, hoping to capitalize on a growing international interest in natural hot-spring baths, Longmire blazed a trail to the mineral springs discovered along Sutulic's route the previous year. Longmire immediately began developing the springs as rustic destination resort that he named *Longmire Medical Springs* (cf., Burtchard et al. 2012). With Sutulic's help, Longmire and family further promoted tourism into the area by building the first wagon-accessible road to Longmire Medical Springs in 1893. Later, the road served as Mount Rainier National Park's primary entrance route until replaced by *Government Road* in 1907. Sections of this road have been incorporated into modern State Route 706 that provides entrance to the park to the present day.

J. Warner Fobes, George James, Richard O. Wells North-side Ascent: 1884[63]

The Fobes party departed Snohomish on August 11, 1884 intending to summit Mount Rainier from the north. They traveled by rail to Wilkeson and then on foot, via the recently completed Bailey Willis Trail, to subalpine Spray Park. After a failed attempt to ascend from Spray Park via Ptarmigan Ridge, the group set up camp further east between Carbon and Winthrop Glaciers above Mystic Lake (where Sluskin and the "King George" surveyors had camped in 1855). After another attempt on Curtis Ridge east of Willis Wall failed, they retreated to Winthrop Glacier, tried again, and again failed. Between attempts, the climbers shot, or shot at, a bear, wolf, ptarmigan, and mountain goat; wounding the wolf and killing the goat. Using yet another route up Winthrop Glacier, the three finally reached the summit on the following day where they found a flagstaff and engraved lead sheet left by Bayley, Longmire, and Van Trump the previous year. Fobes, James, and Wells returned to basecamp the same day; from there, retracing their steps downslope and back to Snohomish where they arrived on August 25, 1884.

[62] After Haines 1999:60-69.
[63] After Schullery 1987:101-113; Haines 1999:70-79; and Molenaar 2011:69-70.

At the time, the Fobes-James-Wells ascent was one of only a few recorded ventures to Mount Rainier without Indigenous guided assistance, and the first to reach the summit. The Fobes group used the new Northern Pacific rail line to Wilkeson before following the Bailey Willis Trail to Spray Park. These new features permitted relatively easy passage to the mountain's subalpine parklands from which climbers could search out passable routes to the summit.[64] While a few Indigenous-guided trips were to follow, the Fobes excursion with its reckless, and needless, hunting and climbing behavior demonstrates a shift from predominantly purposeful, conservative Indigenous uses of the mountain, to those more oriented to personal pleasure and accomplishment with less thought to maintaining montane resources over the long-term.

Yakama Hunting Party with Allison Brown, Ascent via Ingraham Glacier: 1886[65]

In the autumn of 1886, a party of about 30 Yakamas took a young non-Indigenous reservation resident, Allison Brown, on their annual hunting trip. The group crossed the Cascades via Packwood Pass on horseback to the Ohanapecosh River valley; then proceeded up the Indigenous trail to the Cowlitz Divide, a region once considered to be one of their best hunting grounds. Finding no game that year, the party was compelled to hunt higher, near snowline.

Continuing to experience poor hunting conditions, a group of seven or eight Yakamas decided to pass time by ascending the mountain, taking Brown along. According to Brown, the party skirted the edge of Ohanapecosh Glacier and rode across the Whitman Glacier to Ingraham Glacier at about 8,500 ft. Continuing on-foot with only moccasin footwear, self-cut mountain ash alpenstocks, ropes and axes, the group climbed Ingraham Glacier east of Cathedral Rocks; eventually reaching Takhóma's east crater rim, if not its highest point. They then retreated to spend the night in the semi-shelter of Gibraltar Rock. They descended to join the rest of the hunting group the following day. According to Brown, the combined party continued to hunt in the area for about six weeks.

Presence of a large Yakama hunting party at substantial elevation indicates that regular Indigenous use of the mountain continued into the late 19th century despite increasing presence of non-Indigenous adventurers and tourists (though their presence, and unregulated shooting, probably contributed to the poor hunting conditions in 1886). Brown's account of their climb suggests that the tribal members held no obvious superstitious fear of the mountain as has been attributed to Indigenous people in other historical accounts. It is important to note, too, that the trip was an *annual hunting event* involving substantial time investment rather than a casual excursion. It was a serious food-gathering endeavor conducted by a large group, almost certainly in support of villages possibly situated in the Ohanapecosh-Cowlitz Valley or east of the Cascades where the party originated.

Muir, Van Trump, Ingraham, Warner, and Others: 1888[66]

The final successful ascent of Mount Rainier during the 1880s was initiated by naturalist John Muir who had accepted a book proposal originally intended to focus on his home state of California. Venturing north, he took an interest in Mount Rainier which he climbed with an entourage of experienced local climbers and others; including P.B. Van Trump (guide), A.C. Warner (photographer), William Keith (artist), E.S. Ingraham, D.W. Bass, N.O. Booth, C.V. Piper, Henry Loomis, and John Hays. Following Longmire's trail from Yelm to the southwest flank of

[64] The group's 1884 Winthrop Glacier route probably closely mirrored that taken in 1855 from Mystic Lake by the "King George" surveyors as recounted by the elder Chief Sluskin.
[65] Allison Brown in *The Mountaineer* 1920[XIII]1:49-50 and Haines 1999:81-83.
[66] After Meany 1916:150-158 and Haines 1999:84-94.

Mount Rainier, the group camped along the way at Sutulic's (Indian Henry's) farm near Eatonville, Longmire Medical Springs, and Camp of the Clouds upslope from the park's present Paradise Visitor Center. On August 13, most of the group ascended to high camp on a pumice-laden ridge at ca. 10,000 ft (later renamed Camp Muir in honor of the naturalist). On August 14, Ingraham, Van Trump, Booth, Warner, Bass, Piper, and Muir reached the summit where they remained for about two hours before returning to Camp of the Clouds.[67] The next day, the Muir group began their trip back to the Puget Sound lowlands; some lingering again at Longmire's Medical Springs and at Sutulic's farm on the return.

John Muir's expedition illustrates the increasing ease with which approaches to the mountain could be made. By the end of the decade, travelers could reach Mount Rainier's northwest and southwestern subalpine meadows (such as those shown in Warner's Camp of the Clouds photograph below) by steamer, train, and established horse trails without the need to employ Indigenous guides. What had been solely *Indian Country* for thousands of years was shifting rapidly to *tourist country* as transportation options improved and recreational destinations, such as Longmire Medical Springs, became available. Popular accounts by John Muir and promotions by the Northern Pacific Railroad (among others) added to the mountain's fame; drawing an ever-increasing number of non-Indigenous people to experience its scenic beauty and/or the thrill of conquering its summit. Indigenous use struggled on but did so in a context of elevated competition with the new arrivals, a situation that would become even more challenging in the decades to come.

The Mounting Crescendo; Almost a National Park: the 1890s

The last decade of the 19th century saw a marked increase in use of the mountain for recreational, commercial, and scientific purposes. Active promotion for inclusion in the emerging system of National Parks increased awareness of the mountain nationally, further enhancing its draw to an increasingly mobile population now capable of traveling to the region, and almost to the mountain itself, by rail –and soon, by road.

As tourism grew, logging and mining interests crept closer to the mountain as well. The Klondike gold rush of 1896 brought hordes of would-be miners through Seattle; a city that presented clear views of Mount Rainier where many believed mining fortunes also could be made. The massive mountain, with its exposed geologic structure, diverted the attention of some of those attempting to realize "a dream of riches" by prospecting for gold, or silver, or copper, or coal –all valued at this time of industrial expansion (Burtchard et al. 2017:8-10). Not finding gold or silver, would-be miners filed copper and coal mining claims in numerous locations around the mountain. In Glacier Basin alone, over 40 copper mining claims had been filed by the turn of the 20th century.[68] Many more were filed elsewhere on the mountain.

Indigenous bands and tribes traditionally associated with Mount Rainier were swept into the background by this process; their long-standing traditions essentially ignored by the mounting crescendo of alternative uses associated with the expanding nation. Sutulic, the Meshal-Nisqually person so famously involved with James Longmire, P.B. Van Trump, John Muir, and other Mount Rainier ventures, continued to farm in the Eatonville area and to hunt and gather on the southwest flank of the mountain in an area now known as *Indian Henry's Hunting Grounds* nearly until his death in 1895. Other Indigenous people on all sides of the mountain continued to hunt and gather

[67] A.C. Warner took the first photographs of the mountain's summit while there.
[68] A history of Glacier Basin mining, including a review of mining on Mount Rainier in general, can be found in *Mining Glacier Basin* by Greg Burtchard, Jacqueline Cheung and Robert McIntyre Jr. in 2017.

plants in traditionally used places; but they did so in a context of diminished game availability, and in competition with a wave of newcomers with very different objectives.

Figure 2.9. A.C. Warner Photo of Mount Rainier from Camp of the Clouds, August 1888. High elevation meadows –productive places for precontact hunting and gathering– had become tourist destinations by the late 1800s. Hairy seed-heads shown here are western anemone (*Anemone occidentalis*).[69] Gibraltar Rock is the large cliff-face east (right) of Columbia Crest. (Photo courtesy University of Washington Libraries Digital Collections)

The period's climbing and scientific excursions tell us more about adventure, geology, and the mountain's move toward becoming the nation's fifth National Park than about its continuing use by Indigenous people. Accordingly, below we offer only a brief summary list of the best known of these excursions before moving on to issues more directly involved with continuing Indigenous use of Mount Rainier National Park. These summaries are abridged versions of those included in Dee Molenaar's (2011:65-78) *The Challenge of Mount Rainier*. For thorough accounts of the mountain's early expeditions and subsequent developments, see both the Molenaar book and Aubrey Haines' (1999) *Mountain Fever, Historic Conquests of Mount Rainier.*

<u>Fay Fuller, E.C. Smith, Len Longmire, W.O. Amsden, R.R. Parrish: August 1890</u>

Fay Fuller was the first non-Indigenous woman known to have climbed Mount Rainier. Her party ascended by the south-side Gibraltar Rock route now the most popular in the park. The climb was guided by James Longmire's son Len, who continued to guide on the mountain for next 20 years.

[69] Erna Gunther, cited by Nancy Turner (in Pojar and MacKinnon 2014:173) notes that the Upper Cowlitz made tea from some anemone species which they drank to treat tuberculosis. Kane (2017:238-241) suggests that "Small doses of the fresh plant tincture …are useful in relieving …depression, gloominess, and fear…" He also notes that the plant excels as a headache remedy (cf., Kloos 2017:350-352; Moore 1993:257-259).

S.C. Hitchcock, A.F. Knight, F.S. Watson, Will Hitchcock: August 1890

This inexperienced party of four, ascended the mountain, by the same route as above, one day after the Fuller Party guided by Len Longmire. Their names inscribed in the crater constitute the earliest known graffiti on the mountain's summit.

Susan and Len Longmire, Edith Corbet, others: July 1891

Young Susan Longmire and Edith Corbet were the next two women to climb the mountain. They, and others, were guided on the Gibraltar Rock route by Susan's brother Len Longmire.

P.B. Van Trump, Warren Riley, and Alfred Drewry: August 1891

Van Trump, Riley, and Drewry completed the first documented ascent of Mount Rainier via Tahoma Glacier on the mountain's western slope. Beginning at "Indian Henry's Hunting Ground", the men ascended the lower part of Success Cleaver,[70] continued up the South Tahoma Glacier to the base of Tahoma Cleaver, then on up Tahoma Glacier to the summit crater. The party descended via the Gibraltar route.

Frank Taggert, Grant and Frank Lowe: August 1891

Just one week after Van Trump and party's ascent, Taggert and the Lowe brothers ascended the western face via the entire length of Tahoma Glacier from its lower terminus.

Warren Riley, George Jones, Frank Taggert, and Frank Lowe: July 1892

A year later, Taggert and Frank Lowe, plus the second party of Riley and Jones, to ascend Mount Rainier by the Tahoma Glacier used earlier. All four spent the night in the crater and ascended North Peak (Liberty Cap) the next morning –the first documented ascent of that peak.

P.B. Van Trump and George B. Bayley: August 1892

Van Trump and Bayley essentially duplicated the Tahoma Glacier to Liberty Cap route taken by the Riley, Jones, and Taggert-Lowe parties the previous month. On the return, Bayley fell into a crevasse, cracking several ribs. He healed, but ironically, was killed in an elevator accident in San Francisco two years later.

E.S. Ingraham and others: July 1894

Ingraham led a party of 14 men and women up the increasingly popular south-side Gibraltar Rock route to Columbia Crest. The group was caught at the summit by a storm for about 26 hours before they were able to descend.

Albert D. Durham and Roger S. Greene Jr.: August 1895

Beginning at *Paradise* (5,400 ft on the southern slope) the men completed a round-trip climb to Columbia Crest and back in about ten hours via the Gibraltar Rock route. The feat demonstrates how well-known the route had become to the climbing public by the mid-1890s.

[70] Two projectile point fragments –a triangular fine-grained andesite biface tip, and a chalcedony corner-notched arrow point– have been documented on the lower portion of Success Cleaver (Burtchard 1998:85).

Bailey Willis, I.C. Russell, G.O. Smith, E.H. Ainsworth, W.B. Williams: July 1896

This U.S, Geological Survey party ascended the mountain from its northwestern side via a route explored previously by Bailey Willis. The group (which initially included University of Washington's Professor Henry Landes, Willis' young daughter Hope, and others) explored the Spray-Mist Park, Crater (Mowich) Lake, and Carbon Glacier areas before beginning their ascent up Winthrop Glacier on the mountain's northern slope. The group spent a night on the slope, and another in the summit crater, before descending to Paradise Valley via the Gibraltar Rock route. Later, they returned to their Winthrop Glacier camp above Mystic Lake by a counter-clockwise route across Cowlitz, Ingraham, and Emmons Glaciers; completing what arguably was the most ambitious trek across multiple mountain terrains by non-Indigenous people to date.

Edgar McClure, Ed Curtis, and the Mazamas: July 1897

University of Oregon Professor Edgar McClure and a company of over 200 members of Portland's Mazamas mountaineering club undertook a complex, multi-party ascent of the mountain in mid-summer, 1897. The huge group traveled by train to Tacoma, then by horse-drawn stages through Eatonville to Longmire Medical Springs; finally setting up a large tent camp at Paradise. After several practice climbs (a few ascending to the summit and back), the main party moved to *Camp Muir* (previously High Camp). On July 27, Curtis guided 58 Mazamas, including Professor McClure, to the summit where McClure barometrically computed a summit elevation of 14,528 ft above sea level. While some spent the night in the crater, most returned to Camp Muir that evening. Taking advantage of a bright moonlit night, about half of this group descended the remaining distance to their more comfortable camp at Paradise. Veering off-course, Professor McClure fell to his death from a rock outcrop that now bears his name. Due to McClure's death, and several other near-disasters (perhaps to be expected in a group of this size), the Mazamas shortened their outing, returning to Portland on August 4, 1897.

Roads, Trails, and Public Mountain Camps: 1891 through 1897

By 1891, the trail to *Longmire's Mineral Springs* had been improved to a wagon-passable road, enhancing travel options to the southwestern side of the mountain. 1n 1895, a trail was completed on the same side of the mountain to *Paradise Valley* at ca. 5,400 ft via the Nisqually River to the Nisqually Glacier terminus, then across the river on a log bridge before climbing steeply up the east side of the canyon to Paradise (Molenaar 2011:82).

As tourism increased, Longmire added a guide service operating out of *Wigwam Camp* north of the Mineral Springs at the lower edge of *Indian Henry's Hunting Ground*.[71] Accessed via horse-trail from Longmire Medical Springs, Wigwam Camp continued to operate into the early 1900s. It is now documented and protected as an historic-period archaeological site.

Taking further advantage of tourism and enhanced transportation options, new public accommodations were built by Henry Comstock east of Alta Vista just upslope from Paradise in 1895. Comstock retained the name *Camp of the Clouds* first applied to a place somewhat higher on the mountain by John Muir, P.B. Van Trump and party in 1888. Unlike the earlier camp, however, paying visitors could lodge in supplied tents, and purchase prepared meals.

[71] According to Molenaar (1999:78), the guide service was operated by P.B. Van Trump. In the period before the park was established formally in 1899, it was administered as the *Pacific Forest Reserve*; lending Van Trump the distinction of being the first government ranger to serve in what would become Mount Rainier National Park.

In 1897, a second tent camp was opened at Paradise by John Reese on Theosophy Ridge at the southern base of Alta Vista. The camp continued to operate as *Reese's Camp* until 1915. Archaeological remains of this camp have been documented. They persist to the present day.

Mount Rainier National Park Founded: March 2, 1899

As public use of Mount Rainier rose sharply in the last decade of the 19th century, so too did support for setting aside the mountain as a public reserve; a designation that conservationists hoped would free it from the growing pressure of homestead, mining, logging, and other forms of commercial development. One of earliest preservation advocates was P.B. Van Trump who promoted the notion of "a movement looking to the setting apart of the mountain and its extensive and beautiful parks as a state institution or reservation, or failing that, as a national park" (Haines 1999:133). Interest grew rapidly, resulting initially in incorporation of the mountain and its surrounding forested terrain into The Pacific Forest Reserve designated by President Benjamin Harrison near the end of his term in 1893. Avoiding the attention-consuming *Tacoma* versus *Rainier* naming controversy, Washington Senator Watson Squire introduced a bill (S. 2204) to create *Washington National Park* in 1884. While the bill failed, it nonetheless elevated interest in the National Park concept, and drew attention to more generous boundaries that included a greater portion of the mountain's western slope. Figure 2.10 shows the 1893-1894 boundaries.

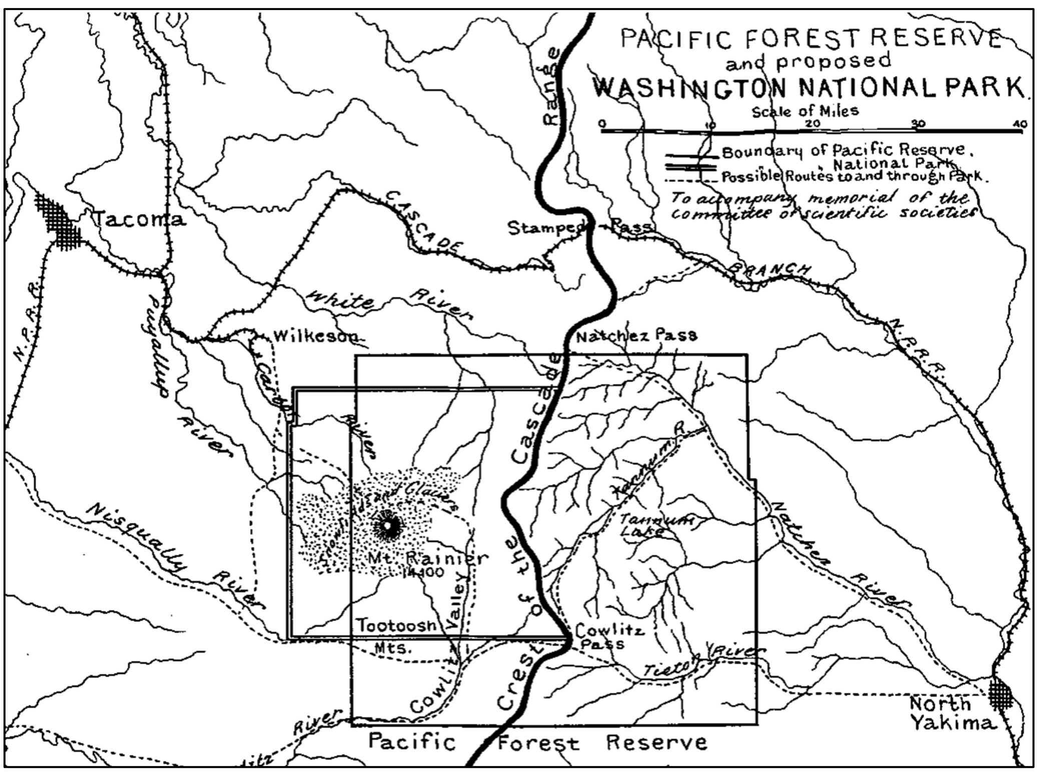

Figure 2.10. Pacific Forest Reserve & Proposed Washington National Park Boundaries.
Note trails and new rail-lines near Mount Rainier. (NARA archives, courtesy Rick McClure)

Revised bills were introduced by Senator Squire and Washington Representative William Doolittle in 1895 and 1896, but again failed. After a series of primarily funding-related delays, a bill to create *Washington National Park* finally passed in late 1897, but not in time to be signed by departing President Grover Cleveland (Haines 1999:189). Rather, the mountain remained part of the forest reserve renamed the *Mount Rainier Forest Reserve.* Map Figure 2.11 shows then-proposed Mount Rainier National Park and Pacific Forest Reserve boundaries as they relate to the larger, encompassing Mount Rainier Forest Reserve.

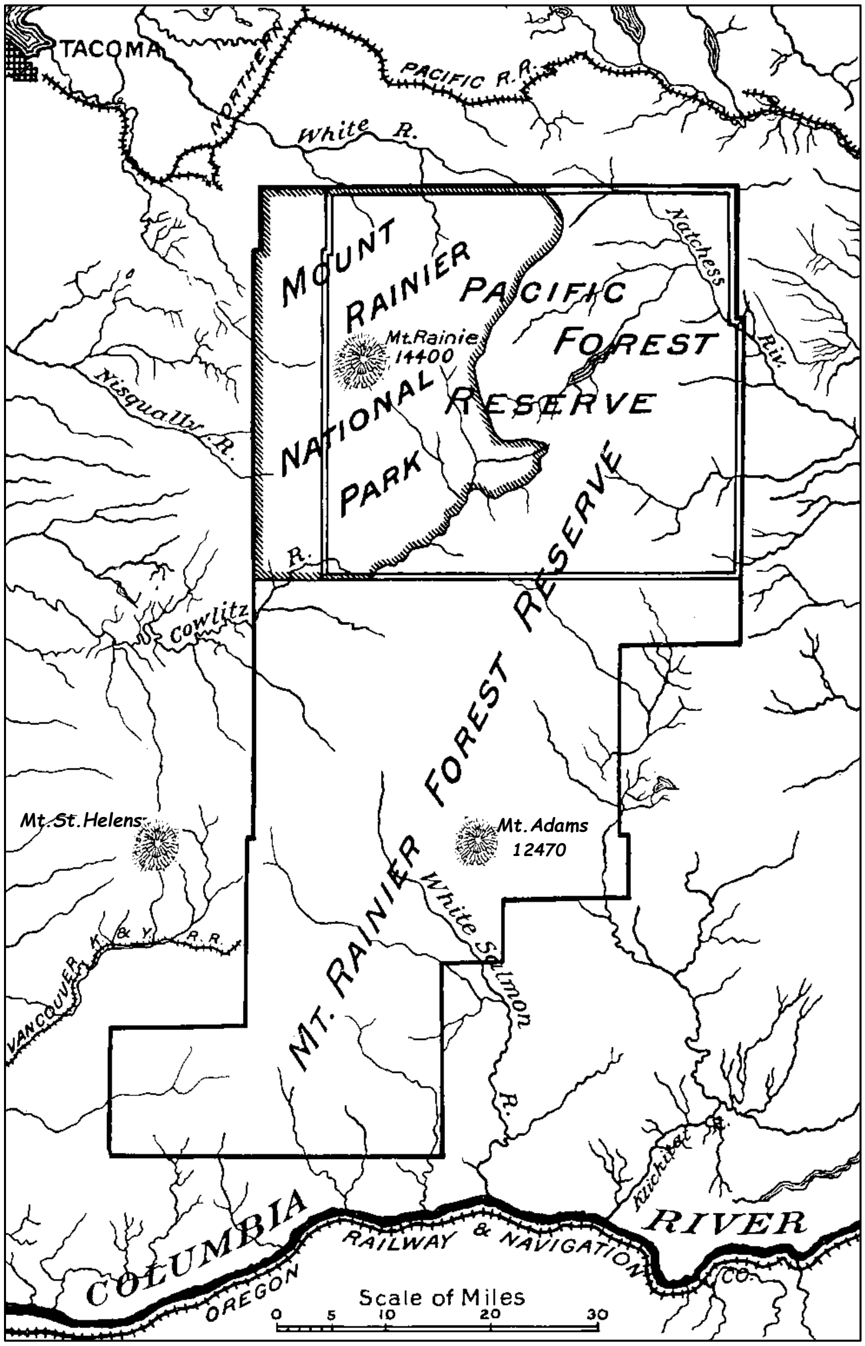

Figure 2.11. Proposed Mt. Rainier Forest Reserve and Mount Rainier National Park. Mt. Adams & Mt. Saint Helens approx. locations added. (NARA Archives, courtesy Rick McClure).

Even though proposed, Washington/Mount Rainier National Park remained in legislative limbo through the mid to late 1890s. Pressure to permanently remove Mount Rainier proper from private claims, however, continued into the McKinley-Roosevelt administration. After several more failed attempts, Washington Senator John Wilson's bill (S. 2552) to establish Washington

National Park passed the Senate and was referred to the House of Representatives in the spring of 1898. After surviving opposition from fiscally conservative Ways and Means Committee Chairman Joseph Cannon, the bill passed with the name changed from "Washington" to "Mount Rainier." The senate concurred, and on March 2, 1899, President McKinley signed bill S. 2552 officially creating *Mount Rainier National Park.*[72] Many funding battles, boundary changes, and administrative issues ensued;[73] but protection initially provided by forest reserve status was strengthened in a manner eventually ensuring that Mount Rainier would remain protected public land, unclaimed by commercial interests, for the benefit of generations to come.

Relevance to Indigenous People and Mount Rainier

It is important to re-emphasize that the decreasing mention of an Indigenous presence in published climbing accounts during the last two decades of the 19th century *does not mean* that Indigenous people were not coming to Mount Rainier. It simply indicates that, with improved transportation options and more clearly delineated trails, Indigenous guides were no longer required for these excursions. Hence, Indigenous accounts simply were not written into the climbers' narratives. Even though traditional use patterns were hindered by non-Indigenous over-hunting and growing tourism, it is clear that Indigenous hunting and gathering practices continued at some level throughout the 1800s, as witnessed by the 1886 account of annual Yakama hunting excursions to the upper Cowlitz Divide.

While the lands around Mount Rainier were managed as part of the Pacific Forest Reserve, and later, Mount Rainier Forest Reserve from 1893 into early 1899, no formal restrictions were placed on Indigenous land-use practices; nor were sanctions applied across the broader forested Cascade landscapes encompassed by new federal forest reserves.[74] Indian Treaties were in effect, and traditional hunting, gathering, and fishing activities remained largely unrestricted for treaty and non-treaty tribal members alike.

The situation did not change immediately after Mount Rainier became the nation's fifth National Park in 1899. The park was young, and the National Park Service was not yet established formally. Mount Rainier's Establishment Act (30 Stat. 993) did not restrict plant gathering or hunting altogether, but rather directed the Secretary of the Interior to "provide against the *wanton destruction* of the fish and game found within the park." And, in any case, tribes ceding claims to land in the park retained hunting and plant gathering privileges via articles contained in each of The Medicine Creek, Point Elliott, and Yakama Treaties.

In time, Mount Rainier National Park, and the National Park Service generally, would restrict traditional Indigenous land-use practices on park lands; restrictions intended to protect natural resources by limiting Indigenous use in the same manner as the general public. While some traditional Indigenous resource gathering activities would continue, they would be forced to do so surreptitiously without permission of the NPS which, for the most part, prohibited them altogether. But those actions lay in the future. In 1899, Indigenous people continued to come to Takhóma to hunt and gather as they had done for millennia.

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[72] An Act To set aside a portion of certain lands in the State of Washington now known as the Pacific Forest Reserve, as a public park, to be known as the Mount Rainier National Park. (30 Stat. 993 [1899])

[73] A well-executed administrative history of the park is available in Theodore Catton's (1996) *Wonderland, An Administrative History of Mount Rainier National Park.*

[74] By this time, Forest Reserves were managed by the United States Government. While logging, grazing, and mining were permitted, reserved lands could not be owned outright by private concerns. These reserves became part of the U.S. Department of Agriculture, National Forest Service in 1905 under overall direction of Gifford Pinchot.

Summary Considerations

Mount Rainier's archaeological record indicates the presence of Indigenous hunter-gatherers as early as 9,500 years ago with no suggestion of significant interruption in land-use patterns prior to the onset of epidemic diseases in the late 1700s, and the influx of non-Indigenous settlers and entrepreneurs in the mid to late 1800s. Despite severe disease-related 18th and early 19th century population losses, relocation onto reservations in the 1850s, and incursions by non-Indigenous explorers and climbers in the 1860s and 1870s, surviving Indigenous groups continued to dominate use of Mount Rainier landscapes into the 1880s. Completion of the Northern Pacific Railroad in 1883, however, dramatically accelerated the pace of social, economic, and political change across the region. At Mount Rainier, Indigenous presence was mentioned with decreasing frequency during the late 1800s. Continuing Indigenous activities simply were subsumed by the onslaught of climbers, hunters, would-be miners, and tourists –few of whom understood, or cared for, the long-standing place of Indigenous people in the mountain's landscapes.

Not all of the new Pacific Northwest settlers supported the largely unregulated development common to the late 1800s. Some of the most influential of these people and organizations (people like Bailey Willis, P.B. Van Trump, Hazard Stevens, and John Muir; plus organizations such as the National Geographic Society and various mountaineering clubs, among others) recognized the physical beauty and environmental value of the mountain and its surrounding Pacific Northwest forests. They also foresaw the threats posed to them by continuing unfettered commercial and recreational use. Their influence was vital to developing support for forest reserves of the 1890s, and ultimately, for the National Park system at the close of the century.

Creation of Mount Rainier National Park in 1899 did not bring Indigenous people back to the foreground, nor did it exclude them altogether –at least not initially. Mount Rainier's Establishment Act of 1899 encouraged preservation of park resources but did not completely prohibit their use. Park personnel struggled with limited resources to preserve the mountain's natural beauty while doing their best to allow people to enjoy its near-wilderness qualities without ruining them. Uncertain as to the place of Indigenous people in the process, park staff initially accepted Native American presence and resource gathering activities. In time, these activities would be prohibited by NPS policy, and Indigenous people would be grouped with the public at-large. They would be afforded the benefit of traveling to Mount Rainier to enjoy its scenic wonders, but prohibited from overtly continuing traditional hunting and gathering practices ostensibly reserved to them by the Medicine Creek, Point Elliott, and Yakama Treaties. In Chapter 3, we offer an overview of key events related to the changing character of Indigenous interaction with the maturing Mount Rainier National Park.

Chapter 3: Mount Rainier National Park; Altered Indigenous Land-use Patterns

...And until some time ago when the white man came, why, they couldn't make any more of them berry patches by starting fires on account of ...forest fire hazard and stuff like that. So since then the huckleberry patches have disappeared almost completely... Mary Kiona, Taidnapam-Upper Cowlitz, 1953

When the nascent National Park Service (NPS) took over management of Mount Rainier in 1899, it was directed to "preserve from injury or spoliation" all "timber, mineral deposits, natural curiosities, or wonders" within the park (30 Stat. 994 [1899]). While this direction is understandable, it was not without consequence for Indigenous people still hunting and gathering on park lands. Here, we consider effects of NPS management on Indigenous land-use patterns from the park's inception in 1899 to 1998 when a new plant-gathering MOU was begun between the Nisqually Indian Tribe and Mount Rainier National Park. Included is a critical period between 1915 and 1917 when Indigenous hunting (and effectively gathering) practices were terminated. Also discussed is a revival of tribal involvement with the mountain and NPS decades later –a process that began with Indigenous fishing protests and resulting *Boldt Decision* in 1974, gaining momentum in 1998 with reintroduction of traditional plant gathering rights at Mount Rainier.

This chapter highlights key 20th century events in the administration of Mount Rainier National Park as they pertain to traditional Indigenous resource gathering practices. We divide the National Park period into five time/event intervals from 1899 to 1998: 1) the early days from park inception through 1914 when basic park policies were developed; 2) a brief, but intense period from 1915 through 1917 when long-standing Indigenous hunting practices were prohibited; 3) a period of diminishing Indigenous presence at Mount Rainier from 1918 into the early 1960s during which plant gathering privileges also were prohibited, and the NPS matured more-or-less into its present administrative system; 4) beginnings of change in the place of Indigenous people in the broader American political and economic system from the late 1960s to 1979; and 5) a period of reemerging tribal identity and renewed presence at Mount Rainier from about 1980 to the end of the century.

Developing Park Infrastructure and Indigenous Activities: 1899-1914[75]

In the beginning, the new Mount Rainier National Park administration appears to have paid little attention to Indigenous presence or activities within its boundaries. There were roads and structures to be built, rangers to be hired, and policies to be developed. Inholdings and business enterprises such as Longmire Medical Springs and Hotel, Camp of the Clouds (Reese's Camp) continued much as before. Mining claims continued to be filed and tested at various points around the mountain; and in the early 1900s, copper and coal mining began at several locations. Minor logging, principally cedar, continued at low elevation around and within the park. Indigenous people, now largely residing on nearby reservations, continued seasonal excursions to the mountain to hunt and to gather berries, medicinal plants, fiber, and other plant materials of value to them.

[75] Much of Mount Rainier National Park's early history is drawn from Catton (1996:105-139).

As part of the Pacific/Mount Rainier Forest Preserve, Mount Rainier proper had been given little physical protection beyond annual visits to check on camping activities at places like Paradise Park (see Catton 1996:107). Perhaps the most effective, if unofficial, oversight during that time came from concerned climbing organizations and local residents such as the O.D. Allen family that homesteaded near Kernahan's Ranch (later Ashford, Washington) southwest of the park boundary. Allen, a retired Yale University botany professor, spent a good deal of time collecting specimens on the mountain with his sons Grenville, Edward, and John. Given the family background, it was reasonable that Grenville Allen was appointed Supervisor for *both* Mount Rainier Forest Preserve and Mount Rainier National Park in 1903 (Catton 1996:107-198). Edward was appointed General Land Office Forest Inspector the same year.

Superintendent Allen and Continuing Indigenous Presence

In his dual role, Grenville Allen continued as the park's Supervisor (effectively its first Superintendent) from 1901 to 1909.[76] During this time, he hired two seasonal rangers to patrol the northern and southern sides of the park; and expanded the trail and road systems in their respective areas. Allen also personally inspected the new large-scale, mining development in Glacier Basin in the park's northeast quadrant. Alarmed by the influx of new mining claims, Allen took steps to curtail new claims and remove those not in active use (cf., Burtchard et al. 2017).

These undertakings notwithstanding, Allen's primary concern during his tenure was with fire prevention and affairs of the huge Forest Reserve that surrounded the new National Park –an area that extended south well past Mount Adams almost to the Columbia River (see Figure 2.11). While Allen attempted to enforce hunting bans within park boundaries, there is no indication that he extended that prohibition to Indigenous hunting and gathering parties. In his annual report for fiscal year 1905,[77] for example, Allen (in Thompson 1981:24) notes that while the Yakama did not make a hunting excursion to the mountain's eastern slope that year, Puyallup, and probably Nisqually, tribal members did so;[78] taking, as Allen put it "…their annual outing in the Tatoosh Range …where they hunted and picked berries and were not annoyed by the presence of either tourists or forest rangers." Reporting for fiscal year 1906, Allen mentions that Cowlitz Indians made occasional hunting expeditions up the Muddy Fork (of the Cowlitz River) Ridge (Backbone Ridge) to the high alpine country between the Cowlitz and White River (Emmons) Glaciers.

There is no doubt that other traditionally associated tribal people, such as the Muckleshoot, also continued to use park landscapes; perhaps entering via the Huckleberry Creek route (among others) on the mountain's northern slope –a route still regarded as a traditional trail by Muckleshoot tribal members. The Yakama continued to use landscapes on the mountain's eastern slope; among other places, focusing attention on Grand Park and the Sunrise Ridge area (Yakima Park) which was regarded as a special place for hunting, gathering, grazing horses,

[76] Mount Rainier National Park Superintendents during this early period include Grenville Allen 1903-1909, Edward Hall 1910-1913, Ethan Allen 1913-1914, and John Sheenhan in early 1915. See Catton (1996) for a summary of park superintendents and administrative events during this time and beyond.
[77] The Park Service fiscal year extends from October 1 through September 30. Fiscal year 1905, then, began October 1, 1904 and ended on September 30, 1905; fiscal year 1906 from 10/1/1905 through 9/30/1906; and so on.
[78] Puyallup and Nisqually tribes were often identified together in these early historic-period days.

ceremonies, and a variety of social interactions in the 19th and early 20th centuries.[79] In short, people now associated with Cowlitz, Nisqually, Puyallup, and Muckleshoot tribes, and perhaps more, continued to use mountain landscapes widely; emphasizing areas most closely associated with their traditional residential and land-use locations (see Figure 2.1; cf., Gibbs 1877:178-179; M. Smith 1940:15-52; A. Smith 2006:29-90; and Boxberger 1998:8-9).

Forest Modification by Fire

Allen's relative ease with continued Indigenous activities in the park's early days may have been due, in part, to the fact that his responsibilities were focused primarily on managing grazing permits and suppressing fire for both forest reserve and park. The emphasis on fire suppression is particularly important in that it provides crucial insight into a primary means by which Indigenous people managed heavily forested habitats. As part of these efforts, Allen tracked ignition sources (including Indigenous sources), fire location, size, and date. In her article *…Indian Fire Use on the Mt. Rainier Forest Reserve*, Cheryl Mack (2003) assesses Allen's fire records for 1904 and 1905. For those years, Allen reported a total of 32 fires, half of which were set by Indians –all in the southeastern portion of the reserve known to have been used extensively for huckleberry harvest by local Indigenous people (Mack 2003:22). This made sense. Huckleberries were an important food resource which, when dried, could be stored and used throughout the winter. Furthermore, huckleberries (and other economically useful plants and animals) thrived in early seral-stage habitats that followed canopy-reducing fires far more than in mature fully forested settings.

Allan was not the only person reporting frequent use of fire to modify forested landscapes at Mount Rainier and the southern Washington Cascades. The practice of intentionally igniting canopy-reducing fires to enhance huckleberry habitat also is supported by Indigenous oral traditions. Cheryl Mack (2003, 21), for example, cites testimony by Mary Kiona (1953), a local Taidnapam (upper Cowlitz) woman born in 1868, who states that "[*T*]hey used to burn, and then after a while the Indians would grow berries, black berries [*Rubus ursinus*], and in higher places huckleberries …every now and then they would burn …in there so that the huckleberries would grow." We also know that Indigenous people used fire to dry berries for transport out of the mountains, a practice that occasionally ignited broader fires. In 1911, forest assistant Arthur Willcox (in Mack 2003:21) wrote "In the high, open country around the summit of the Cascades the most prolific cause of fire is the method the Indians use in drying huckleberries by mean of a burning log."

Forest fires, and the grassy-brushy early seral-stage habitats that follow, not only improve huckleberry production, but support a broader suite of useful plant and animal populations as well. There is little doubt that Indigenous people, following patterns established for millennia, set fires to enhance the productivity of valuable resources, a practice that extended, at least in the early days, onto Mount Rainier itself. In his pamphlet *Forests of Mount Rainier National Park* written after his tenure as Park Superintendent, Grenville Allen (1922:5-6) points out that

> The old burns in the middle altitudes of the park occupy regions once frequented by the Klickitat Indians. Every summer parties of hunters and berry pickers from the sagebrush plains crossed the Cascades with their horses. They followed the high divides and open summits of the secondary ridges until they came around to the open parks about Mount Rainier where they turned their horses out to graze and made their summer camp. The

[79] See Thompson 1981:22-23, and L.V. McWhorter to W.F. Clarke, Rainier National Park Committee, January 7, 1931, in folder *Yakima Park.* McWhorter Papers. Archives, Washington State University. Pullman.

> women picked huckleberries and the men hunted deer and goats. They made great fires to dry their berries and kindled smudges to protect their horses from flies. It was also their custom to systematically set out fires as they returned. *Burning made the country better for the Indians* [emphasis added]. The fires kept down the brush and made it more accessible. Deer could be more easily seen and tracked and the huckleberry patches spread more widely over the hills.

Relying on Yakama informants, Eugene Hunn (1991:130-131), notes further that

> …fire is one of the Indians' most powerful tools of food production. Fire creates sunny openings in the forest, creates edges that foster the rapid spread of nutritious herbs and shrubs, most notably the black mountain huckleberry and related species, blueberry and grouseberry …Such zones increased natural productivity and draw deer and elk within the hunter's range as well. …

Available accounts suggest that, in early National Park-Forest Reserve days, annual Indigenous foraging trips involved active manipulation of the forest ecosystem to expand open habitats better suited to plant and animal productivity. While enhancing huckleberry production often is cited as the driving motivation, it is clear that early seral-stage, post-fire habitats functioned to concentrate a wide suite of plants and animals that helped to sustain Indigenous communities in the vicinity of Mount Rainier National Park.[80]

Even though carried on for millennia, Indigenous fire-based manipulation of forest habitats could not continue in the face of growing U.S. Forest Service and National Park Service efforts to suppress fires in lands under their purview. Mack (2003:24) cites Forest Reserve ranger H.O. Stabler (1911) who reported that "During the last two summers and particularly …last summer, the Indians have been rather overawed by the number of Forest Officers and other Service employees that have appeared among them at any and all times." The 1953 testimony of Upper Cowlitz/Taidnapam Mary Kiona that begins this chapter illustrates the impact of that period on Indigenous subsistence practices.

The intense focus given to fire suppression in the Mount Rainier Forest Reserve, and later, Mount Rainier National Park, made it nearly impossible for Indigenous people to continue use of this technique to enhance plant and animal productivity. The problem became more acute for Indigenous people as the U.S. Forest Service and the NPS became better staffed in the second decade of the 20th century. In time, the practice virtually ceased altogether; forcing Indigenous people to rely on western commodities to replace traditional resources that required fire to maintain productivity. In addition to loss of economically important plant resources, game animal populations, already depleted despite hunting regulations, were suppressed further by the loss of forage as forests returned to previously burned areas –especially on the wet, naturally fire-resistant forests west of the Cascades where Mount Rainier is located.

Pressure to Restrict Indigenous Subsistence Hunting

Indigenous hunting and gathering practices, already under pressure from game shortage and tourist presence, became increasingly untenable as the National Park Service and Mount Rainier National Park matured. During the first decade of park development, Indigenous subsistence practices largely were ignored, or at least tolerated. In 1908, however, The Secretary

[80] See Adam Nickels (2002) *History Under Fire: Understanding Human Fire Modification of the Landscapes at Mount Rainier National Park* for additional consideration of Indigenous use of fire to improve food-resource productivity on and around Mount Rainier.

of the Interior (1908) published *Laws and Regulations relating to the Mount Rainier National Park, Washington* as required by the park's 1899 Establishment Act. Park regulations included in the Secretary's pamphlet specifically prohibited for the first time "Hunting or killing, wounding or capturing any bird or wild animal on the park lands…" and cutting or injuring "any timber growing on the park lands or to deface or injure any government property." The regulations also advised exercising the "utmost care … at all times … to avoid setting fire to the timber and grass." Plant gathering practices were not specifically mentioned.

In principle, the Secretary's rules removed, in a stroke, two pillars of Indigenous resource practices on Mount Rainier –hunting and fire-based traditional forest management practices. But while these practices did indeed suppress fire, park management did not, for a time, prohibit either traditional hunting or plant gathering. Even so, these practices were coming under increasing public disapproval as time went by. This concern was reflected by Ranger Thomas O'Farrell when he wrote Superintendent Ethan Allan on September 18, 1914 that there was "reported to be a band of Yakima Indians hunting in the Eastern District of the park in the vicinity of Grand Park and it will be necessary for both myself and Ranger Krogh to make a trip into that region together at once."[81] There is no further record of the result of that trip. Even so, it marks the beginning of enforcement of the 1908 Laws and Regulations against Indigenous hunting and gathering activities in Mount Rainier National Park.

Prohibition of Indigenous Hunting on Mount Rainier: 1915-1917

By 1915, Mount Rainier National Park had solidified its identity as a *bona fide* institution independent of the Forest Reserve[82] and was developing its own administrative and land-use policies. Government Road was complete from the southwest corner of the park to Paradise. Automobiles routinely were carrying visitors to Camp of the Clouds and the soon-to-be-opened Paradise Inn, among other places. In the park's northeastern corner, a new access road (Storbo Road) also was complete, serving park visitors and the large-scale Glacier Basin copper mining venture that had been in operation since 1905. Throughout the park, non-Indigenous use of Mount Rainier had increased dramatically.

At the federal level, discussions as to how to best protect parks –with an emphasis on nature and wildlife– had been going on for some time. Implications of continued Indigenous use of park resources, such as the hunting activities reported on Mount Rainier in 1914, would soon be tested at this level as well.

The Challenge and the Solicitor's Opinion: 1915

DeWitt Reaburn became the fifth Supervisor-Superintendent of Mount Rainier National Park in 1915. That year, the U.S. Geological Survey published the first map of Mount Rainier that accurately captured the park's substantial topographic variability. Also in 1915, the hunting party that Ranger O'Farrell reported the previous year in Grand Park returned again, setting into motion

[81] Report from Ranger Thomas O'Farrell to Superintendent Ethan Allen dated September 18, 1914. Park records are stored in microfiche files stored at Mount Rainier National Park headquarters in Ashford, Washington, and at National Archives in Seattle (NARA). Reports cited here also are assembled in an unpublished "Administrative Record to the Memorandum of Understanding Regarding the Gathering of Plant Resources between Mount Rainier National Park and the Nisqually Indian Tribe." Compiled by Greg Burtchard 2005, on file in Mount Rainier National Park Archives and the Natural and Cultural Resource Division.

[82] The Mount Rainier Forest Reserve was restructured as *Columbia National Forest* in 1908. In 1949, it was renamed *Gifford Pinchot National Forest* in honor of the first director of the National Forest Service.

a chain of events that would challenge long-standing treaty-reserved Indigenous hunting and gathering rights on Mount Rainier.

In late July of that year, Ranger Tom O'Farrell was passing through Yakima Park (now Sunrise Ridge) on the way to inspect mining operations in Glacier Basin[83] when he encountered:

> …the remains of an Indian camp where the bands of natives are accustomed to annually make visits for the purpose of hunting deer. They have constructed two corrals for their horses by cutting down timber and also a wigwam of poles. There are great quantities of bones and other evidences of recent game destruction. *I wish to be advised as to whether or not the Indians under their treaty with the federal Government have the right to hunt and take game in National Parks and if not what steps are to be taken to cause a discontinuance of this practice* [emphasis added].[84]

O'Farrell's observations and request are particularly important because of the information they contain about the regularity of Native American entry into the park, the approximate location and structure of the hunting camp encountered, and because it was the first known attempt to establish officially whether or not treaty-reserved hunting and gathering privileges on open and unclaimed lands applied to terrain now under jurisdiction of the National Park Service where such practices were otherwise prohibited.

Simple as it seemed, the request instigated a cascade of rapidly unfolding administrative actions at Mount Rainier National Park and within the United States Department of the Interior. Within a week, newly appointed Superintendent DeWitt Reaburn forwarded O'Farrell's request to the Secretary of the Interior. On August 9, 1915, Acting Assistant Secretary E.J. Ayers replied that

> …the act of Congress establishing Mount Rainier National Park makes no provision for hunting therein by Indians. In order to determine whether or not any rights under treaty are involved in the hunting… it would be necessary that we know to what tribe the Indians belong.[85]

Ayers reply implied that hunting rights reserved by treaty might indeed be applicable to the park *if* the Indian people involved were members of one of the treaty tribes associated with Mount Rainier prior to ceding lands to the new National Park.

The tribal identity mystery was soon resolved. In late August, the group led by a now-elderly Chief Sluskin[86] (Figure 3.1) returned to Yakima Park where they were met by Park Rangers Leonard Rosso and Arthur White. The rangers questioned them about their hunting

[83] Early 1900s Mount Rainier Park maps show the site of the mining operation in Glacier Basin, Grand Park, Yakima Park in the park's NE quadrant. On close inspection, a trail also can be seen. This most likely is the route used by Yakima hunting parties to access the northeastern slope of the mountain from the east in the 19th and early 20th centuries.
[84] Report from Thomas O'Farrell to Superintendent Reaburn, July 29, 1915. (Mount Rainier and NARA Archives, and Burtchard 2005)
[85] Letter from Acting Assistant Secretary of the Interior E.J. Ayers to Superintendent Reaburn, August 9, 1915. (Mount Rainier and NARA Archives, and Burtchard 2005)
[86] Almost certainly, this was the person who, as a boy, guided Governor Isaac Stevens' surveyors to the north slope of Mount Rainier in 1855. This elder Sluskin died on December 30, 1917. He clearly *was not* the Sluiskin "with the crippled hand" who guided Hazard Stevens and P.B. Van Trump on their accent of Mount Rainier in 1870. This second Sluiskin died in a drowning accident in the Yakima River between 1910 and 1913 (see Chapter 2, this volume; McWhorter 1917; and Haines 1999:15).

activities but did not actively interfere. The rangers, however, relayed the news to Reaburn who, on September 1, 1915, telegraphed the Secretary of the Interior that:

> …Yakima Indians under chief Sluiskin are now on a hunting expedition in the northeast corner of the park they refuse to obey the rangers orders claiming the right to hunt and kill as they please but say they will slaughter only what is needed.[87]

While the issue was being considered at the federal level, the Yakama party continued their hunting and gathering activities on Mount Rainier without further interaction with park personnel that year.

Figure 3.1. Chief Sluskin (Sluiskin) at Yakama Indian Reservation, October 13, 1915. Sluskin met park rangers in Yakima Park (Sunrise Ridge) in late August, 1915. As a young man in 1855, he guided two state surveyors to Mystic Lake on the mountain's northern slope where they ascended Columbia Crest via Winthrop Glacier. Chief Sluskin died December 30, 1917. A second similarly named Yakama guided Stevens and Van Trump during their 1870 ascent. (Asahel Curtis photo courtesy Washington Historical Society)

[87] Telegram from superintendent Reaburn to Acting Assistant Secretary of the Interior E.J. Ayers, September 1, 1915. (Mount Rainier and NARA Archives, and Burtchard 2005).

Even though allowed to continue traditional hunting and gathering practices, the encounter between Rosso and White and the Yakama party attracted local interest as witnessed by an article in the *Tacoma Daily Ledger* on September 10, 2015. In the culturally insensitive language of the time, the article nonetheless offers useful insight into the issue, as well as to the character of Indigenous hunting parties of the late 19th and early 20th centuries. Edited for brevity, it reads:

> Under the leadership of old Chief Sluiskin, [*incorrectly referring to him as the guide for the Stevens-Van Trump 1870 ascent rather than the 1855 guide to the northern flank of Mount Rainier*] …a band of Indians has crossed the Cascades from the North Yakima reservation to the …northeast corner of Rainier National Park. There they are camped and are eking out an existence in the manner of their kind before the coming of the white man.
>
> Government rangers have caught them shooting and trapping wild game animals within the border of the park and have remonstrated with them against it. But …in vain, the wrinkled leader producing old documents and treaties to show that he and his followers have been given the right to hunt and fish in the state without molestation.
>
> …Whether the treaties …are of the value he contends …is a question that will have to be answered by officials at Washington, D.C. They have been notified and asked to straighten out the situation by D.L. Reaburn, supervisor of the park, who was informed of the little band's presence within the line …where the shooting, trapping or killing of game animals is prohibited. …
>
> …[*After being informed that hunting was prohibited*] …old Chief Sluiskin ...trotted to one of the two tepees that provides shelter for the 30 redskins …and returned with several papers.
>
> …the rangers read the documents while the old leader smilingly watched them and spoke in his native tongue to his followers. One of the treaties was written by Governor Stevens of Washington territory… It specified a certain district the Indians could hunt and trap in, but did not include the territory now bounded by the line of the park, according to Supervisor Reaburn…
>
> After a lengthy talk in general with the Indians, which was accomplished through girl interpreters said to be former students from the Puyallup Indian reservation here, the rangers left and reported to Supervisor Reaburn. The park official immediately telegraphed to Washington D.C. [*see telegraph text above*], but to date has received no reply…
>
> The party includes redskins ranging from papoose age to old Sulskin [*sic*], four score and two years old. They are all attired in white man's clothes with the exception of their feet coverings, which are moccasins. The two tepees that shelter them at night are of typical Indian design. Thirty head of horses, a few blankets and cooking utensils making up the rest of the equipment.
>
> The several girls and young women in the party who said they were graduates of the local Indian school spoke English fluently, but made no effort to talk to the rangers until told to do so by their wrinkled old leader. During the "heart to heart" talk the rangers noticed that in speaking of the mountain the Indians called it "Tacoma." …[88]

The DOI did not respond to park management directly, but rather referred the issue to the Department of the Interior Solicitor for a formal opinion.[89] The forwarded memorandum cited both the telegram from Superintendent Reaburn and language in the 1855 treaty with the Yakama that provided for the "…privilege of hunting, gathering roots and berries, and pasturing their

[88] Indians Defy Park Hunting Regulations; Chief Sluiskin Shows Ancient Treaties; Violations Referred to Government Officials at Washington, D.C.. *Tacoma Daily Ledger*. September 10, 1915.
[89] Memorandum for the Assistant Secretary, prepared by Acting Chief Clerk, and referred to the Interior Department Solicitor for opinion by DOI Assistant Secretary Bo Sweeney, September 2, 1915. (Mount Rainier and NARA Archives, and Burtchard 2005).

horses and cattle upon open and unclaimed land." The memo also cited the provision in the 1899 act establishing Mount Rainier National Park (30 Stat. 993) directing the Secretary of the Interior to "provide against the wanton destruction of fish and game" found within the park. Noting that the treaty provision may not be "sufficient to support" the claimed right to hunt and kill game within the park, the Assistant Secretary of the DOI requested the opinion of the DOI's Office of the Solicitor.

The DOI Solicitor issued his opinion to the Secretary three weeks later. On September 23, 1915, the Solicitor advised that the 1899 Act modified the 1855 treaty by limiting the "killing of game" within the park to the "taking of such game as" the Tribe may "reasonably" require for its subsistence. Below is Theodore Catton's (1996:17-18) summary of Solicitor West's findings. Full text of the opinion, and the Secretary's memorandum that stimulated it, are included in Appendix D of this document.

> Solicitor Preston C. West argued that the act of 1899 establishing Mount Rainier National Park *did not* [emphases added] terminate the Indians' treaty right to hunt game within the boundaries of the park. First, the solicitor argued, the national park did not remove the area from the status of "open and unclaimed land" as it was construed in the treaty. West referred to the longstanding principle in federal Indian law which required the courts to resolve all ambiguities of meaning in Indian treaties according to how they had been understood by the Indians. The Indians who signed the treaty [of 1859],[90] West presumed, recognized "open and unclaimed land" as land that was not settled upon or appropriated by claimants under the general land laws. [West also rejected the distinction between "right" and "privilege" in the treaty.] The treaty's Indian signers, West argued, "*intended to reserve the right to hunt on the open and unclaimed lands as effectually as they reserved the right to fish in waters outside the reservation described in the treaty for their use*."
>
> Second, the act of 1899 did not specifically address hunting by Indians. With respect to the protection of game, the act of 1899 gave the Secretary authority "to provide against the wanton destruction of the fish and game found within said park, and against their capture or destruction for the purposes of merchandise or profit." Looking at the treaty right issue in the context of 1855, West argued, *it did not seem that either party had in view the wanton destruction of game* or hunting by the Indians for the purposes, of merchandise and profit. Therefore, wrote West, "the law of 1899 simply stated specifically what was necessarily implied in the treaty." Since the treaty language appeared not to have given the Indians the right to destroy game wantonly or to hunt game for the market, West reasoned that the act of 1899 had taken nothing away. It followed that the *Indians' right to hunt for their subsistence within the park had not been taken away by the law of 1899*, either. This did not mean that subsistence hunting by Indians was not *subject to regulation*, West hastened to add. Since the act of 1899 gave the Secretary of the Interior broad authority to fulfill the purposes of the park, and the park was created for the public's enjoyment. "the Indians must exercise their privilege in such manner as not to defeat this expressed purpose." *In sum, West believed that Indian hunting rights and national park purposes were in fact compatible under carefully drawn regulations*.

With the Interior Department Solicitor's opinion in place, the hunting-gathering issue appeared to be resolved, at least for members of treaty tribes with ceded lands now under the purview of Mount Rainier National Park. That is, hunting, and by extension huckleberry and other plant gathering activities, could be <u>regulated, but not terminated,</u> so long as they were directed toward subsistence purposes and did not involve wanton resource destruction. Events of the next two years, however, proved this assumption to be premature.

[90] The date of 1859 used by West refers to the U.S. Senate ratification date for the 1855 Treaty with the Yakamas. Catton interpreted this as the Walla Walla Treaty of 1855.

Assertion that State Regulations Supersede United States Treaty Provisions: 1916

Regardless of the opinion of the Department of the Interior regarding Indigenous hunting and gathering on park lands, the year of 1916 witnessed the temporary ascendancy of state over federal treaty provisions in the matter. Shortly after DOI Solicitor West's opinion advising continuation of treaty-reserved hunting and gathering privileges or rights in Mount Rainier National Park, the Washington State Supreme Court held that "…Yakima Indians outside of their reservation are subject to the *State Game Laws*" [emphasis added].[91] On June 12, 1916, the United States Supreme Court added weight to that ruling in a case involving the right of Seneca Indians in the state of New York to fish outside their reservation but within territory where fishing was reserved by "certain grants under the sanction of the United States of America…"[92] The court decided that "…the reservation of this right to the Indians was no bar to legislation by the State regulating fishing, but was merely the reservation of the right on the part of the Indians to use the lands in common with others for fishing under such laws as the State might enact."

Washington State's attempt to extend this ruling to new federal land-holding entities within its boundaries was not long in coming. On October 9, 1916, Washington State Fish and Game Commissioner L.E. Darwin mailed a letter to Mount Rainier Forest Reserve Supervisor G.F. Allen noting the Washington and United States Supreme Court decisions, concluding that "the Indians in this State are compelled to obey the same laws as the Whites, and therefore, cannot take any kind of game or game fish during the closed seasons."[93] Allen relayed the message to Mount Rainier National Park Superintendent Reaburn, implying that Washington State hunting regulations appeared to apply to the federal Forest Reserve and the National Park as well.

Park Superintendent Reaburn's actions were equally rapid. On October 19, he wrote to the Department of Interior asking again for instructions regarding Indigenous hunting and fishing rights in light of the new Supreme Court ruling and the recent letter from the Washington State Game and Fish Commissioner.[94] On October 28, the issue became acute when Reaburn telegraphed Superintendent of National Parks R.B. Marshall that:

> A band of Yakima Indians is camped in Park hunting and killing game shall we arrest them and bring them before the park commissioner? Instructions desired immediately.[95]

Marshall was immediate and curt in reply. Responding later that day, he simply directed that "…Indians hunting should be arrested."[96]

It is not clear whether Reaburn acted on Marshall's instructions that year, or if the Yakama band had moved on prior to the arrival of park rangers. But in any case, there is no record of any Indigenous hunting parties being arrested or confronted by park officials in 1916. The issue of Indigenous hunting within park boundaries was resolved the following year.

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[91] *State v. Towessnute,* 89 Wash. 478, 154 Pac. 805 (1916). In "Memorandum for files Relative to Indians Hunting in Mount Rainier National Park." J.J. Cotter, 1916. (NARA and Mount Rainier Archives; Catton 1996, 19; Burtchard 2005.) Opinion vacated by Washington Supreme Court Order 1308-3 in 2020.
[92] *New York ex rel Walter S. Kennedy v. Becker,* 241 U.S. 556 (1916). (Ibid.)
[93] Letter State Fish and Game Commissioner L.E. Darwin to Mount Rainier Forest Reserve Supervisor G.F. Allen. October 9, 1916. (NARA and Mount Rainier Archives; Burtchard 2005; and Catton 1996, 19)
[94] Letter Mount Rainier Superintendent D.L. Reaburn to Superintendent of National Parks R.B. Marshall. October 19, 1916. (Ibid.)
[95] Telegram D.L. Reaburn to R.B. Marshall, October 28, 1916. (Ibid.)
[96] Telegram R.B. Marshall to D.L. Reaburn, October 28, 1916. (Ibid.)

Indigenous Hunting Terminated in Mount Rainier National Park: 1917

After thousands of years, Indigenous hunting and gathering practices on Takhóma/Mount Rainier effectively came to an end on Friday, October 5, 1917. After learning of the return of an Indian hunting party to Yakima Park, Mount Rainier Superintendent Reaburn, Ranger Yorke, and U.S. Commissioner Edward Hall drove around the park to White River Camp on the northeast flank of the mountain where they camped for the night of October 4. Early in the morning of October 5, Reaburn and Yorke hiked to Yakima Park via an old Indigenous trail where they met Ranger O.W. Curtis who had reported the hunting activity initially. The three continued to the Indians' camp where they confronted and arrested the six men and women present, later returning with them downslope to a point where the trail met the road east of White River Camp. Here, Commissioner Hall held a make-shift court, finding the men guilty of illegal hunting on park land. They were fined, their rifles confiscated, and the entire party sent back to Yakama Country east of the Cascades, presumably via the same trail across Cayuse and Chinook Pass by which they and their predecessors had traveled to this part of the mountain many times in the past.

On October 6, 1917, the *Tacoma Ledger* carried the story under the headline "Six Indians, 20 Horses, Three Rifles Bagged by National Park Officials." The complete text (minus sub-headlines) reads:

> For the first time since Rainier National Park was park. Government officials indulged Thursday in an Indian hunt.
>
> The result was a bag of four Indian bucks, two squaws, 20 head of horses, and "artillery" consisting of three fine rifles.
>
> A further result was a fine of $50 assessed against each buck by United States Commissioner Edward S. Hall, stationed in the park, confiscation of the three rifles, and the departure of six sad, but wiser Indians, gladdened somewhat by the return of their horses and other trappings, to their native hunting ground in the Yakima country.
>
> The chase was a hurried one, brought about by the report of Park Ranger O.W. Curtis, stationed in Yakima Park, in the northeast section of the national park, that a band of Indians was encamped in that section hunting. He had heard shots and had seen the horses and dogs.
>
> Upon receipt of the news Park Supervisor D.L. Reaburn, Park Ranger John Yorke, and Commissioner Hall hurried by auto to Tacoma, arriving at 2:30 Thursday and starting at once for the northeast section of the park. They reached the park road camp on the White River at 7:30 Thursday night, got up at 3 a.m. and hiked for three hours to the Indian encampment.
>
> Not knowing whether the Indians might be in ugly mood, the approach was made cautiously at first. However, the Indians offered no resistance and were all placed under arrest. Leaving Rangers Yorke and Curtis in charge of the band while the Indians horses and equipment were gathered together, Supervisor Reaburn went back to the road camp for Commissioner Hall.
>
> In the automobile, on the spot where the trail to the park connected with the White river road [*about a mile east of White River Camp*], federal court was held. The Indians pleaded guilty. They had a deer skin in their possession, the skin of which was not over 48 hours old. Because of their plea of ignorance of park rules, Commissioner Hall let them off with the light fines, altho he could have fined each $500 and confiscated every bit of equipment they had under the recent act of congress which provides for this confiscation regardless of any treaties the Indians may ever have had.
>
> The "artillery" was brought into Tacoma and will be held for the secretary of the interior to say what shall be done with it. Supervisor Reaburn last night called attention to

the hunting restrictions in the national park and warned that anyone caught hunting would be prosecuted to the full extent of the law.

Over the next two months, actions taken to terminate hunting in Yakima Park began to solidify into policy prohibiting Indigenous hunting at Mount Rainier, and throughout the National Park Service generally. In a letter written on October 8, 1917, Superintendent Reaburn informed the NPS Director of the event, and confiscation of the rifles. He included a clipping of the *Tacoma Ledger* article shown above.[97] Ten days later, newly appointed acting NPS director Horace Albright relayed the message to the Commissioner of the U.S. Office of Indian Affairs (OIA –later Bureau of Indian Affairs), recommending that he use the power of his office to give the Yakama Tribe "an emphatic warning and promise severe punishment, not only by the United States Commissioner in the park, but also by your own office, [*so that*] they might be induced to keep away from the park in hunting season."[98] Assistant OIA Commissioner E.B. Meritt replied that such action was beyond the jurisdiction of his office, but that he would contact the Superintendent of the Yakima Reservation and recommend that he "take the necessary steps to warn the Indians under his jurisdiction that neither they nor white people have any right to hunt within the confines of Mount Rainier National Park at any time of the year… ."[99] After receiving a response, Meritt again wrote to Albright indicating that the issue had been taken up with the Yakama. He suggested that the rifles be returned to the Yakama in exchange for a signed statement that "they will not, in the future, trespass on National Park territory; and furthermore, will abide by the laws of the State and of the Government with respect to hunting… ."[100] Albright concurred; and on the following day, November 24, 1917, wrote to OIS Assistant Commissioner Meritt and Mount Rainier Superintendent Reaburn to finalize the agreement.[101]

And so ended Indigenous subsistence hunting in Mount Rainier National Park. As late as the 1850s, anecdotal evidence suggests that plant and animal populations on the mountain remained more-or-less intact despite thousands of years of Indigenous hunting and gathering activity. The 1852 Ford climbing party, for example, waxed enthusiastic about the mountain's bounty, noting that they were able to fare "sumptuously on the game afforded by the mountain, which they found very numerous, in the shape of brown bear, mountain goat, deer, etc., with an endless variety of the feathered genus; the side of the mountain …literally covered with every description of berries, of most delicious flavor (Schullery 1987:8 and this volume)."

Such abundance, however, did not last. In the absence of conservation-oriented land-use practices, high-elevation plant and animal communities could not withstand unregulated sport-hunting of the sort employed by the 1884 Fobes climbing party described earlier in this chapter (cf., Schullery 1987:101-113; Haines 1999:70-79; McIntyre 1952:128-134). Game patterns were disrupted further by increasing human activity on all sides of the mountain. As early as 1886, Indigenous people were experiencing poor hunting conditions in formerly productive places such as upper Cowlitz Park (see Allison Brown 1920 and Chapter 2 this volume). It is reasonable to infer that similar conditions were experienced in other locations around the mountain as well.

[97] Letter Mount Rainier Superintendent D.L. Reaburn to Director DOI National Park Service, October 8, 1917. (NARA and Mount Rainier Archives, and Burtchard 2005).
[98] Letter Acting Director H.M. Albright to Commissioner of Indian Affairs, October 18, 1917. (Ibid.)
[99] Letter Office of Indian Affairs (OIA) Asst. Commissioner E.B. Meritt to NPS Acting Director H.M. Albright. November 2, 1917. (NARA and Mount Rainier Archives; and Burtchard 2005).
[100] Letter E.B Meritt to H.M. Albright. November 23, 1917. (Ibid.)
[101] Letters H.M. Albright to E.B. Meritt and D.L. Reaburn. November 24, 1917. (Ibid.)

By the time the Department of the Interior took over park administration in 1899, animal populations had been severely depleted; a problem exacerbated by non-Indigenous hunters, sight-seers, hikers, explorers, miners, poachers, and others that visited the mountain in increasing number. While he also blames annual Indigenous firearm-assisted hunting for the "condition of scarcity…," Robert McIntyre Sr. (1952:128), in his *Short History of Mount Rainier National Park*, implies that primary responsibility lay with non-Indigenous sources.

> …Newspaper accounts and the verbal accounts of old-timers tell of the 1890's wanton destruction of goats and other animals by small parties of sportsmen who came to the mountain for late summer or fall hunting. Parties of hunters staying at the Longmire's Springs Hotel often bragged about the large numbers of goats which they shot to watch them pitch over the faces of cliffs or glaciers. John Muir, who visited the mountain in 1888 with William Keith, the artist, reckoned that the icy cone of Rainier furnished protection to 200 mountain goats. By 1899 when the area was set aside as a national park and sanctuary for the wildlife, goats were seldom seen by visitors to the mountain.

Expanding slightly on McIntyre's work, Catton (1996:175) also notes that:

> Illegal hunting was so prevalent in the park's early years that it posed a real menace to the wildlife populations. Beaver and otter were thought to have been entirely trapped out by 1905.[102] The mountain goat had long been a prized quarry of sport hunters, the population fell off considerably in the 1890s, and probably continued to decline in the early 1900s… Deer and bear were also relatively scarce. …

Given these conditions, it is little wonder that, when the NPS assumed responsibility for maintaining Mount Rainier resources, officials worked to end further degradation of any kind. From 1907 to 1913, park officials proposed three measures 1) no hunting within park boundaries; 2) trapping and shooting of predators in the park; and 3) establishing a three, then ten, mile no-hunting buffer around the park as a wildlife refuge (McIntyre 1952:129-130). Although the buffers were never established and Indigenous hunting not yet halted, the remaining measures appear to have had some effect. Regarding the years 1914 through 1916, McIntyre (1952:130) writes that

> By 1914 wildlife in general was on the increase. Deer and goats were often seen. Goats had once more returned to Van Trump Park. A small herd of elk, the first seen in the park since 1905, was reported from the central east side of Mount Rainier. During the winter the rangers had trapped two cougar, two wildcats and twenty-five marten as predators.
>
> In the years of 1915 and 1916 the large mammals were more often seen. Deer were plentiful, one hundred goats were seen in one band, and bear, for the first time, were causing serious damage to construction camps. …

Thus, the events of 1917 were preceded by three years of increasing animal populations. Other regulations intended to limit plant gathering activities also were in place, but these were less stringently enforced so long as they did not involve large-scale impact such as commercial logging or intentional burning –the latter long-used by Indigenous people to enhance plant and animal productivity in heavily forested environments. Accordingly, there is little doubt that some level of medicinal, fiber, berry, and other food-plant gathering activities by Indigenous people continued well beyond the 1917 hunting prohibition. However, stripped of the hunting component and discouraged by park personnel, these traditional practices dwindled to a lower level as well.

[102] Secretary of the Interior Annual Report, 1905. *Rainier Nat. Pk. Fiscal Year ended June 30th.* (NARA and Mount Rainier Archives). Also see McIntyre (1952:128).

Theodore Catton (1998:19), suggests that the "initiative to end subsistence hunting by Indians in the park came from local authorities –seasonal park rangers, state and county game wardens, newspaper editors– and not from any general policy that was crystallizing in the national park system bureaucracy." Be that as it may, it is clear that, buttressed by state game laws, park policy prohibiting *all* hunting at Mount Rainier National Park had taken root, and that the idea existed at the national level as well. By acting on the Yakama hunting party in such a decisive manner, park management, in conjunction with the State of Washington and the NPS, sent a message to Indigenous people that park regulations prohibiting hunting would henceforth be extended to all tribal people traditionally associated with the park. That is, park regulations aimed at protecting plant and animal communities within park boundaries would now be applied to tribal members in the same manner as the general non-Indigenous population regardless of treaty-reserved provisions.

This point of view, and the assumed supremacy of state hunting and fishing regulations over federal treaties, continued more-or-less intact from 1917 until the basic premise began to unravel with renewed agitation for treaty-reserved Pacific Northwest Indian fishing rights in the 1960s; culminating with the landmark *Boldt Decision* in 1974 as reaffirmed by the United States Supreme Court in 1979. But that was over a half-century in the future. For now, the prospect of meaningful Indigenous involvement in hunting, plant gathering, and habitat management on Takhóma/Mount Rainier seemed bleak.

Diminished Indigenous Presence at Mount Rainier: 1918-1960s

Despite elevated park sensitivity to the issue, relatively few park records convey useful information related to tribal hunting or gathering during the years following formal prohibition in 1917. We believe that the combination of depleted game, newly enforced NPS regulations, and the disrupted state of Indigenous societies combined to reduce Indigenous presence in the park except for still-legal plant gathering activities[103] and park-promoted appearances.

An early reference to Indigenous presence in the park after 1917 comes from Charles Landes' 1925 article in *Mount Rainier Nature News Notes* regarding huckleberry gathering –which continued uncontested through the 1920s despite the ban on hunting. Landes' article, while brief, tells us a good deal about huckleberry habitat, its continuing importance to Indigenous people, and steps previously used to enhance productivity.

> Huckleberry time as usual was heralded by the arrival of parties of Indians who come to the mountain each year to get a supply of the delicious fruit. The Indians usually camp on this [*western*] side of the mountain either up the Kautz [*Creek*] a few miles from the road or at Recksecker [*sic*] Point, where the large wine-colored or nearly black variety, without bloom, (*Vaccinium macrophyllum*) [now *V. membranaceum*]) grows in great abundance in the burned over land. This variety is preferred because of its superior sweetness and keeping qualities. This annual pilgrimage of the Indians has lost much of its picturesqueness. A few years ago they arrived on horseback in gayly colored attire. To-day they arrive in sedan cars and ordinary business garb. Before the time of the white man Indians came to the Park for berries and it is thought that many of the burned areas of the

[103] Disturbing vegetation on park lands was prohibited by DOI National Park Service Rules and Regulations Section 1 published in the *Federal Register* June 27, 1936. (F.R. Doc. 1006 [1936]). NPS Rules and Regulations were reorganized into a unified *Code of Federal Regulations* as *36 CFR Part 2* in 1938; where they remain, subject to update.

> park were originally burned over by the Indians to increase the distribution and yield of the huckleberry.[104]

Floyd Schmoe who worked at Mount Rainier from 1919 to 1928 as Paradise Lodge caretaker, mountain guide, Park Ranger, and finally, Park Naturalist, reinforces Landes' comments.

> It is still the practice of the local Indians to come each season into the open parks and gather the year's supply of berries. Several varieties of huckleberries are abundant in the region, and these the (women) dry for the winter's food supply. …Although the women carry their papooses on their backs and use some wonderful native baskets, it is about as usual to see them arrive in closed cars as upon the traditional Indian Pony, and tho' many of them still employ the Chinook jargon, typical American slang phrases are as frequently heard.[105]

About this time, a group of Yakima tribal members also were employed at Paradise by the Rainier National Park Company to demonstrate traditional crafts and activities for park visitors. These events included activities such as drumming, dancing, horseback riding, and spear fishing (Thompson 1981:26; Catton 1996:14). According to Catton, the agreement broke down over unwillingness of the Yakama participants to pose for souvenir photographs.

Despite these lingering tribal activities, institutional memory of routine Indigenous use of park landscapes and resources for traditional hunting and gathering purposes had already begun to fade. Organized berry-gathering excursions such as those described by Landes and Schmoe withered and came to a close in the early to mid-1900s (Thompson 1981:26). With them, went the last visual reminder of Indigenous people as even periodic users of park resources. The archaeological record of routine long-term use of park landscapes discussed earlier, while abundant, was difficult to see and remained virtually unknown prior to completion of the park's first archaeological overview years later (Burtchard 1998). Furthermore, periodic presence of Indigenous people such as Wapowety, the elder Chief Sluskin and younger Sluiskin of the broken hand, Sutulic (Indian Henry), as well as annual tribal hunting and gathering parties was gone. In its place, came a general belief that Indigenous people rarely used the mountain at all. Those that did so were, in essence, viewed as relics of a noble but limited and largely inconsequential past.

Park Naturalist Floyd Schmoe reflects this changing view of Indigenous people from hunter-gatherers who actively managed, and seasonally occupied, Mount Rainier to people that feared and seldom ventured onto its slopes. In early 1926, for example, Schmoe acknowledged at least some sort of routine Indigenous presence when he wrote that while he had never "…found evidence of permanent camps within what is now the National Park, …there is no question but that Indians made summer pilgrimages into the high country to hunt and to gather wild berries. …" He goes on to say that his friend Ben Longmire "…a descendent of the first settler in the region, tells me that he has also found arrow heads in the goat beds above timberline in Van Trump Park."[106] Schmoe himself found an obsidian arrow point in a mountain goat wallow at the base of a rocky spire on Lane or Plumber Peak in 1922; an event that he references in his 1925 book *Our Greatest Mountain* (Schmoe 1925:80) and in 1926 *Nature News Notes*.[107]

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[104] *Mount Rainier Nature News Notes*. Vol. III, No.8. August 18,1925. (MRNNNs are available on-line.)
[105] *Mount Rainier Nature News Notes*. Vol. III, No.15. February 1,1926. Schmoe's remarks essentially are reiterations of comparable statements included in his book *Our Greatest Mountain* (Schmoe 1925:82-83); and *A Year in Paradise* (Schmoe 1999:125-126).
[106] *Mount Rainier Nature News Notes*. Vol. III, No.15. February 1, 1926.
[107] Ibid.

Years later, Schmoe seems to have changed his mind about Indigenous people in the park. In 1959, he again wrote of the arrow point discovery in his popular *A Year in Paradise* (Schmoe 1999:115-118). Oddly, in his later writing, and contrary to earlier accounts, Schmoe promotes the idea that his was the "*only* arrow point ever found on the mountain…" and that "This scarcity of artifacts gives weight to the stories that the Indians *never lived on the mountain and seldom hunted there*" [emphasis added]. Whether absence of Indigenous people on the mountain "…was from fear of the gods who dwelt in Tahoma's fire pit as the legends say, or from the sheer fact of inaccessibility, I am not certain."

Schmoe appears to have come to accept and promote a point of view that had become popular among local non-Indigenous residents, park visitors, and even park staff in the years following termination of tribal hunting in 1917, and the fading away of organized berry gathering over the next few decades. That is, he (Schmoe 1999:126) now concluded that Indigenous people *avoided* Mount Rainier essentially because:

> …An Indian, fully at home on his woodland trails, would be ill equipped to climb over broken lava and ice of the upper reaches shod only in deerskin moccasins.
>
> …this is "Tahoma," *The Mountain,* and they have long held its upper slopes in awe. For within the memory of men still living, earthquakes have rocked the mountain, causing great avalanches of stone and ice. Naturally they attribute these phenomena to the spirits who dwell at the summit, and the Indians want no truck with gods capable of such violence.

And so, in the absence of constant reminders of an Indigenous presence, the sense grew that Indigenous people seldom ventured onto Mount Rainier, and certainly not to its upper slopes – this despite presence of numerous early historic-period trails, reliance on Indigenous guides, multiple accounts of hunting and gathering parties, documented Indigenous ascents, and eventually, a robust archaeological record of millennia of Indigenous use of mountain landscapes and resources. In its place, came a more limited view of the Native American role –one dominated by infrequent forays to hunt and gather berries in picturesque attire. Catton (1996:26) suggests that the National Park Service "…reshaped the Indian's relationship to Mount Rainier by profoundly influencing the way the Indian past was reconstructed. …Indian use of the park was altered at the same time that past Indian use of the area was romanticized." He (Catton 1996:20) suggests that "…Indians became an adornment for the nation's scenic wonderlands –picturesque, nostalgic, and innocuous. In the hands of the park's naturalists [in the early days], the Indian past in Mount Rainier National Park was sentimental and compliant with the park's purpose." And at least for a time, the factual, more robust story of a sustained Indigenous relationship with upper-elevation landscapes and resources at Mount Rainier was lost.

Beginnings of Political and Economic Change: 1960s-1974

By mid-century, memories of an Indigenous presence at Mount Rainier had faded to a shadow of what it had been in its precontact or even early historic-period past. In essence, Indigenous people came to be treated much the same as other park visitors. They were welcome to visit the park; but other than on special occasions, they paid normal entrance fees, experienced the mountain much as non-Indigenous visitors, and left when the visit was over. As institutional memory of its Indigenous past faded, the park's principal focus turned to recreation and natural history interpretation, and to restoration and preservation of the Mount Rainier's scenic values and natural resources. Interpretive displays dealing with tribal people sometimes mistakenly employed imagery more in tune with tribal groups from the central plains than with more local people now known to have accessed Mount Rainier's slopes for thousands of years (those tribes noted in Chapter 1 this volume, cf., Catton 1996:9-26).

As the National Park Service moved into the second half of the century, however, events in the nearby coastal lowlands, and indeed around the country, were gathering momentum –events that ultimately would reshape the political and economic fortune of Indigenous people within broader American society. In time, these events would extend to a reemerging connection to the mountain as well.

Civil Rights and Fishing Rights

The mid-1960s and early 1970s were widely associated with social unrest in the United States. African American protests and urban unrest, resistance to economic and educational inequality, and growing opposition to the Viet Nam conflict were common elements of the country's political landscape. Lesser known, but comparably important, was civil unrest within Indigenous populations across the country. The American Indian Movement (AIM), founded in 1968, epitomized a resurgence of Native American identity and resistance to their subordinate role within the broader American political and economic structure. Indigenous occupation of California's Alcatraz Island in 1968, Seattle's Fort Lawton in 1970, and Wounded Knee, South Dakota in 1973 are among the better known of a wider array of civil disobedience events that took place across the nation.

Closer to Mount Rainier, Indigenous protests and civil disobedience over state regulations prohibiting Indigenous out-of-season subsistence fishing were gathering momentum. For generations, the State of Washington had compelled Indigenous people to refrain from taking game or fish of any kind during the state's closed seasons; a position consistent with 1916 Washington State and U.S. Supreme Court rulings in *State v. Towessnute* (89 Wash. 478, 154 P. 805), and *Kennedy v. Becker* (241 U.S. 556) –both of which were overruled in the years that followed.[108] Beginning in the 1960s, however, Indigenous activists (especially those residing along the Nisqually and Puyallup watersheds) began taking salmon and steelhead off-season in defiance of state policies that they believed to be contrary to rights reserved by the Treaties of Medicine Creek and Point Elliott, among others.[109]

The issue of Washington State's limiting of treaty-reserved fishing rights came to a head in 1970, when the United States filed *United States v. Washington* in District Court on behalf of Puget Sound and Olympic Peninsula tribes; both signatory to 1850s Stevens Treaties (Wilkinson 2000:50). Buoyed by an earlier finding in favor of Yakama fishing rights on the Columbia River,[110] the tribes hoped to overturn regulations that limited Indigenous subsistence fishing to sport-fishing seasons common to other state residents, and gain instead, a substantial share of the commercial Washington fishery. According to Charles Wilkinson (2000:49), the tribes based their case on three fundamental treaty-derived points: 1) tribal fishers could fish free of state regulation; 2) tribes, as sovereign governments, had primary regulatory authority on the reservations and at off-reservation sites; and 3) the tribes had the right to harvest a substantial part of the runs.

[108] In 1916, *State v. Towessnute* and *New York ex rel Walter S. Kennedy v. Becker* rulings asserted the supremacy of state regulations over federal treaties in prohibiting out-of-season off-reservation fishing and hunting. In 2020, *Towessnute* was vacated by Washington Supreme Court Order 1308-3. The *Becker* ruling was overturned by the 1974 "Boldt Decision" (*United States v. Washington* [384 F. Supp. 312]) and reversed definitively in 2019 by the U.S. Supreme Court in *Herrera v. Wyoming* (139 S. Ct. 1686 [2019]).
[109] Charles Wilkinson's (2000) *Messages from Frank's Landing* provides a compelling narrative of these events and times.
[110] *Sohappy v. Smith*, 302 F. Supp. 899 (D. Or. 1969).

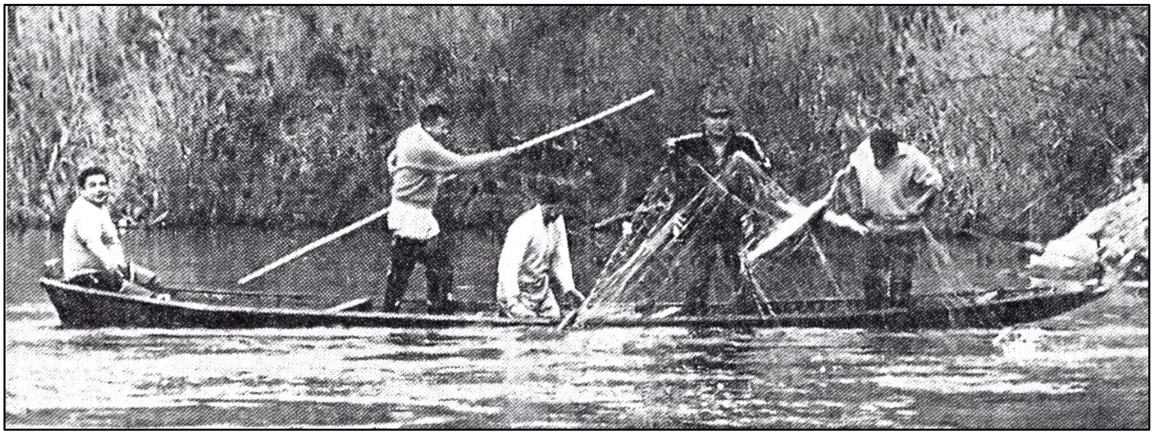

Figure 3.2. Nisqually Tribal Members Recover Off-season Steelhead in 1966.
Contrary to state fishing regulations, Leonard Squally, Billy Frank Jr., Al Bridges, Roy Kalama, and Herman John (left to right) recover netted fish from a traditional shallow draft river-canoe.
(Courtesy Charles Wilkinson, University of Washington Press, and The Olympian newspaper)

The Boldt Decision

United States v. Washington (384 F. Supp. 312 [W.D. Wash. 1974]) was assigned to Western Washington District Court Judge George H. Boldt. After a period of prolonged pre-trial preparation, delays, and continued protest, the case went to trial in Tacoma in late 1973. The 1974 ruling was dramatic. Boldt's landmark decision in favor of the United States and its tribal partners reversed the long-standing limitation of state fishing regulations on treaty-reserved fishing rights. It not only mandated termination of Washington State seasonal fishing restrictions on Indigenous fishermen, but also allocated a 50 percent share of Washington's total salmon and steelhead commercial fishery to Pacific Northwest tribal authorities to be managed by the soon-to-be-created Northwest Indian Fisheries Commission (NWIFC).[111]

Now better known as the *Boldt Decision,* the *United States v. Washington* ruling was upheld by the Ninth Circuit Court of Appeals in 1975. The U.S. Supreme Court declined to take further appeal in 1976, making it the "supreme law of the land", overriding state law to the contrary (Wilkinson 2000:55-58). In 1979, responding to continued state resistance, the Supreme Court vacated contrary judgements of lower federal courts and the Washington State Supreme Court and substantially reaffirmed the Boldt Decision.[112] In so doing, the court formally ended years of conflict over the *treaty-reserved fishing rights* versus the *state law supremacy* issue, reinvigorating a sense of tribal sovereignty throughout the region.

Boldt's reinstatement of Pacific Northwest salmon and steelhead treaty-reserved fishing rights was a key component to the revitalization of affected tribal societies. Equally important was the fact that the Boldt Decision *reversed* the 1916 Washington and U.S. Supreme Court rulings that had relegated treaty-reserved rights inferior to state law. The revived status of treaty tribes as

[111] The NWIFC now supports 20 Indian tribes in western Washington.
[112] *Washington v. Washington State Commercial Passenger Fishing Vessel Association* (443 U.S. 658 [1979]).

sovereign governments[113] with reserved rights superior to state regulation provided an avenue for development of policies and institutions of social and economic benefit to tribal people nationwide –some of which were otherwise prohibited by state laws (e.g., commercial gaming venues). Ultimately, because of general revitalization of tribal societies, and because the National Park Service had relied on 1916 state and federal rulings as the legal basis for prohibiting hunting (and effectively, gathering), implications eventually would trickle up to Mount Rainier and other National Parks as well.

Re-emerging Indigenous Presence: 1975-1998

Situated inland from the coast and lacking commercially viable salmon runs, Mount Rainier National Park was peripheral to the social ferment building around it. The mountain, of course, remained a majestic symbol of cultural and spiritual significance that, on clear days, dominated the lowland's eastern horizon. Even so, in the beginning, its physical use by Indigenous people continued to lag much as it had since the early to mid-1900s while leaders focused on concrete issues of reconstructing tribal society. Traditional Indigenous plant gathering and hunting activities, to the extent that they occurred at all, apparently took place surreptitiously and without NPS knowledge or approval.

Nonetheless, Indigenous people were experiencing a period of dramatic political and economic change. The Boldt Decision was a key element in events that marked the start of a new period of social, economic, and political revitalization within tribal societies throughout much of the country. Not only was the salmon fishery restored to Indigenous people in the Pacific Northwest, but a host of other social and economic changes followed in its wake. In many places, tribal governance and facilities were built or improved; federal tribal recognition was restored; revenue-producing ventures were begun; tribal self-policing became commonplace; tribal health care, housing, and schools were improved; and much more. The extended period of declining Indigenous population densities, displacement by non-Indigenous settlers, inferior economic and political status, prolonged separation of individuals from tribal society, substandard health care and education opportunities, and subjugation to local regulations contrary to treaty-reserved rights that began (in the PNW) in the 18th century finally had slowed and reversed –a process that continues to the present.

Examples of these changes can be seen among the tribes traditionally associated with Takhóma/Mount Rainier. In the mid-1970s, for example, the Nisqually Indian Tribal Council still met on a more-or-less ad hoc basis at a variety of off and on-reservation sites, while struggling with a nearly non-existent budget (Zelma McCloud pers. com. ca. 2006; cf., Wilkinson 2000:67). The Cowlitz Indian Tribe, whose draft treaty had been passed over during the U.S. Civil War, had lost federal recognition altogether. Other local tribes (e.g., Puyallup, Muckleshoot, Squaxin Island, and Yakama) were dealing with a complex array of comparable issues. Just thirty-some years later, all associated tribes (including the restored Cowlitz Indian Tribe) had developed functional self-governance systems and facilities; and had, or were working toward, substantially improved tribal housing, elder and child-care facilities, income-generating casinos and/or entertainment venues, health care and education opportunities, and departments devoted to environmental, agricultural, and fishery sciences. They also had begun acquiring and restoring, as finances and opportunity made possible, land parcels lost during treaty and historic-period settlement times; all of which were part of an evolving process that continues to the present.

[113] The notion that American Indian Tribes functioned as sovereign states was established in *Worcester v. Georgia* (31 S. Ct. 515 [1832]). The *Worcester* ruling expanded on *Cherokee Nation v. Georgia* (30 U.S. 1 [1831]) that recognized distinct Indian Tribes as "domestic dependent nations."

Continuing tribal revitalization was not, and is not, limited to construction of physical facilities. By the 1990s, many organizational, economic, and structural needs were being met –at least at a basic level. As tribes became more secure in their re-emerging presence within 20th century American society, the process begun in the 1970s increasingly involved renewed interest in connecting with native languages, traditional ways, and traditionally used landscapes beyond the limited Stevens Treaty reservation boundaries. It is no surprise that these interests included, among others, greater involvement with Mount Rainier –a special, to many, sacred place. Beginning in 1998, for the Nisqually Indian Tribe, and soon thereafter for others, this interest included recognition of treaty-reserved plant-gathering privileges within the boundaries of Mount Rainier National Park. This issue is, of course, the primary object of the present study; one that is pursued more directly in the chapters that follow.

Summary

This chapter has addressed various aspects of the changing relationship between Indigenous societies, Mount Rainier National Park, and the broader U.S. political system during the 20th century. In 1899, when Mount Rainier National Park was founded, Indigenous people continued subsistence hunting and gathering activities on the mountain in a manner comparable to practices followed for thousands of years in the past. They did so, however, in the face of seriously decreased game abundance, and in competition with non-Indigenous sport hunters and a growing number of tourists and climbers eager to visit the new National Park.

Consistent with Stevens Treaty provisions, park management continued to permit hunting and gathering activities by Indigenous people in the early 1900s. At the same time, park management banned such practices by other visitors in accordance with emerging NPS policy and in the attempt to restore depleted game populations in the park. Such restrictions, however, were difficult to enforce with available staff. Restoration success was, at best, uneven.

Given limited staff, park and forest reserve managers directed much of their early 1900s efforts toward reducing predator species believed to endanger more visible, charismatic ungulate populations, and by suppressing fires considered to be a threat to forest integrity and timber values. In the latter case, federal personnel unknowingly deprived Indigenous people of one of the prime tools (fire) by which they maintained animal and plant (especially huckleberry) productivity in the mountains –further diminishing the economic value of these places to their original users.

In the face of limited restoration success and mounting opposition to Indigenous hunting and gathering practices, Mount Rainier National Park managers sought clarification of the no-hunting provision in park policy regarding Indigenous people. The legal means to do so emerged in 1916 when Washington and United States Supreme Courts ruled that state-mandated game restrictions superseded treaty provisions and thereby applied to off-reservation Indigenous hunting and fishing practices regardless of treaty language to the contrary. In 1917, acting on these rulings, park personnel arrested a group of Yakama men and women hunting on park lands, removed them, and officially banned further subsistence hunting by Indigenous people –a regulation that continues to the present.

While not officially banned, traditional plant gathering practices –always part of the hunting and gathering process– declined in value. Even so, tribal people continued to travel to the mountain through most of the 1930s –initially on horseback, later in automobiles– to collect berries, and occasionally, to entertain park visitors. Eventually, however, decreased value of plant gathering in in the absence of hunting, coupled with fire-suppressed loss of huckleberry productivity, made continuing journeys to the mountain impractical. By mid-century, Indigenous presence on park lands had dwindled to a shadow of its precontact and even historic-period past.

In the lowlands surrounding Mount Rainier, social unrest common to the 1960s and early 1970s was taken up by Indigenous people as well. Long chafing under state-mandated fishing restrictions, tribal members –especially on Mount Rainier's glacier-fed Nisqually and Puyallup watersheds– conducted repeated off-season fishing protests intended to challenge state laws that they believed were contrary to rights reserved to them under terms of the Treaties of Medicine Creek, Point Elliott, and others. The resulting *United States v. Washington* (384 F.Supp 312 [W.D. Wash. 1974]) case, the outcome of which is now better known as the *Boldt Decision,* found in favor of Native American litigants in 1974. After surviving appeal, the decision was reaffirmed by the U.S. Supreme Court in 1979, effectively making the Boldt Decision the law of the land throughout the country. In Washington state, the result afforded Pacific Northwest tribes a 50 percent share of the commercial salmon fishery. Charles Wilkinson (pers. com. 2021), notes that "more recent cases, especially the 2019 U.S. Supreme Court ruling in *Herrera v. Wyoming* (139 S. Ct. 1686 [2019]), have clarified the situation of resource use on federal lands," in part, by "definitely asserting the supremacy of federal treaty provisions over conflicting state laws throughout the nation."[114]

The Boldt Decision proved to be a key component in the revitalization of tribal identity, and in elevating tribal economic and political status within broader American society. The years that followed witnessed remarkable improvements in health care, housing, and education for Indigenous people. It also stimulated increased tribal involvement in the sciences; including fish, plant, and animal ecology, forestry, agricultural science, archaeology, geomorphology, and other fields important to their interests. With environmental specialists in place, Pacific Northwest tribes have assumed prominent roles in salmon fishery restoration, terrestrial ecosystem and landscape preservation, timber management, and more.

Along with these changes came a renewed sense of tribal identity and a drive to reconnect with long-standing traditions, including traditionally used, highly valued, landscapes at Mount Rainier National Park. In recent years, renewed involvement has included routine consultation on park affairs, annual meetings between park management and its tribal neighbors, special jointly held events, designation of special areas for tribal uses, and more. The first of these was renewal of plant gathering privileges negotiated between Mount Rainier National Park and the Nisqually Indian Tribe in 1998. That MOU, its beneficial effect on the tribe/park relationship, its opposition by an environmental group, and the outcome of research regarding potential environmental effects of its implementation is the central subject of the chapters that follow in Part II of this volume.

[114] Also see Charles Wilkinson's (2024) publication *Treaty Justice: The Northwest Tribes, the Boldt Decision, and the Recognition of Fishing Rights* for a more complete consideration of the history and implications of the landmark *United States v. Washington* (Boldt) decision.

Part II.

Reintroducing Traditional Plant Gathering to Mount Rainier National Park

by
David Hooper, Arnie Peterson, and Greg Burtchard

Bundled Beargrass Leaves Gathered from a Mount Rainier Experimental Collection Plot
(Photo by David Hooper)

Chapter 4: The Nisqually–Mount Rainier Plant Gathering Memorandum of Understanding; Opposition, & Research

Figure 4.1. Gathering Beargrass Leaves at Mount Rainier
Georgiana Kautz, Arlene Kautz, and Joyce McCloud (*left to right*) collect beargrass leaves in a Mount Rainier research plot. (Photo by Ben Diaz)

In Part I, we reviewed archaeological, ethnographic, and historical accounts to develop a clearer understanding of the place of Indigenous people in the ecosystems and landscapes on and around Mount Rainier during the precontact and historic-period past. Following a prolonged period of population loss and socio-economic disruption that began in the mid-1700s, Indigenous societies began to re-emerge as viable political entities in the mid to late 1900s. Arguably, the most rapid period of change began with tribal fishing protests in the late 1960s and early 1970s; culminating in the landmark *United States v. State of Washington*, or *Boldt*, *Decision* of 1974 that restored 50 percent of Washington State's commercial fishery to Pacific Northwest tribes. The ruling was upheld by the United States Supreme Court in 1979, asserting the supremacy of U.S. treaty-reserved rights over most conflicting state laws and regulations nationwide.

During this time, and especially after the Boldt Decision, tribes in the vicinity of Mount Rainier experienced a resurgence in effective tribal governance, facilities construction, health care, educational opportunities, and more. With these changes, came a re-emerging sense of tribal identity and renewed connection with long-standing tribal traditions –including traditionally used and valued landscapes. One of the foremost of these landscapes among southern Puget Sound and west-central Washington tribes was the singularly large white mountain known by linguistic variants of *Takhóma.*

Progress in reestablishing ties with Takhóma (now Mount Rainier) gradually gained momentum at the close of the century. In 1995, Mount Rainier National Park hired its first cultural resource staff with responsibilities that included communication with culturally associated Indigenous tribes. During the same year, park management funded its first park-wide survey since 1963 devoted directly to systematic documentation of the mountain's precontact archaeological record. Contrary to previous widely held assumptions, survey results indicated substantial precontact use of Mount Rainier's upper elevation subalpine to alpine landscapes.[115] Continuing research has since established at least 9,500 years of continuous human presence on all sides of the mountain –results consistent with long-term, repeated seasonal use of Mount Rainier landscapes by Indigenous people ancestral to those residing in its vicinity today.

The strengthening connection between Mount Rainier National Park and modern tribal people continued into the 21st century as witnessed by establishment of routine consultation procedures, annual meetings, special events, fee-free park entrance, increasingly frequent visitation, and among other things, creation of designated tribal use areas. One of the most important events in this process was the 1998 plant gathering MOU between park management and Nisqually Indian Tribe to permit gathering of limited quantities of traditionally used plants and plant materials within park boundaries. Even though, in practice, use of the permit was minimal, the MOU nonetheless generated a sense of partnership and good-will between park staff and tribal people –a sense that a new cooperative age was dawning between Mount Rainier National Park and its tribal neighbors.

This process, however, has not been uniform or uneventful. As expected, initiation of the 1998 Nisqually-Mount Rainier plant gathering MOU was followed by similar requests by other traditionally associated tribes. Not anticipated, however, was vigorous protest by an environmental advocacy group arguing that the NPS lacked authority to enter such agreements and could not guarantee that such actions would not significantly impair park resources contrary to the National Park Service's Establishment Act.[116] That complaint effectively halted extension of traditional plant gathering privileges to other tribes for an extended period of time. During much of this time, park staff, in concert with representatives of the Nisqually Indian Tribe, engaged in research to determine effects, if any, on gathered plants and associated habitats. At the same time, at the national level, the NPS worked to revise the Federal Code of Regulations to clarify the legal foundation for permitting such activities by traditionally associated tribes in the future.

This book grew out of the 1998 MOU, its opposition, and ensuing research. Moving on from Part I historical background material, this chapter focuses on issues related to the MOU and

[115] *Environment, Prehistory, and Archaeology of Mount Rainier National Park* (Burtchard 1998). Also see related discussion in Chapter 2 of this document.

[116] The National Park Service Establishment Act of 1916 (39 Stat. 535) requires the Park Service to conserve park resources and provide for their use and enjoyment "in such a manner and by such means as will leave them unimpaired" for future generations.

plant gathering research, including 1) why we consider traditional Indigenous plant gathering practices, rooted in the precontact and early historic past, to be generally environmentally conservative; 2) an introduction to the origins of the Nisqually-Mount Rainier plant gathering MOU and its opposition; and 3) the basic character of plant gathering research at Mount Rainier.

Why Traditional Resource Gathering Practices Tend to be Conservative

The key to understanding the conservative nature of Pacific Northwest hunting and gathering practices is rooted in 1) the spatially limited ranges in which critical subsistence resources could be gathered and distributed during the precontact past; 2) the long time-span over which those practices functioned successfully; and 3) the importance of maintaining a stable supply of critical plant and animal resources over the long-term. Living, as we do now, in a time when food and other commodities can be shipped great distances easily and rapidly, it is useful to remember that this was not always the case. Prior to ready access to fossil fuel-based transport, prior even to availability of overland horse or draft-animal transport,[117] Indigenous people across North America were obliged to move food and other resources entirely by foot, dog-pulled travois, or over-water. This meant that, except for very unusual circumstances where long-distance river or sea travel was possible, societies were forced to gather and distribute the bulk of their critical resource goods within relatively narrowly confined geographic areas.

Lacking options for reliable movement of bulk quantities of subsistence and maintenance resources over great distances, most Indigenous societies were required to sustain themselves on locally available resources with limited alternatives in the face of significant shortfalls. This pattern was common and widespread across North and South America from the earliest presence of human populations until well after European colonizers arrived thousands of years later.

In the context of narrowly circumscribed critical resource-capturing areas –dramatically contrasting with what we experience today– successful societies were those that developed mechanisms to conserve plants, animals, and other resources important to their continued survival over the long-term. In other words, limits to critical food and maintenance resources created a selective context favoring development and promotion of social mechanisms that served to conserve and maintain those resources through time.

Not always acknowledged by non-Indigenous settlers was the fact that the resident Indigenous people they encountered were smart. Not only were they equally intelligent as their non-Indigenous colonizers, hunting and gathering people, by necessity, were intimately familiar with the life and reproductive cycles of the plants and animals upon which they relied. They were well-aware of variables that affected habitat productivity within their resource gathering areas. Societies that succeeded over the long-term applied this acquired ecological knowledge to reinforce behaviors that served to sustain resources that were important to them. That is, in general, Indigenous people with limited resource acquisition options tended to develop hunting and gathering strategies that were conservative.

Of course, this conservation-oriented adaptive process was not perfect in all cases. Environmental and social variables are multi-faceted and changeable. Nonetheless, socially reinforced tendencies toward critical resource conservation in hunting and gathering societies were genuine, widespread, essentially unavoidable aspects of long-term reproductive success and social continuity in the context of limited resource alternatives.

[117] Horses and draft animals were introduced to the Americas by Spanish and other European explorers and settlers in the 16th century.

Accordingly, when we speak of *traditional* Indigenous societies, or *traditional* plant gathering and hunting/fishing activities, or *traditional* ecological knowledge,[118] we refer to those societies whose resource acquisition systems are rooted in this more locally-reliant past. A past that sustained Indigenous people in the Pacific Northwest for thousands of years until disrupted by introduced diseases, territorial loss, and partial-absorption into the modern American agricultural-industrial system less than 200 years ago. Traditional plant gathering practices are those that employ techniques based on cultural values and knowledge that tend to function to conserve plant population and habitat viability over time. These sorts of habitat sustaining traditional techniques, and their functionally conservative equivalents, are what we discuss in this report.

The Nisqually-Mount Rainier Plant Gathering MOU; Origins and Opposition

In November 1998, Mount Rainier National Park and the Nisqually Indian Tribe entered into a Memorandum of Understanding that provided for limited collection of 11 traditionally used plants within park boundaries. In accordance with six general terms of understanding, the park and tribe agreed to: 1) collection of traditionally appropriate amounts of plants for personal, family, or community uses in a manner not affecting sustainability of existing ecological patterns; 2) plant collection undertaken by members of the Nisqually Indian Tribe; 3) collection group sizes consistent with park policies; 4) gathering access for tribal members in all areas of the park, provided that plant gathering occurred, to the extent possible, out of sight of other visitors and in places not restricted due to resource conditions as determined by park and tribal monitoring efforts; 5) gathering plants and plant parts traditionally used for cultural or religious purposes and not those listed as sensitive, threatened or endangered by park staff; and finally 6) using gathered plants for traditional religious, medicinal, or other customary purposes rather than for broader commercial gain. The full text of the original Nisqually-Mount Rainier MOU, with accompanying regulations and plant list, may be seen in Appendix A of this report.

Nisqually plant gathering activities under terms of the MOU began in the summer of 1999, regulated by a permit system developed and administered by the tribe, and reviewed annually by park and tribal officials in joint conference. In accordance with terms of the plant gathering MOU, and annually renewed special-use permits, Nisqually Tribal members gathered small quantities of beargrass (*Xerophyllum tenax*) in 1999 and 2000. At the conclusion of each year, park and tribal officials met to discuss the results of the gathering season. Park officials subsequently determined that gathered quantities did not impair park resources.

In 2001, the park's authority to enter into plant gathering agreements of this sort was challenged by the environmental advocacy organization *Public Employees for Environmental Responsibility* (PEER). In a letter dated June 22, 2001, addressed to NPS Acting Director Dennis Galvin, PEER argued that Mount Rainier (and several other NPS units) failed to comply with the National Environmental Policy Act (NEPA) requirement to evaluate environmental effects of plant gathering described in the MOU prior to signing. PEER also maintained that reference to the 1854 Treaty of Medicine Creek as an authority for the MOU ignored an 1896 Supreme Court decision (Ward v. Race Horse, 163 U.S. 504), claiming that "when Congress reserved lands formerly ceded by Tribes as national parks, the lands were no longer open and unclaimed and the rights and

[118] In essence, traditional ecological knowledge (TEK) refers to the cumulative body of environmental-ecological information gained, evaluated, used, and passed on through cultural transmission to subsequent generations of Indigenous societies. In Chapter 8 of this volume we discusses various aspects TEK related to ethnographic research. For more detailed information, interested readers may also wish to consult Berkes 1999; Berkes et al. 2000; Ford and Martinez 2000; Huntington 2000; and Fowler and Lepofsky 2011:286.

privileges conferred by treaty ceased." The full text of PEER's original 2001 request for a moratorium on Indigenous resource gathering practices at Mount Rainier, and the NPS response, can be seen in Appendix B of this report.[119]

Over the next several years, PEER issued additional letters of concern about the plant gathering issue. These reiterated, and further clarified, the organization's continuing legal and environmental concerns with the Nisqually-Mount Rainier MOU, the potential issuance of similar agreements with other tribes, the status of plant gathering on park lands following termination of the MOU, and other related issues.[120]

These letters were taken seriously by NPS officials, influencing park managerial decisions to delay implementation of comparable memoranda of understanding requested by other traditionally affiliated tribes such as the Muckleshoot Indian Tribe, the Puyallup Tribe of Indians, and the Cowlitz Indian Tribe. NPS sanctioned plant gathering activities at Mount Rainier, however, did not cease altogether. While pursuing Code of Federal Regulations (CFR) changes to provide an alternative authority for Indigenous plant gathering privileges on NPS lands (Jarvis pers. com. 2001), park management continued to honor the terms of the Nisqually-Mount Rainier MOU until its termination in November 2003. However, in recognition of PEER's concern about unknown environmental effects of traditional plant gathering activities, the park and tribe agreed to gather plants in specific places where effects could be evaluated by the park's plant ecology staff –a policy that continued through the remaining years of the MOU.

In 2004, following termination of the MOU, no sanctioned tribal plant gathering activities took place in the park. In 2005, Mount Rainier National Park and the Nisqually Indian Tribe developed a joint plan to facilitate plant gathering within a botanical research context. The intent was to determine more rigorously possible effects of traditional collection practices on long-term sustainability of collected species, and on the health of the surrounding ecosystem (Hooper 2015:36-37). This research continued through 2015, the results of which are the primary subject of the remainder of this report. At the time of this writing, no other plant gathering MOUs, agreements, or permits have been issued by the NPS to any tribe since the research project ended.

Mount Rainier–Nisqually Traditional Plant Gathering Research

Accompanied by park Special Use and Research Permits with appropriate NEPA compliance documentation, field research into traditional plant gathering at Mount Rainier took place in two phases: 1) beargrass (*Xerophyllum tenax*) gathering observations and effects evaluations by the park's plant ecologist from 2001 through 2003; and 2) limited ethnographic research, controlled field-plot collection, plant observations, and data analyses conducted by co-

[119] Charles Wilkinson (pers. com. 2021) maintains that "in the years since 2001, issues regarding cessation of treaty rights on federal lands have been resolved substantially in favor of Indigenous people." He notes especially the *Herrera v. Wyoming* (139 S. Ct. 1686 [2019]) ruling that "treaty-reserved rights did not expire with statehood and that lands did not automatically become 'occupied' by conversion to federal authority."

The *Herrera* case involved out of season elk hunting by Crow Tribal members on Bighorn National Forest Lands in Wyoming; a right that tribal member Clayvin Herrera claimed to be reserved by the 1851 Treaty of Fort Laramie. Reversing a lower court ruling, U.S. Supreme Court Justice Sonia Sotomayor summarized the ruling briefly by stating that "The Crow Tribe's hunting right survived Wyoming's statehood, and the lands within Bighorn National Forest did not become categorically 'occupied' when set aside as a national reserve" (139 S. Ct. 1686, 1691 [2019]).

[120] For example, PEER letters to NPS Director Fran Mainella dated January 7 and July 29, 2002; Mount Rainier Superintendent David Uberuaga dated April 27, 2005; and NPS Director Jonathan Jarvis dated December 18, 2009.

author David Hooper from 2006 through 2015. Basic procedures are introduced below. Detailed discussion of studies specific to the three primary plants gathered –beargrass, pipsissewa, and cedar– follow in Chapters 5, 6, and 7. Chapter 8 offers recommendations related to a broader range of plants based on those results.

Early Observations: 2001-2003

From 2001 through 2003, Nisqually tribal members gathered only beargrass (*Xerophyllum tenax*) –a plant with long, thin, fibrous leaves valued for basketry. Beargrass had fallen into short supply in lowland habitats largely due to unregulated heavy use for floral displays as described in Chapter 5, pages 111-112. To help relieve the short-fall, Nisqually gatherers at Mount Rainier used traditional techniques involving removal of a limited number of individual leaves rather than cutting entire plants –a technique common to florist collectors. To assess effects, plant ecologist Laurie Kurth and crew set up six 10 by 10 meter plots near the park's Canyon Rim viewpoint on the mountain's southeastern slope. Here, they monitored the gathering process to evaluate the extent to which Nisqually harvest practices affected individual plants and associated habits.

The Canyon Rim plots were set up early in 2001 prior to the onset of gathering activities. Three plots served as non-harvested controls. The remaining three were harvested by Nisqually gatherers under terms of the Nisqually-Mount Rainier MOU. For monitoring purposes, five line-transects were established in each non-control plot. Before harvest, park monitors estimated total ground cover percentage of all species in five 1 by 1 m microplots set up along each transect. After harvest, the microplots were inspected to assess effects. At the close of the first year, Kurth (2001:17) speculated "that the number of leaves collected by the tribe members was so limited that the detection of measurable changes to bear-grass plants, populations, and the plant community could not occur using the above methods." Next year, noting "a small increase in the estimated cover of herbaceous plants" Kurth (2002:13) extended her sense "that little or no change would occur due to the miniscule amounts of beargrass collected by the tribe." Concluding the final year, and given procedures employed, Kurth (2003:9) notes that the "…data shows, for the plot area as a whole, an increasing percent cover of beargrass and decrease of bare ground."

The Canyon Rim observations, while limited, were encouraging and consistent with Superintendent Jarvis' 2001 NEPA environmental screening statement in which he asserted that "collecting the quantities described will not impact the species over the broad range of their occurrence in the park, nor their continued occurrence or long-term abundance in specific areas of collection." The results also set the stage for more detailed studies that were to follow under the joint Nisqually-Mount Rainier plant gathering research project that began in 2005.

Second Phase Ethnographic, Field Observation, and Replication Research: 2005-2015

After a one-year hiatus, traditional plant gathering effects studies began again; conducted in accordance with annually renewed research permits, with associated NEPA documentation, developed by the park in consultation and coordination with Nisqually tribal officials. David Hooper, then a University of Montana Ph.D. candidate in ethnobotany and a seasonal employee in Mount Rainier National Park's Natural and Cultural Resource Division, conducted ethnographic and field monitoring procedures under terms of the permits.

The renewed study echoed Kurth's early (2001:17) observations that other methods of monitoring the impacts would be needed in the future; such as use of "…an ethnobotanist to work with the Tribe to document the plant species collected, techniques of collection, and the frequency of collection in the same area could indirectly determine collection impacts." Her recommendation for complimentary greenhouse studies appear as continuing recommendations in Chapter 8, pages 189-190 of this volume. Below, we summarize basic methodology based on Hooper's (2015:39-65) dissertation.

Study Methods

Semi-structured Interviews

Commonly used in ethnobotanical studies, semi-structured, or semi-directed, interviews involve use of a scripted list of topics about plants of interest to stimulate continuing discussion. The semi-structured technique tends to increase participation by allowing interviewees a role in guiding the topics covered.[121]

In practice, Joyce Wells McCloud and family became the primary contacts for traditional Nisqually plant gathering practices at Mount Rainier. Joyce participated in two interviews; one in 2007, the second in 2008. Questions focused on plant and habitat characteristics sought when selecting gathering sites and individual plants for harvest. Joyce's son Hanford, also involved in Mount Rainier plant gathering activities, was interviewed in 2012. Both were contacted on a number of occasions about organizing harvesting trips to Mount Rainier. A fourth interview was conducted with Allen Frazier in 2014. Allen is an Indigenous man from California who married into the Nisqually community and was active in the plant gathering process in the park. Finally, in 2015, Hooper interviewed Joyce's brother-in-law, Jack McCloud, regarding cedar bark harvest and the cultural significance of Mount Rainier to the Nisqually people (sq̓ʷaliʔabš). All interviews, save for the first in 2007, were recorded and transcribed following the session.

In each interview, Hooper included additional questions regarding various aspects of plant use. These questions sought information including: How is the plant used? What characteristics of an area make it a good place to gather plants? Do you visit the same sites each year? If so, do you have expectations as to what the site will look like on return trips? Other questions concerned the cultural importance of traditional plant gathering and Mount Rainier as a gathering destination.

Participant Observation

Participant observation involves direct observation and, when appropriate, physical assistance with particular tasks in order to develop a better understanding of those tasks (cf., Bernard 2006:343-344; Schensul et al. 1999:91; Nolan and Turner 2011). Based on these observations, it is possible to document common behaviors –even those of which participants are not actively aware. Participation in common tasks also helps develop an understanding of difficulties that are not apparent through passive observation alone.

Nisqually tribal members visited the park to gather plants in 2007, 2010, and 2011. The 2007 trip involved four adult Nisqually tribal members: Joyce McCloud, her son Hanford, her daughter, Daydishka, and Georgiana Kautz, director of the tribe's Natural Resource Division. These individuals harvested beargrass leaves and bark from one Alaska yellow cedar (*Callitropsis nootkatensis*) on a ca. 4,570 ft elevation ridge on Mount Rainier's south-central slope. A short film documenting the event was prepared for viewing in Mount Rainier's Paradise Visitors' Center. Figure 4.2 below is a photograph taken during that event.

The 2010 plant gathering event was substantially larger than the 2007 event. Participants included Joyce McCloud and family, Allen Frazier, and members of the Nisqually Community

[121] For additional information regarding ethnographic interview techniques see Bernard 2006; Martin 1995; Schensul, et al. 1999; and Huntington 2000.

Garden. In total, the October 8, 2010 event involved nine harvesters and five guest observers. During this trip, beargrass was gathered in a test plot located on the same ridge as the 2007 and 2001 through 2003 events. In addition, the group gathered pipsissewa from a plot located in an historic campground at ca. 2,700 ft elevation in the park's administrative area at Longmire.

Figure 4.2. Recording Beargrass Collection in 2007 Test Area.
Georgiana Kautz, with Joyce, Daydishka, and Hanford McCloud (*left to right*) gather beargrass leaves as the film crew captures the event for interpretation in the park's Paradise Visitor Center.
(Photo by Greg Burtchard)

Finally, on August 20, 2011, nine Nisqually tribal members harvested beargrass from the same ridgeline used since 2001 and pipsissewa from Longmire plots employed in 2010; helping us better assess repeated use of the same collection areas.

Information gained by participant observation during these field excursions provided information as to how individuals physically interacted with the plants, and how experienced harvesters taught less-experienced tribal members these techniques. Observing how members of the Nisqually community gathered plants also improved our understanding of both the general approach to gathering as well as methods used for specific species. Information gained during tribal excursions addressed the tribe's three most commonly gathered plants: beargrass, pipsissewa, and western red cedar bark. These observations and results are discussed in detail in Chapters 5, 6, and 7 respectively.

Surveys and Questionnaires

Surveys and questionnaires are structured interviews in which lists of identical questions are presented to a sample of the population being studied (Bernard 2006:251). Maintaining consistency throughout is important in that it allows for reliable response comparison. In 2010, a self-administered survey was given to the gatherers visiting Mount Rainier that year. The survey addressed four topics: how often and for how long people harvested plants; the importance of traditional plant use to cultural identity; the importance of Mount Rainier to the Nisqually community; and finally, in reference to a list of plant species from the original MOU, how many times in the last twelve months each species had been harvested. Four surveys were completed. Numerical scores were averaged without further statistical analysis.

Data Analysis

Data analysis involved transcription and coding of audio interview and field notes. All semi-directed interviews were transcribed. Coding was done in a manner that permitted the ethnographic data to be organized into uniform, usable pieces of information. The first coding level identified aspects of gathering such as ceremonial harvesting, utilization, and ecological knowledge. Under the second level, the topics identified in the first were organized into more detailed subtopics. For example, use of harvested plants was further classified as medicinal, edible, crafts, and/or ceremonial. Results helped to produce a plant-specific description of the ethnobotany of gathered plant resources at the park.

<u>Personal Interview Results</u>

Observations below are based on Hooper's fieldwork and interviews noted above. They also benefit from interviews conducted by Samantha Nemecek, then a graduate student at the University of Denver. In part, her research (Nemecek 2014) considered how the sanctioned ability to gather plants in Mount Rainier National Park impacted the cultural and political identity of tribes with historic ties to the mountain (including the Nisqually).

Importance of Mount Rainier

For Nisqually tribal members, Mount Rainier figures prominently in at least two ways. One relates to the traditional place of the mountain as a supplier of spiritual and material resources, the second to changes brought about by the creation of Mount Rainier National Park in 1899. Several times during participant observations and interviews, the mountain was referred to as a *provider of life*. "That is what she does. She gives life to these plants and animals, and we utilize that life, that tea, these leaves, these plants and bark" (Hanford McCloud 2012). "In the older days, families would go up in the mountain in fall-time, and as whole families. They would harvest and get medicinal plants and food plants, and just be together and pray and do healing work" (Frazier 2013). By visiting Mount Rainier and interacting with the plants, the Nisqually reinforce their indigenous identity by participating in some of the same activities their ancestors had done for millennia.

In addition to providing raw materials, Mount Rainier has long been an important spiritual place for the Nisqually. "Within the tribal realities, the local natives were known for their profound spiritual power with the thunder and lightning that has to do with the sacred mountain *Ta-co-bet* [Mount Rainier]. There were what they called thunderbird spirits that lived there. Really, probably the most powerful spirits, so all the other tribes respected them for that, and honored them for that" (Frazier 2013). Because of the spiritual power attributed to Mount Rainier, there remains a belief that just by visiting it, one's spiritual health is improved; providing another reason for Nisqually people (sq̓ʷaliʔabš) to participate in gathering plants in the park.

The founding of Mount Rainier National Park in 1899 generated conflicting views among the Nisqually and other tribal people living in its vicinity. On one hand, the mountain is seen as being taken from them. "These parks, they are basically traditional homelands that were stolen from the tribes" (Frazier 2013). Because of its spiritual value, Mount Rainier's conversion into a National Park is seen by some as a significant violation of their land-use rights. "That was sacred land to our people, it was just like our church, and we did not bother anyone else's church. And it should have been respected and honored, and that is faith" (Jack McCloud 2015). On the other hand, there is also recognition that the National Park Service's preservation mission has maintained plant and animal populations that have been diminished elsewhere. In 2008, for example, Joyce McCloud and several other gatherers commented on the abundance of the pipsissewa in the park –a resource that had diminished substantially due to development on and near the Nisqually Reservation (Hooper n.d. personal notes).

Despite Mount Rainier National Park's involvement in the plant gathering MOU, the structured way harvesting was approached by park management discouraged some from gathering. Following implementation of the initial MOU, Joyce McCloud took some of the tribal elders on a couple of harvesting trips. "But we always have to let them [the park staff] know we are coming so they can monitor it. And the elders are like 'Why can't we come and get what we want?' I [answer that] we have to keep track of it to see how it grows. So, they did not want to go after that" (Joyce McCloud 2008). In response to possible legal challenges to tribal plant gathering in the park, Jack McCloud (2015) stated that "Allodial rights is law. That means we do as our ancestors did for thousands of years without persecution or prosecution." Implying that limitations placed on how members of the tribe practice traditional plant gathering practices should only come from tribal tradition, and that the NPS does not have the right to regulate their activities.

Importance of Traditional Plant Gathering

Multiple factors contribute to participation in traditional plant use, which serves to reinforce the gatherers' identity as Nisqually by connecting the present with the past. There is also a sense that, by gathering and using plants, they are maintaining the health of the individual, the community, and the natural world. By gathering at Mount Rainier, the Nisqually feel that they are maintaining and reinforcing tribal self-reliance as well as exercising treaty rights afforded to them by the United States government.

In response to a question regarding the cultural importance of plant gathering, Joyce McCloud cited plants as a source of health and spiritual well-being. "Like you have plants that you use for ceremonies that [help] people [who are] off their head and then [also] when we are sick." She uses family history to support this idea. "My grandma would tell me this plant is for your heart, and I have a bad heart so I would learn everything. She had 15 kids, and the women that delivered her babies would tell her, here, you drink this plant, drink this wild raspberry. She had all her babies out in the berry field, or if she was at home, her husband, grandpa, would deliver her babies. But I guess she would take care of herself with a few of the plants" (Joyce McCloud 2008). By talking about her grandmother, Joyce made a connection with the past. By participating in traditional plant use, Joyce and others work to ensure that the connection with the past and with ancestors persists into the future. "So just handing them [plant knowledge] down for food, for medicine. We usually cook with salmon. We cook them with the camas and the wild carrot. So, it is like tradition passed down" (Joyce McCloud 2008).

Along with cultural identity, the Nisqually participate in plant gathering activities to help maintain what they consider to be natural laws. "Prior to all this treaty rights and legislation and congress, there was this natural law and that some of that, you know, that especially my upbringing and my belief is that without the natives there would not be any law, natural law" (Hanford McCloud 2012). By helping to maintain natural law, the gatherers believe they are improving the landscape. During several of the harvesting trips, Joyce made comments about how abundant beargrass was at the gathering site compared to when they first started to harvest. She also noted that the elders always say that if you do not use the plants, they will go away (Hooper n.d., personal notes). Joyce and the elders see a connection between harvesting and the increase in overall plant abundance. In essence, we take this to mean a connection between ecological relationships, ecosystem function, and traditional ecological management practices.

While traditional plant gathering is important to those who physically participate, there were relatively few at the time of the study. It is widely acknowledged that the historical decline in hunting and gathering subsistence practices is due to assimilation policies of the 19th and 20th centuries. Today, some community members prefer *not to learn* about, or participate in, traditional plant use because it is simpler to buy the materials to make their own items, or simply buy the finished products from others. "Money buys you stuff. You have money, you get things. They have money, they can buy the drum. They can buy the cedar hat. They can buy the basket. And now, show them how to go out and gather? Why would I do this [they answer] when I can go out and buy it? Why would I want to get bark when I just go buy it? Why would I want to make the basket when I can just go buy it? That is the hard part, you know. If you are not teaching that traditional value at a young age, then the money value takes its place" (Hanford McCloud 2012).

Between 2001 and 2013, the Nisqually traveled six times to gather plants from the park. All together, we know of only six days in that 13-year period when traditional Nisqually plant gathering took place in the park under terms of the MOU and research permits that followed. One reason for so few trips was due to scheduling conflicts with full-time jobs. Furthermore, during the summer, two important events took place that limited gathering time –the late July inter-tribal Canoe Journey, and the annual tribal Huckleberry Camp, a two-week August harvesting trip to Gifford Pinchot National Forest south of Mount Rainier.[122] By the time camp ended, the school year had begun, further limiting available gathering time in the face of the realities of modern life.

It is important to note, too, that many gathered materials are storable and need not be collected every year (e.g., beargrass, cedar bark, and pipsissewa). Reduced trip frequency allows for plants and habitats to recover. Taking only what is needed, only as frequently as needed, are important aspects of the Nisqually tradition. "In that way, for me to be just around it [gathering at Mount Rainier] for one, and then also to take just what I need to use" (Hanford McCloud 2012). Even though actual gathering activities do not occur every year, there remains a strong desire to maintain treaty rights to do so.

Learning Traditional Plant Use

Members of the McCloud family describe three primary sources of plant knowledge. The first involves learning from one's older family members. Hanford McCloud (2012) has been learning from his mother for over twenty years. "I can remember as far back as being like ten years old when we would come up there [to Gifford Pinchot National Forest] …and we would just take the prince's pine [pipsissewa], the huckleberries, and the beargrass at that time."

Learning from family members was more challenging for Joyce McCloud (2008). Her great grandfather, Peter Kalama (1860-1947), was a healer who taught traditional ways to his children –Joyce's grandmother and great aunts. Joyce learned about medicinal plants such as pipsissewa and devil's club (*Oplopanax horridus*) from her grandmother, and from her great aunt, Blanch Simmons, who was known as a medicine woman. Blanch was a challenging teacher. "It is kind of hard. Would she tell you about the plants? No, you just have to watch" (Joyce McCloud 2008). Part of the early discussions between tribal and park staff that lead to the initial gathering MOU involved generating of a list of plants that could be collected at Mount Rainier (see

[122] Recall that through approximately the 1930s, similar trips took place at Mount Rainier.

Appendix A.). Blanch Simmons was one of the Nisqually consultants called upon to help develop the list. As different species were discussed, Joyce would ask Blanch about where they were collected and their uses. "That is how I got her to tell me" (Joyce McCloud 2008).

Other sources of plant and plant gathering knowledge came from people outside of the family. Joyce and two other tribal members, for example, would collect plants from Fort Lewis. Whoever knew about a particular plant would explain its use. This remains a method Joyce uses to teach classes in the community. "Health services asked me to do a little class. I was supposed to do it on the plants that we used, or I have used, over the years. At first, I had no idea. Then I thought, okay, walk around like we used to do and just pick plants. Bring them into the workshop, and just see if people know what the plant was used for. But if they don't know, I would have known. …I ended up picking 35 plants, but could have picked more" (Joyce McCloud 2008)

The third information source involves individuals that offer classes outside of the tribe. "When I was pregnant with my youngest son, I had the opportunity to go to an herbal class in Issaquah [Washington], and the teacher was a master herbalist from the University of British Columbia …Norma Myers" (Joyce McCloud 2008).

Inherent to the learning process is the understanding that traditional plant use is not frozen in the past. New plants, or new plant uses, are being learned continually. Introduction of new ideas into the knowledge-base is generated by trading information with other people –much the same as it was in the past, albeit with the aid of modern technology. "If I go to South Dakota, …I will bring plants like prince's pine [pipsissewa], which is good for the bladder. So, people will ask [me to] bring some of the prince's pine so we can have it. And then they will get me echinacea" (Joyce McCloud 2008). These exchanges also include knowledge of introduced plants such as St. John's wort (*Hypericum perforatum*) used to calm children suffering from attention deficit disorders, and common dandelion (*Taraxacum offininale*). Joyce heard about the potential uses of dandelion from a Hopi medicine man; illustrating how traditional information exchange, while comparable to past exchanges, has expanded with modern travel options and technology.

<u>Survey Results</u>

In the present study, the return rate of ethnographic survey forms was low (four of eleven). Even so, responses tended to reinforce opinions expressed in formal interviews and witnessed first-hand during the gathering observation process.[123] Among the respondents, for example, traditional plant gathering tended to be regarded as an important as a link to cultural identity and a symbol of continuing association with Mount Rainier.

In regard to the mountain, respondents saw it as an important source of plant materials, and as a significant physical, ceremonial, and spiritual landmark. Reactions were mixed on its importance as a National Park (though most recognized its value as a protected refugium for plants falling into short supply elsewhere), and as place of healing, teaching, and recreation.

The final part of the survey addressed the previous year's frequency and timing for gathering plants listed in the Nisqually-Mount Rainier MOU. Respondents noted five of the 17 species listed in the survey questionnaire: Alaska yellow cedar, beargrass, devil's club, blueberry/huckleberry, and strawberry. One respondent harvested no plants at all. Collectively, the others reported four gathering trips for huckleberries in August and September, two for

[123] See Hooper (2015:52-56) for more detailed discussion and tabular summaries of survey results.

beargrass in September and October, one for Alaska yellow cedar bark in September, devil's club in April, and wild strawberries in June.

Discussion

In the 2010 United States census, 845 individuals identified themselves as Nisqually tribal members. During each of the gathering trips discussed here, the number of people who came to Mount Rainier was less than 15. Only four people participated in interviews about the plant harvesting process. Three of these were members of the extended McCloud family. In essence, the ethnographic results provided here relate as much to one family's relationship to the mountain as it does to the entire community. The results nonetheless provide hints about cultural factors, the mechanisms by which individuals learn about plants, and the role plant use plays in personal and cultural identity for the Nisqually as a whole.

Why There Are So Few Gatherers

According to harvesters, the current economy is a major factor underlying limited interest in traditional plant gathering within the modern Nisqually community. Involvement in the cash economy allows people to buy the final products instead of going through the effort of gathering and constructing the items themselves. Second, participation in the modern economy simply limits the time available to participate in traditional practices such as plant gathering.

Limitations also stem from a desire to participate in the general non-Indigenous American culture more broadly. In 2012, younger family members' participation in school athletics was the reason that the McCloud family could not make gathering trips in September or October. The combination of employment, school attendance, and participation in extracurricular activities simply consumed the time available to travel to Mount Rainier. Participation in the national market economy, and involvement in the modern education system, also are important factors restricting transmission of traditional skills in many Indigenous communities, resulting in the continuing erosion of traditional tribal knowledge in the younger generations (Ohmagari and Berkes 1997; and Perce et al. 2011).

Enjoyment of the Gathering Process

Enjoyment of traditional plant gathering is one of the reasons that Nisqually people (sq̓ʷaliʔabš) collect plants. These feelings are enhanced further in landscapes, such as Mount Rainier, that carry cultural significance to tribal members. Hanford McCloud (2012) expresses these ideas clearly, "What I tell my kids [is that] …we have always looked at Mount Rainier as *our mountain,* our place. And they love that. So, every summer they look forward to getting into the canoe in the water, and going to the mountains to pick huckleberries, and going to see Mount Rainier…" The personal joy of gathering is an important reason for plant harvesting today because gathering and using plants in the traditional manner, while important, is no longer an essential factor in one's identity as a Nisqually in the modern age.

Learning about Traditional Plant Gathering

Knowledge about traditional plant use is a product of information exchange between many people. These exchanges, in essence, are consistent with past learning patterns. Joyce McCloud, for example, learned about medicinal plants from her great-aunt and grandmother, both of whom were taught by *their* father, Peter Kalama, who learned from *his* mother, and so on. In keeping with this tradition Joyce now passes her knowledge on to her children and others.

Such intrafamilial information transfer through generations is a common focus of research as to how individuals gain truly traditional ecological knowledge (cf., Ohmagari and Berkes 1997;

and Pearce et al. 2011). But there are other means of transmission as well. Jack McCloud (2015) described finding teachers who could provide views into traditional skills that were not practiced within the immediate family. He also noted that different skill sets often were passed down within different families to be shared with other members of the community. "My two grandfathers, one was the runner, he would run from village to village, and the other grandfather was the canoe maker and house maker. He carved the river canoes and big water canoes, plus [built] the houses. He knew how to make the plank houses, so we had to go to someone else for the medicines, someone who knew medicines." The oldest son would learn the skills of the father, "and then the other ones would learn from other teachers. What we do, if we had to make a little shack, they know how to go find the teacher to show them how to build."

It is important to recognize that links to traditional methods of information transmission were interrupted by events of the past few centuries. For the Nisqually and other Indigenous communities, epidemic population loss in the late 18th to late 19th centuries was followed by decades of boarding-school education. The combination of the two seriously disrupted inter-generational instruction. Knowledge loss due to the broken linkage between the traditional knowledge base of the past with that of the present underlies revived interest in ethnobotanical classes and in exchanges with more-distant Indigenous sources in the attempt to restore some of this lost information-base.

The essential difference between information gained via traditional Indigenous trade processes in the past, versus classes or trade in the present, is that precontact knowledge exchange (ethnobotanical and otherwise) generally was *incidental* to the primary event. In the present, however, information is the *primary* commodity of exchange. The annual gathering of the Northwest Native American Basketweavers Association –where weaving classes are a major activity– is an example of a form of contemporary trade where traditional Indigenous plant and technical knowledge is transmitted (Bowechop et al. 2014:172-173). The *function* of the information exchange remains constant, the *mechanisms* by which the exchanges take place have evolved to fit modern realities of life.

Finally, transmitting traditional plant use information may take place through peer-to-peer exchange. Discussing uses of different plants among peers, such as that noted by Joyce McCloud in her Nisqually community classes, extends and refines botanical knowledge. In addition, the physical act of holding specimens while discussing them, increases one's ability to recognize plants. Discussions help to refine gathering techniques and pass on information as to best uses.

Cultural Identity

Even though traditional Indigenous fishing, hunting and plant gathering activities are not the only elements essential to maintaining tribal cultural identity, they are part of a complex of long-held practices that reinforce participants' sense of cultural continuity. People who participate in traditional plant gathering activities at Mount Rainier emulate their elders and ancestors. In so doing, they fulfill a sense of moral responsibility toward their ancestors, toward those of future generations, and to nature. They also reconnect with what they consider a sacred landscape. Furthermore, by exercising what they believe to be treaty-reserved rights, gatherers consider plant collection on public lands to be an expression of their sovereignty as Indigenous people.

McCloud family interviews for the present study exhibited a common thread of traditional ecological knowledge (TEK) passed on through family stories. Stories set in the distant past (e.g., *Mountain Sheep Boy* in Davis (1963)) often serve to teach TEK. Such stories and other personal family biographical sketches provide guidance on proper ethics, self-reliance, and justification for gathering. By emulating his ancestors, for example, Hanford McCloud (2012) sees plant gathering as helping to meet his obligations to nature and his family.

The TEK literature is full of examples of Indigenous peoples expressing an essential relationship with the natural world, an obligation that requires them to behave in a manner that promotes ecosystem health (cf., Anderson 2005; Berkes 1999; Turner 2008). What is not clear is how that belief leads to sustainable behaviors. Part of the answer lies in the fact that a strong sense of responsibility toward plant and animal communities contributes to more deliberately conservative actions during the gathering process. Nisqually harvesters who comb through beargrass to select only a few leaves at a time demonstrate thoughtfulness about how the plant is treated. Such thoughtfulness, extended more broadly through the tribal community, enhances habitat sustainability by causing harvesters to be careful where they collect, how much they harvest, how their actions impact the resource.

The sense of Mount Rainier as a sacred landscape also reinforces a sense of stewardship. Responding to concerns expressed by those who oppose Indigenous plant gathering activities in the park, Hanford McCloud (2012) stressed that "They do not know [that it] is healthy for that mountain to be able to give what it produces. That is just what she does, she gives life to these plants and animals, and we utilized that life –that tea, these leaves, these plants, and the bark. It is that cycle …that natural cycle, that's the cycle for us to live off the earth…" The sense of the mountain as a source of life contributes to its acceptance as a sacred place. That sense, in turn, influences use of thoughtful, sustainable practices for plant and animal resources found there.

While generally regarded as a sacred landscape, Mount Rainier's value as a National Park is met by ambivalence. While many feel that included lands were unfairly taken from them, most also recognize that National Park Service protection is a desirable benefit to them (cf., Nemecek 2014, 98). Even so, tribal members feel that it is important to exercise treaty rights on park lands lest those rights be lost. Hanford McCloud (2012) captures those thoughts by noting that it is important "under that treaty right, to be able to gather, fish, and hunt in our traditional ceded lands… Going back to the 1855 Medicine Creek Treaty… we have the right, from my point of view, …[to] gather in a traditional way. And that is what I instill in my kids and the people I come across. When we gather, we pack out what we bring in and leave the land as we found it. But also, if [we] don't use it, we will lose it." According to Nemecek (2014:2-3), seeking to clarify access to plant resources is an example of Nisqually tribal members exercising their resource sovereignty; that is, the continuing ability of a group to exercise political and practical governance, management, and control of Indigenous traditionally used resources.

In short, traditional plant gathering allows members of the Nisqually, and other, affiliated Indigenous communities to express their cultural identity by participating in activities that their ancestors conducted, fulfill their moral responsibility to maintain local biodiversity, and exercise what they believe to be their treaty-reserved rights. The skills needed to conduct plant gathering in a traditional manner are learned from relatives, peers, and gatherers from surrounding communities. These are skills that connect people to traditional Indigenous roles and sustain them as they strive to give meaning to their place in modern American society.

Summary

In this chapter's introduction, we reviewed briefly material discussed in greater depth in Part I of the report; emphasizing long-term precontact and historical background for Indigenous presence on Mount Rainier, recent strengthening of park-tribal ties that led to the plant gathering

MOU discussed here, and subsequent opposition to that agreement. The body of the chapter, and indeed the remaining chapters included in Part II, focus on issues more directly relevant to the plant gathering MOU and on research into the effects of traditional plant gathering practices on those plants and associated habitats. In this regard, the present chapter addressed three major issues: 1) why traditional Indigenous resource gathering practices tend to be conservative; 2) origins of, and opposition to, the 1998 plant gathering MOU between Mount Rainier National Park and the Nisqually Indian Tribe; and 3) basic elements of the Nisqually-Mount Rainier plant gathering research conducted between 2001 and 2015.

At the outset, we suggested that factors underlying the conservative character of traditional Indigenous plant gathering techniques were rooted in the precontact past when limited critical resource alternatives tended to select for development of socially reinforced methods that sustain them through time. In the chapters that follow, we investigate the extent to which such traditional practices achieve that goal at Mount Rainier; and ultimately, employ those results to develop recommendations by which traditional Indigenous plant gathering practices, and their functional equivalents, might be restored without reducing the viability of involved plant populations or diminishing habitat structures at Mount Rainier National Park and beyond.

The second section of the chapter focused on origins and short-term consequences of the Nisqually-Mount Rainier plant gathering MOU. It provided background as to what tribal representatives hoped to achieve by reinitiating plant gathering activities on the mountain, why park management considered it appropriate to do so, and how the two entities worked together to assure that park resources were not harmed in the process. The section also introduced protests that arose in opposition to the MOU; opposition that, in the main, expressed concern with the amount of environmental analysis required and the legal basis for entering into such agreements. It is the tension generated by these opposing points of view that stimulated the multi-year study reported here.

Finally, we outlined the general character of the multi-year study stimulated by the traditional plant gathering MOU and its subsequent opposition. We laid out basic participant interview and field-study procedures –the former to provide background into the tribal point of view, the latter to allow readers to better assess field study results reported in the following chapters. Those chapters discuss procedures and results in greater detail as they relate to the three plant groups most commonly gathered over the course of the study –beargrass (*Xerophyllum tenax*), pipsissewa (*Chimaphila umbellata*), and cedar bark (*Thuja plicata* and *Callitropsis nootkatensis*). Chapter 8 applies information gained to generate recommendations as to how comparable non-destructive plant gathering procedures could guide collection of a wider suite of traditionally used plants on NPS lands. It concludes *Part II. Reintroducing Traditional Plant Gathering to Mount Rainier* by offering recommendations by which comparable plant gathering agreements may be generated and sustained at Mount Rainier National Park and beyond. Chapter 9 in *Part III. Initiating and Maintaining a Traditional Plant Gathering Agreement* considers foundations of the original 1998 Nisqually-Mount Rainier plant gathering MOU; components of the 2016 addition to the Federal Code of Regulations intended to provide clear legal authority to enter into agreements with federally recognized tribes to allow for the gathering and removal of plants and plant parts from NPS lands for traditional purposes;[124] and a brief review of the document as a whole.

[124] As described in final rule announcing the 2016 regulations (81 Federal Register 45024 [July 12, 2016]).

Chapter 5: Traditional Plant Gathering Effects; Beargrass

Figure 5.1. Beargrass (*Xerophyllum tenax*) in an Old Burn in Mount Rainier's Sunset Park.
(Photo by Greg Burtchard)

Introduction

Beargrass Natural History

Because of its bunchgrass appearance, inflorescence of white flowers, and its high-density growth pattern, beargrass is an easily recognized plant throughout its range. Beargrass (*Xerophyllum tenax*) is a perennial evergreen member of the false-hellebore family (Melanthiaceae) (Hitchcock and Cronquist 2018:679). Populations reproduce sexually every five to seven years as well as asexually through rhizomes. Because of the rhizomes, it is possible that what appears to be several individuals actually may be part of single plant. Figure 5.1 above shows a beargrass meadow at about 5,000 feet on the western slope of Mount Rainier.

Several animals common to mountain environments are attracted to beargrass, and may affect its herbivory[125] and reproduction. Beargrass flower stalks, for example, are highly desirable ungulate grazing fodder (Crane 1990). Indeed, co-author David Hooper has observed that heavy grazing by deer appears to reduce seed-driven reproduction of the plant at Mount Rainier. Other

[125] Herbivory refers to the consumption of plant materials by animals. Similar to predator-prey interactions, herbivory drives adaptations in both the herbivore and the plant species it consumes.

species common to montane environments also affect the plant. In the Mission and Rattlesnake Mountains of Montana, Servheen and Klaver (1983:205) found that, when a dominant component of the plant community, beargrass was a significant component of bedding material in grizzly bear (*Ursus arctos*) dens. Hooper also has observed that pika (*Ochotona princeps*) hay-piles often contain large amounts of clipped beargrass leaves. Furthermore, Daniel Mathews (1999:170) notes that beargrass stems and rhizomes also may be an early spring food for black bears (*Ursus americanus*) –a species common to Mount Rainier. Despite these sources of natural disturbance, beargrass continues to be a common component of early seral-stage mid to upper elevation plant communities at Mount Rainier National Park as can be seen in Figure 5.1.

Ethnobotany

Beargrass' vegetative reproduction and co-evolution with mammalian herbivores may play a role in its response to traditional Indigenous harvesting techniques. In the Pacific Northwest, the predominant traditional use of beargrass is for basketry structural integrity and decoration (Blukis Onat 1999:63; Crane 1990; Gunther 1973:23; A. Smith 2006:146-147). While baskets may be woven exclusively of beargrass, in most cases, it is used with other materials such as cedar bark or the roots of cedar and spruce (*Picea* ssp.). When dried, the leaves are white and can be dyed (Turner 1998:111-112). Designs and motifs created by beargrass weaving often blend personal and cultural identities, serving to express social affiliation and enhance the desire to work with the material.

In this chapter, we address three questions concerning traditional beargrass gathering at Mount Rainier: 1) what are the methods used by members of the Nisqually Indian Tribe to harvest beargrass; 2) how does harvesting influence beargrass ecology; and 3) is there a relationship between traditional cultural knowledge held by the tribal gatherers and beargrass ecology?

Beargrass Gathering Practices

Ethnographic Methods

Participant observation of Nisqually traditional beargrass harvesting methods took place in 2007, 2010, and 2011. In three semi-structured interviews following individual harvest events, interviewees discussed several aspects of beargrass ecology and harvesting. Information gained from these interviews and participant observations are used to characterize the manner in which members of the Nisqually Tribe harvest beargrass, in essence, defining what is meant by *traditional harvest practices* as they relate to this plant species.[126]

Nisqually Tradtional Beargrass Gathering Methods

Beargrass gathering typically begins in August and continues until at least mid-October when snow accumulation makes collection difficult in the upper part of the plant's 2,000 to 6,000 ft elevation range on Mount Rainier. The primary factor in selecting a beargrass gathering site is abundance. The McCloud family, whose members most commonly collected beargrass during the course of the study, associates exposed ridgetops with higher beargrass abundance. As a result, they tend to prefer this type of landscape for harvesting. Beargrass also thrives in other early seral-stage habitats within its elevation range where ample sunlight reaches the ground –places like recovering burns (Figure 5.1), blow-down areas, and recovering landslide or snowslide chutes.

[126] See Chapter 4 for a more detailed description of the ethnographic methods used throughout the study.

Shading does not eliminate beargrass altogether, but by reducing abundance and plant vigor, tends to make these plant gathering sites less valuable.

During her first interview, Joyce McCloud talked about an area near Mt. Saint Helens that had been devastated by the 1981 eruption, emphasizing how, after the eruption, the area regenerated abundant stands of beargrass. Over time, trees invaded and reduced beargrass abundance (Joyce McCloud 2007). Perhaps because of the time involved, searching for new gathering sites appears to be less common than simply returning to previously used areas as long as they remain productive (Joyce McCloud 2008 and Hanford McCloud 2012). The present study focuses on sustainability of repeated harvest in a single, productive early seral-stage site. It is important to note, however, that changing sites when impacts become noticeable is commonly used to sustain productivity.

Central stem size and leaf length help to determine which leaves are to be pulled from individual plants. Hanford McCloud (2012) notes that "A lot of the characteristics of the plant; how big it gets and …the longer stems of those beargrass leaves [affect which plants are selected for harvest]. So we will …walk through patches to see what plants …we can pull [leaves] off of to get the most abundant crop without …killing it, and to get the longer ones that are utilized for the weaving and decoration on the basket." The gatherers assume that stem width and length correlate with plant age. Plant *stem-size* determines the *number of leaves* harvested, with up to fifteen leaves collected from the most mature plants. Plants with the smallest stems are assumed to be the youngest and are not harvested at all.

Once a plant has been selected, the plant is "opened up" to gain access to its central stem. Factors that determine selection of individual leaves for harvest are length of the leaves, width of the leaf at its base, and color of the base. Longer and wider leaves are preferred for basket making over shorter, thinner leaves. The base of beargrass leaves can be either white or purple. Members of the McCloud family believe that a purple base indicates an older leaf and that white bases are younger (Joyce McCloud 2008). Younger leaves are more "tender" and better for weaving into a basket. In addition, white leaves can be dyed various colors while purple leaves absorb dyes poorly. Harvesters prefer to collect "the outer center leaves" because these tend to be white, young and supple, long, and wide. The very center of the plant is described as the heart. According to both Hanford and Joyce McCloud, leaves must not be removed from the stem's center if the plant is to survive (Hanford McCloud 2012; Joyce McCloud 2007, 2008).

Beargrass gatherers pull one to four leaves at a time. The action taken to remove the leaves is to hold the plant at its base, then pull down and out. After leaves are harvested from about ten individual plant stems, the loose leaves are bundled together, and the tips tied into a half hitch as shown in Figure 5.2.

After returning home, harvesters hang the leaf bundles up to dry. The leaves are ready for use in about a year. As long as the leaves stay dry, they will remain usable for decades. In 2007, Joyce McCloud was still using leaves she had bought from a florist in 1990. It is important to note that, in contrast to common florist beargrass collection practices, Nisqually traditional gathering practices do not cut or harvest the central plant stem. Note in Figure 5.2 that the beargrass leaf bundle contains only leaves. The center of the rosette remains intact on the plant. Figure 5.3 shows beargrass harvesting in progress.

Figure 5.2. Harvested and Bundled Beargrass Leaves. Approximately 15 leaves are plucked from mature plant stems. The growing stems are not harmed. (Photo by David Hooper)

Figure 5.3. Gathering Beargrass. Joyce McCloud harvests individual beargrass leaves. (Photo by Greg Burtchard)

Monitoring Ecological Effects of Traditional Beargrass Harvest

Sustainable Plant Gathering

The idea of sustainable plant gathering involves a combination of culturally-reinforced practices and ecology. One could say a practice is sustainable if, by regulating the amount gathered, the gathering method, and/or the length of time between gathering events, the individual plant or the plant population is able to recover to pre-collection conditions over time. While the immediate plant harvest effect may focus on individual plants, the major concern is the condition of the overall plant population. This can be seen with different types of plant gathering strategies. For example, in sexually reproducing plants, gathering fruit will not damage an individual plant but enough seed must be left so that the growth of new plants keeps the population stable. Non-reproductive parts of plants may be harvested, such as beargrass leaves, with negligible effect provided sufficient time is allowed for new leaves to grow before another harvest collection is taken from that specific plant. Entire plants also may be gathered as long as the growth of new plants is at a rate to replace those collected. The unifying goal of sustainability is that the plant population is stable over a long period of time.

To determine that gathering practices are sustainable, experiments must demonstrate that plants are able to recover to a pre-harvest condition prior to the next harvest event. This could consist of a measure of the amount of plant recovery prior to the next season, or a measure of the number of seasons needed for full recovery. Where an individual plant takes longer than one season to recover, continuous yearly harvest events may be sustainable by rotating to non-harvested plants or to new gathering areas.

Monitoring Methods for Nisqually Traditional Beargrass Harvest

Beargrass harvest was studied in Mount Rainier National Park on a ridgetop landform near Canyon Rim viewpoint (elevation approximately 4,500 ft), roughly a mile west of the Paradise visitor center. The setting is a forest plant community with an understory co-dominated by beargrass. National Vegetation Classification plant association: Pacific Silver Fir – (Douglas-fir, Noble Fir) / Thinleaf Huckleberry / Common Beargrass Forest. The harvest area is an early seral stage patch within the wider community created by powerline clearing several decades past.

Beginning in 2001, a 30 meter by 30 meter (30 m by 30 m) area was divided into three 10 m by 10 m sections in which Nisqually tribal members harvested beargrass leaves using traditional techniques. The harvest area was paired with three 10 m by 10 m control sections in which no harvesting took place. Each of the areas had 25 monitoring microplots measuring 1 m by 1 m each. Within each microplot, the ground cover of beargrass was estimated visually as a percentage of the microplot area. The percentage of ground cover, including all vegetation up to one meter in height, was also estimated visually.

The initial phase of Nisqually beargrass leaf harvest took place in 2001 through 2003. The microplots were inspected before, and again after harvest (Kurth 2001, 2002, 2003). Unfortunately, there was some ambiguity in the record-keeping for 2001 and 2002 regarding uncertainty with some plot locations, changes in plot treatments between years, changes in monitoring methodology, and no record of amount harvested in first year. Even though results suggested an increasing percent of beargrass cover and a decrease in bare ground during this period (Kurth 2003:9), the observation difficulties make results difficult to interpret in a meaningful fashion. Due to a variety of park and tribal issues, no beargrass monitoring or harvest took place in these plots for the years 2004 through 2006.

In 2007, the beargrass monitoring process began again. In that year, the earlier beargrass test plots were reestablished to resume the harvest study using methods comparable to the earlier study. This study continued from 2007 through 2012 with Nisqually tribal members harvesting in 2010 and 2011. Sampling was consistent in 2007 to 2012, using unchanging protocols, and retaining the same plot locations. Typically, sampling occurred in July and harvesting in October. In the end, we were able to obtain metric data relevant to beargrass abundance and general plant community characteristics, in both harvest and control plots, based on 1) traditional beargrass harvest during two of those years (2010, and 2011); and 2) plant monitoring measurements for six years (2007 through 2012). Following the field study period, Hooper employed repeat-measure analysis of variance (ANOVA) statistics (Elzinga et al., 1998:245-246) to test for changes in percent cover of beargrass in each of the test plots. He also used detrended correspondence analysis (DCA) to search for possible changes in plant community species composition resulting from the beargrass harvesting process.

Results of Beargrass Harvest Monitoring and Analyses

Beargrass Ground Cover Effects

Statistical analysis detected no difference in beargrass cover between control and harvest plots either *prior to* harvest in 2001 or in 2002 *after* the 2001 harvest event (Table 5.1). Following monitoring and harvest activities in the first year of the study, park plant ecologist Laurie Kurth (2001:17) concluded from visual observations of the site that, due to the small number of leaves collected, the monitoring methods used could not detect changes to the beargrass plants or to the plant community. Analysis of the variability in the data suggests that, for a harvest effect to be detectable by this method, there would need to be at least a 15 percent change in ground cover; an amount far greater that experienced in the Nisqually 2001 harvest event.

Table 5.1. Student's t-test of Beargrass Ground Cover from 2001 to 2002

Year	Control Plots[1]	Harvest Plots[1]	Student's t-test[2]
2001	45 +/- 19	40 +/- 22	0.12
2002	36 +/- 17	38 +/- 21	0.53

1. Mean +/- standard deviation averaged to plot.
2. t-test performed for equal variances for 2001 data, and for unequal variances for 2002.

Following monitoring in 2003, Kurth noted that the study area as a whole showed an increasing percent cover of beargrass to bare ground; an effect apparently driven by the observation that several of the microplots that exhibited "dramatic yearly differences" (Kurth 20003:9). She attributed these changes to errors in placing microplots as discussed above, and to errors in making visual estimates; hence these data were not considered sufficiently reliable to include in Table 5.1 above. Other studies also have determined that observer error is of concern when visually estimating cover. Kennedy and Addison (1987:156; cf., Elzinga, et al., 1998:179-180), for example, determined that more than 20% change in cover must be observed before the change can be attributed to factors other than observer bias and annual variation.

Figure 5.4 shows beargrass cover for years during the second monitoring phase from 2007 through 2012 –years in which data gathering and monitoring procedures are known to be constant. Results for these years indicate declines in percentage of beargrass regardless of harvest or control treatment ($F=0.936$, $df=5$, $p=2.5^{10-7}$). During the study period, *all* plots experienced a decrease of percentage of beargrass ground cover. The fact that *both* harvest and control plots exhibited the same general pattern suggests that factors other than beargrass harvest led to the gradual change through time. There was no significant difference between control and harvest plots. An approximation of the detection limit for statistical significance was made by calculating confidence intervals. To be statistically significant beargrass cover would have needed an approximately 10 to 15percent change. Note that small, but emerging differences between the treatments cannot be determined here because of small sample sizes. Larger value changes did not emerge 12 years out from the initial harvest and subsequent repeated harvest events. Cumulatively, these data suggest that Nisqually beargrass harvest practices had no significant effect on beargrass abundance within the detection limits of the study.

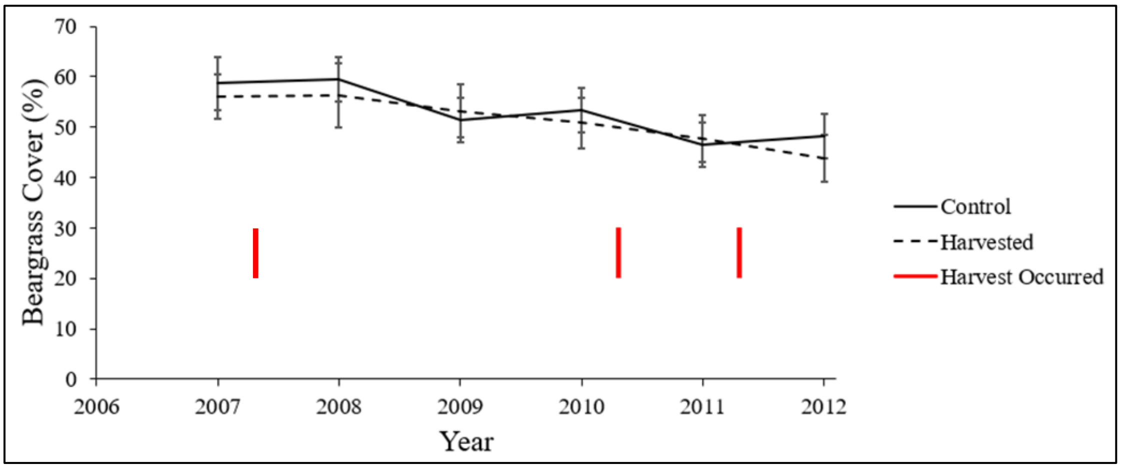

Figure 5.4. Change in Beargrass Cover. Harvest occurred after monitoring in 2010 and 2011. Plots were monitored annually though there was no harvest in 2007, 2008, 2009, and 2012. Bars are 95% confidence interval.

<u>Plant Community Effects</u>

In addition to the beargrass cover studies, associated plant species were measured to see if harvesting beargrass leaves changed associated plant community characteristics. There is a possibility, of course, that plant trampling or soil compaction incidental to beargrass harvest could have caused changes in the broader community represented in the plots. During the course of the study, visual estimates were made of vegetated cover for the wider spectrum of plants present such as beargrass (*Xerophyllum tenax*), thinleaf huckleberry (*Vaccinium membranaceum*), silver fir (*Abies amabilis*), subalpine fir (*Abies lasiocarpa*), Douglas-fir (*Pseudotsuga menziesii*), western white pine (*Pinus monticola*), false azalea (*Menziesia ferruginea*), slender wintergreen (*Gautheria ovatifolia*), and dwarf bramble (*Rubus lasiococcus*).

General observations accompanying the beargrass evaluation process did not detect a change in general plant composition over the study years, suggesting that beargrass gathering practices did not appreciably alter the associated plant community composition. In addition, using all plant species visible in the plots, a detrended correspondence analysis was run on the plots monitored from 2007 through 2012 (cf., Callaway et al., 2005). Figure 5.5 is a graphic display of the result. Increasing distance in the data points suggests community turnover. Clustering in the data points suggests consistency in plant community composition. The overlap in the year-by-year treatment pairs evident in Figure 5.5 shows no trend to species shift by treatment. The result is consistent with visual observations for those years, again suggesting that there was no detectable change in the general plant community associated with the beargrass harvest plots.

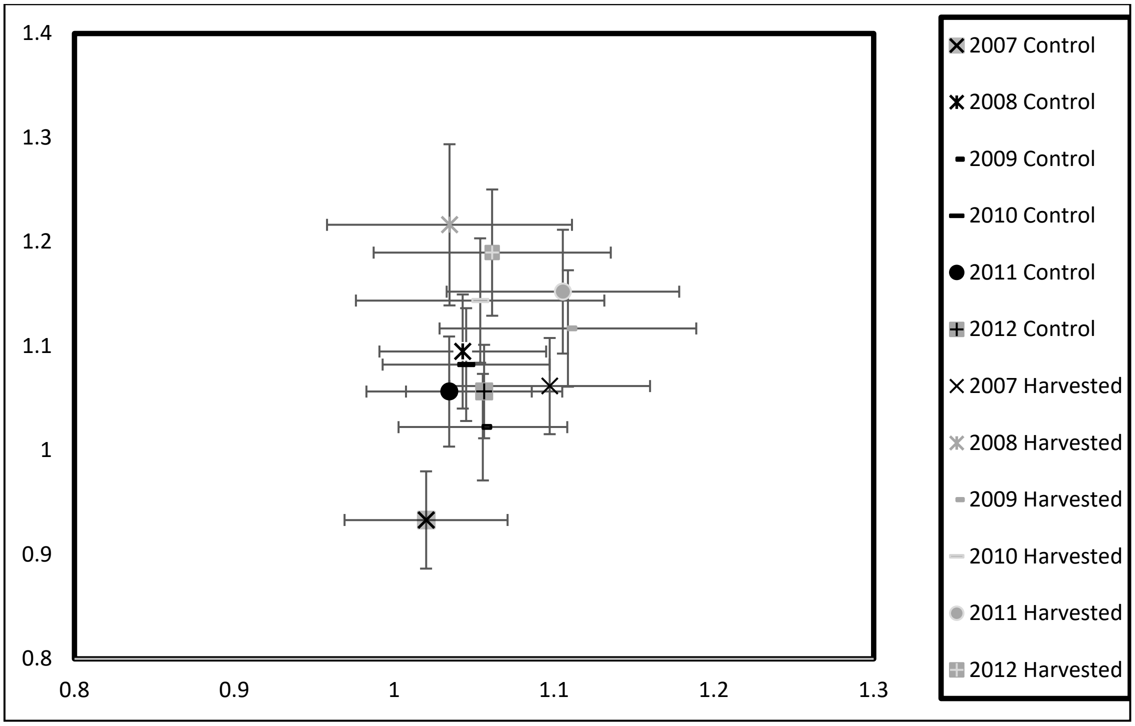

Figure 5.5. Effect of Traditionally Harvested Beargrass on Associated Plant Community. Detrended Correspondence Analysis. Symbols are mean values per year. Bars are standard error.

Experiments to Understand How Beargrass Responds to Traditional Harvesting

To explore these results further, Hooper established an experimental manipulation to address two questions: 1) does beargrass compensate for leaf removal from human harvesting; and 2) if compensation is demonstrated, what is the process underlying such vegetative production? If the answer to the first question is yes, then we would predict that the amount of above ground biomass of harvested plants in an experimental plot would be the same or greater than the non-harvested plants in a year or two following harvest. If this proves to be the case, then the second question has two possible outcomes: a) removing leaves from beargrass stems stimulates the plant to produce new leaves; and/or b) leaf removal induces the plant to produce additional stems.

Experimental Harvest Methods

In 2010, Hooper addressed these questions by establishing a separate test site with two treatment plots: 1) a control plot with no harvest; and 2) a harvest plot employing the traditional Nisqually practice of removing fifteen leaves per stem. Within each plot, twenty plants were selected randomly to receive the assigned treatment (i.e., no harvest in the control plot and fifteen-leaf removal in the harvest plot). All of the beargrass stems were marked with unique tags. Harvest treatment took place only the one time in 2010 after preliminary measurements were complete. Plant measurements were made again in 2011and 2012.

For each plant, Hooper measured stem base diameter and length of the longest leaf. If beargrass compensates for removal of leaves by increasing new leaf production, then there should be no difference in the diameter at the stem's base between treatments.

To detect change in plant abundance and community structure (Coulloudon et al., 1999:37-42), Hooper also sampled the number of times a particular species occurred in a given number of samples (Coulloudon et al. 1999:23). Species abundance was measured by laying a 40 cm rod at the base of stems in the four cardinal directions, recording species intercepted by the rod (cf., Gibson 2002 and Hutchings 1986). Beargrass plants extend approximately 30 cm from stem to the outer edge of leaves, so other plants overlapping or very near the central beargrass plant are recorded. As with leaf harvest by Nisqually tribal members, plant community species abundance was analyzed by using DCA (Callaway et al., 2005). Potential effects on beargrass abundance were examined using repeated-measure ANOVA statistics (Elzinga et al., 1998:245-246). If compensation occurred because harvested plants increase their production of new stems, then the abundance of beargrass would be higher in the harvested area than the control.[127]

Results of Experimental Beargrass Harvest

Harvesting 15 leaves in the traditional Nisqually manner from a beargrass plant was visually unnoticeable as shown in Figure 5.6. There also was no apparent change in the visual estimate of ground cover. In fact, the only change noticeable by eye was that some of the remaining beargrass leaves had been moved during manipulation of the plant. Gathering beargrass leaves by Nisqually tribal members during the field observation period had a similar visual effect.

Figure 5.6. Beargrass leaf harvest. First photograph (left) is a single beargrass plant pre-harvest. The same plant on the right was photographed after removing 15 leaves. (Photos by Arnie Peterson)

<u>Beargrass Stem Diameter Effects</u>

Prior to harvest in 2010, the diameter of beargrass stems to be harvested and control stems were not significantly different. Following the initial measurement, fifteen leaves were removed from each plant in the harvest group. When measured again a year later in 2011, the harvested

[127] Between 2010 and 2011, one of the tags marking a harvested stem was lost. Between 2011 and 2012, one of the control tags was also lost. Because of these missing markers, the statistical analysis uses a sample size of 19 (rather than the original 20) for each treatment.

plants' mean stem diameter had decreased by an average 3 to 4 mm compared to 2010 and remained at that size through 2012 (Figure 5.7). Beargrass leaf bases grow along the stem, so this measurement of stem diameter includes measurement of leaf bases. The decrease observed in measurements of stem diameter with the Harvested plants likely results from the removed leaves no longer contributing to stem diameter. Measurement of individual stems varied greatly between years, for example one stem in the control plot had a diameter of 20 mm in 2010, 35 mm in 2011, and 21 mm in 2012. We believe that the apparent change in size is simply an error in measurement, not a change in the plants *per se.*

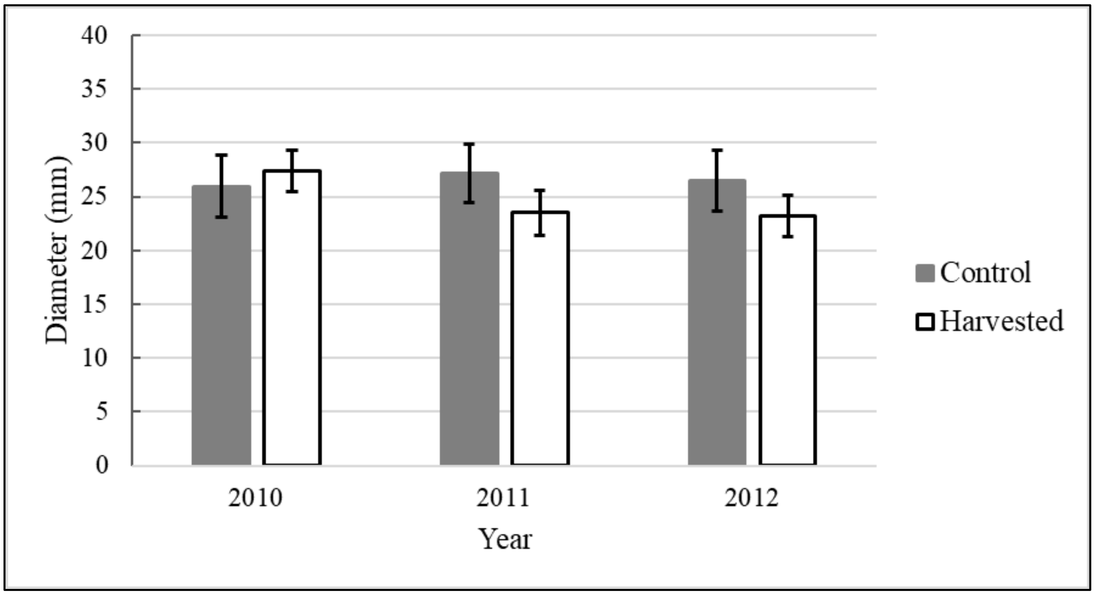

Figure 5.7. Average Diameter of Beargrass Stems. Bars are 95% confidence interval.

An analysis of variance was run to test whether or not observed changes in beargrass stem diameter were statistically significant. Consistent with the notion that initial changes in stem diameters were the result of leaf removal rather than changes to the stem itself as noted above, repeated-measure ANOVA analysis indicated no significant differences between the control and harvested stems during the study period ($F=4.117$, $df=1$, $p=0.0449$).

Beargrass Leaf Length Effects

The length of the longest mature leaf on each plant was measured each year. Prior to treatment, the control stems had significantly shorter leaves than the harvested stems ($F=86.681$, $df=1$, $p=1.49^{-15}$). This relative difference in mean leaf length did not change over time as plants tend to have the same length leaves each year ($F=0.448$, $df=1$, $p=0.505$) (Figure 5.8). The results indicate that, while the difference between control and harvested treatments was initially present, beargrass harvest using the traditional Nisqually gathering method, did not impact leaf lengths. The absence of observable effect is probably due to the fact that the mature leaves measured had stopped growing regardless of treatment.

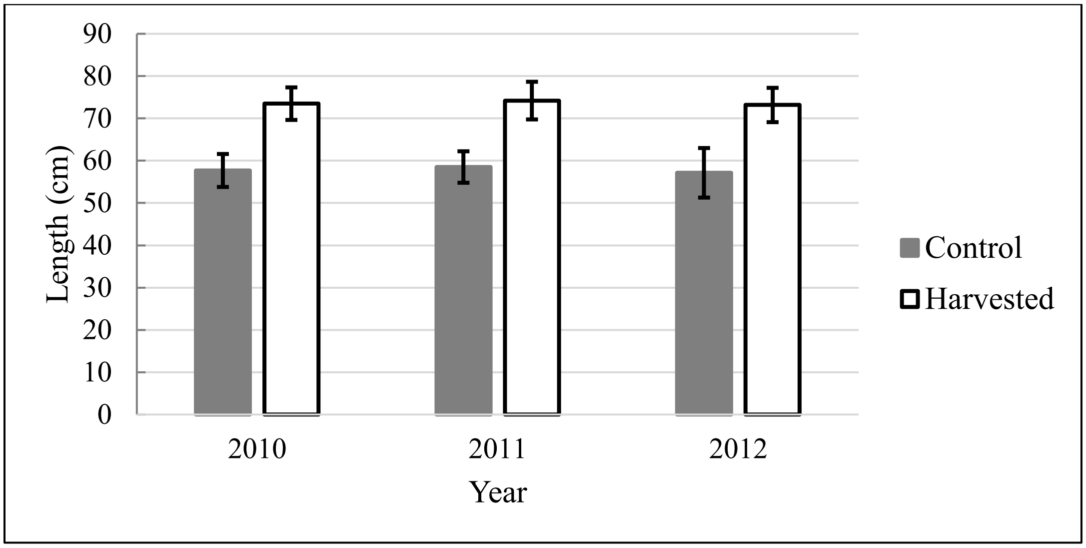

Figure 5.8. Length of Longest Leaf of each Treated Beargrass Stem.
Bars are 95% confidence interval.

Effects on Beargrass Abundance

As with leaf length, there was no significant change in the number of beargrass plants around the target plants during the two-year study period (F=0.114, df=1, p=0.7364) either by treatment (F=3.848, df=1, p=0.0523), or by interaction of treatment and year (F=0.754, df=1, p=0.3872). As a long-lived perennial plant, we expected minimal change in the number of beargrass plants over two years; and, as indicated in Figure 5.9, no appreciable change was detected in the average number of adjacent plants between years, nor did plants die in either control or harvest treatment plots.

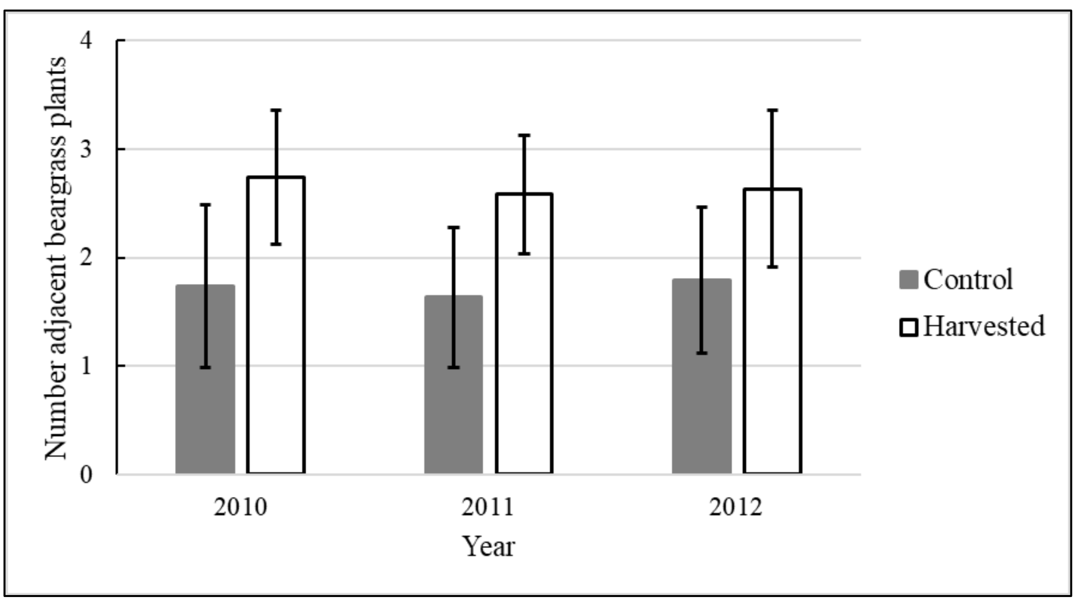

Figure 5.9. Abundance of beargrass plants around marked plants.
Bars are 95% confidence interval.

Plant Community Effects

Similar to the effects of traditional beargrass harvest by Nisqually tribal members discussed above, detrended correspondence analysis (DCA) suggests that the broader plant community surrounding the targeted beargrass stems did not change over the course of the study. This was the case both for control and harvested plots. This DCA uses species abundance data to represent species assembly. Even though the control and harvested plots are about two meters apart, the DCA indicates a slight difference between the composition of the two plots (Figure 5.10). Because the 2011 and 2012 control measurements cluster around the initial 2010 plot, there were no measurable changes in species composition as result of environmental factors. The clustering of 2011 and 2012 measurements around 2010 indicate that the removal of 15 beargrass leaves did not impact the immediately surrounding plant species within the two years of the experiment

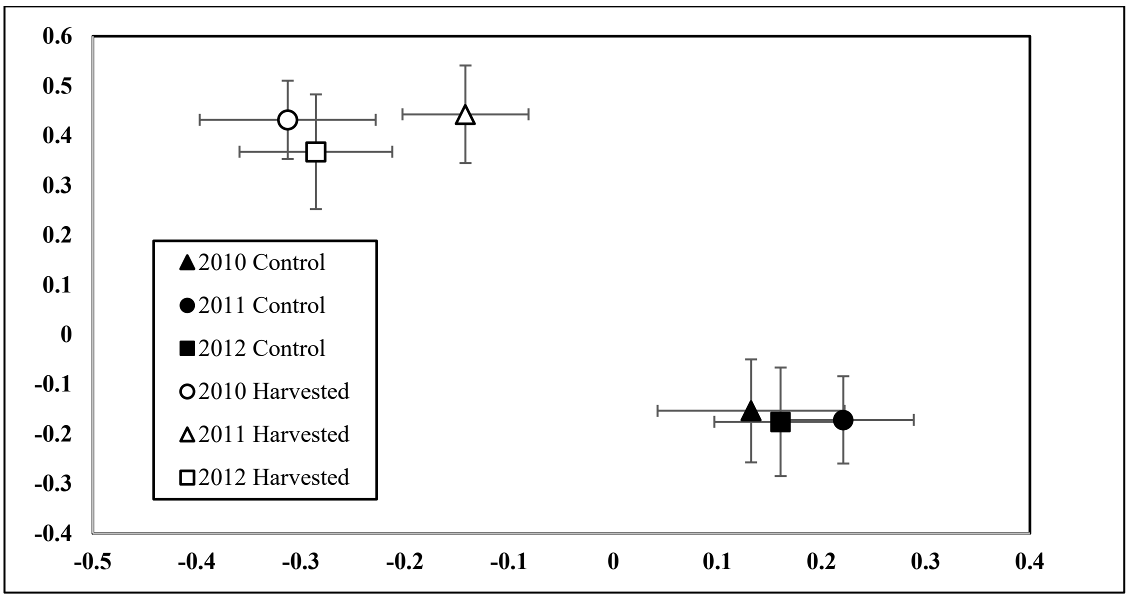

Figure 5.10. Mean Species Abundance DCA Values from Beargrass Experimental Harvest.
Symbols are mean values per year. Bars are standard error.

In sum, these experiments detected no statistically significant changes related to harvest of beargrass leaves in terms of plant mortality, the outward appearance of beargrass plants, stem diameter, length of longest leaves, number of adjacent beargrass plants, and number of adjacent other plant species. Neither do results of the experimental harvest support the notion that beargrass harvesting stimulates new compensatory growth, either through the increase of the harvested stems' growth rate, enhanced leaf growth rate, or the production of new stems. Stem number and mean leaf length remained constant in both harvest and control plots. Visual inspection showed no variation in species composition, or vegetative cover. It is likely that the removal of about 15 leaves per plant represents too low a percentage of above ground biomass for visual detection.

Discussion

Members of the Nisqually community gather beargrass by combing through leaves near the center of the central plant stem searching for long leaves with white bases. After selecting suitable leaves, the harvester pulls them out of the stem. Some harvesters pull one to two leaves at a time, while others pull as many as five. The size of the stem determines the number of leaves taken –about fifteen leaves from larger stems and fewer from smaller stems. Harvesting takes place between snowmelt in the spring and the first significant snowfall in the autumn, typically from early July through October on Mount Rainier. Preferred collecting sites are sunlit ridges and other early seral stage habitats with limited to open forest canopy. In Mount Rainier National Park, the best collection areas most frequently occur in sunny upper forest and lower subalpine plant communities where beargrass reaches maximum abundance as shown in Figure 5.1.

Below, we consider present results within the context of existing literature to evaluate variation between indigenous harvesting procedures. We also contrast traditional versus commercial harvest methods and effects, as well as natural herbivory alone, to gain further insight as to why traditional beargrass harvesting methods tend to be sustainable over time. Finally, we consider how traditional habitat management practices (aside from harvest techniques *per se*) affected beargrass abundance in the past. In this regard, we focus primarily on use of intentionally ignited fires (anthropogenic fires) to enhance beargrass habitat by reducing competitive forest cover. We suggest that synergetic effects of the two management practices (i.e., selective harvest and habitat management) were variables that worked in concert to sustain beargrass abundance in the past.

How Nisqually Gathering Procedures Compare to other Traditional Harvest Methods

There are a few differences between the observed Nisqually approach to gathering beargrass versus other documented traditional harvesting accounts –particularly in regard to techniques used to remove leaves from the stem and the number of leaves removed per plant. As with Nisqually gatherers, tribal people on the Olympic Peninsula pull long leaves from beargrass stem, leaving the growing stems intact (Hummel et al. 2012:28; Shebitz and Crandell 2014:157-158). Indigenous peoples of California and British Columbia may pull or cut the leaves but, again, leave the stems intact (Anderson 2005:193; Hummel, et al., 2012:28; Turner and Peacock 2005:122).

Biological effects of pulling versus cutting leaves from the stems have not been compared but neither should lead to stem death so long as the apical meristem remains intact. Based on the experimental beargrass harvest described here, the most notable effect of pulling leaves is minor reduction in stem diameter –reduction that does not appear to be biologically significant to continued plant viability. Since the plants used in the experiment had not yet flowered, we can only assume that limited leaf pulling does not impact bloom. However, since the growing stems and buds were not removed and leaf removal was minimal, impacts to flower and seed production should be negligible.

Contributing to our sense that removal of a limited number of beargrass leaves per plant (so long as stems are not damaged) has little appreciable effect on reproductive success are observations related to natural herbivory and mechanical mowing. Hooper, has observed severe animal and human damage to beargrass plants that, nonetheless, survived and bloomed successfully. Figure 5.11 shows a beargrass patch that had been heavily foraged by American pika (*Ochotona princeps*). It also shows two beargrass stems that flowered despite repeated mowing by the park's road maintenance crew. These are examples of damage far greater than any caused by Indigenous harvesting at Mount Rainier National Park. Even so, these plants survived and, in the mowing case, bloomed successfully.

Figure 5.11. (Above) Beargrass Foraged by American Pikas. (Right) Flowering Beargrass Stems Subject to Repeated Mowing. (Photos by David Hooper)

Descriptions of indigenous beargrass harvest practices outside Mount Rainier National Park seldom report the number of leaves removed per stem (e.g., Anderson 2005:193; Hummel et al., 2012:28; Shebitz and Crandell 2014:157-158; Turner and Peacock 2005:122). Hummel et al., (2012:28), however, cite Schlick (1994) in suggesting that one good plant can provide enough leaves to cover a gallon-sized basket. It is not clear if this refers to a single plant stem or a group of stems connected through rhizomes. We assume that she refers to a group. Our experience suggests that leaf collection of this quantity from an individual plant stem would be excessive and *non-sustainable* for beargrass harvest.

Descriptions of gathering methods also tend to differ from those employed by the Nisqually. Anderson (2005:193), for example, does not describe how leaves are pulled or cut from the stem at all. Shebitz and Crandell (2014:157-158) cite Thompson and Marr (1983), noting that a few of the long center leaves are bunched together, wound around the harvesters' hands, and then removed with an upward jerk. Because of the bunching of leaves, it is difficult to know how many leaves are removed from the stem. It also is unclear how selective these harvesters may have been in choosing which leaves to remove.

This said, the Nisqually beargrass gathering approach is highly selective. Gatherers choose individual leaves carefully, then bundle them together after harvest as shown in Figure 5.2. The selective nature of beargrass gathering observed during the present study is likely to be similar to traditional practices throughout the region due, in part, to techniques promoted at the Northwest Native American Basketweavers Association. At regular meetings, up to a thousand indigenous basket weavers meet and exchange information on best harvest and construction techniques (Bowechop et al., 2014:172-173).

Comparison of Traditional to Commercial Harvest Methods

The traditional Nisqually approach to gathering beargrass appears to fairly represent selective harvest techniques common among traditional tribal gatherers throughout the Pacific Northwest. In a few cases, traditional and commercial harvests share common practices (see Hummel et al., 2012:28). Blatner et al. (2004:83) describe two commercial harvest methods that, superficially at least, resemble traditional techniques. "Some harvesters grasp the inner-whorl leaves and then twist and pull the leaves to free them from the rhizome. Others prefer to cut the leaves off at ground level with a knife." The method of pulling leaves is similar to the Shebitz and Crandell (2014:157-158) description of traditional collection practices. The cutting reference is less clear since it may refer to the entire plant. That said, Hummel et al. (2012:48) note that commercial harvesters tend to target the longest leaves as do traditional gatherers.

Taken at face value, traditional and commercial beargrass harvesting practices may seem to be similar. Within Indigenous communities, however, there is widespread concern that commercial harvesting reduces beargrass abundance. This is due to the sense that commercial harvesters often cut or pull *the entire plant* out of the ground and/or remove more leaves than plants can tolerate (Shebitz and Crandell 2014:161). The Nisqually also express concern about overharvesting by commercial harvesters. "…[You] don't see beargrass patches like they use to be. Which is kind of sad to see… Because you used to drive along the road and get out, you know, pick your beargrass, and keep on going. Soon there was no beargrass anywhere except for [a few places like] …French Creek. I think they [commercial beargrass gatherers] didn't know about it or couldn't get back there" (Joyce McCloud 2008). The sight of trucks full of beargrass reinforces the impression of over-harvesting by commercial gatherers (Figure 5.12). The fact that the National Park Service prohibits commercial beargrass harvest is one reason that tribal groups, like the Nisqually, seek to develop plant gathering agreements with Mount Rainier National Park.

Figure 5.12. Commercially Harvested Beargrass on a Washington State Highway.
(Photo by Josh Drown)

The critical difference between traditional beargrass harvesting and commercial harvest practices lie in the tendency for commercial harvesters to collect more leaves per stem, and to damage the center of the stem where the apical meristem is located. Members of the McCloud family describe the meristem as the heart of the plant and acknowledge that for the plant to survive harvesters must not damage the heart (center) during harvest (Hanford McCloud 2012; Joyce McCloud 2007, 2008). In any case, there is little incentive to collect stems near the meristem since these are not suitable for basketry. This selective collection practice generally does not apply to commercial harvests (primarily for floral arrangements), lowering the incentive for avoiding meristem leaves and increasing the probability of mortality through damage to the apical meristem.

While damage avoidance to the apical meristem is typical of traditional beargrass gathering practices, and is related directly to maintaining beargrass abundance, the *number* of leaves removed from a single stem probably varies from plant to plant. It may be possible for commercial gatherers to adopt traditional indigenous practices without significantly reducing their product, but commercial methods are more poorly studied than traditional approaches. Commercial beargrass-harvest monitoring by the U.S. Forest Service simply involves tracking the number of permits issued. The agency currently does not document quantities collected, collection methods, or ecological effects of collection (Hummel et al., 2012:48).

Additional ecological and social research would be helpful to understand more fully how differences between traditional and commercial harvest techniques impact beargrass abundance and sustainability. Even so, present research suggests that the traditional Nisqually approach to beargrass gathering results in little or no effect on beargrass abundance so long as individual plants are not harvested repeatedly. While it would be useful to understand more fully how indigenous beargrass harvest techniques vary across the region, it is clear that procedures comparable to the selective traditional Nisqually method should be maintained at Mount Rainier because of their benign effect on individual plants and associated habitats so long as collection locations are rotated periodically as leaf abundance shows signs of diminishing productivity.

Herbivory Biology and Sustainability of Traditional Beargrass Gathering Methods

Present data suggest that beargrass can tolerate[128] selective leaf removal by traditional Nisqually practices with minimal measurable effect on plant vigor. Plant tolerance of human harvesting is similar to animal herbivory. The selective character of traditional ecological knowledge (TEK), as applied to plant gathering, results from harvesters' desire to minimize plant damage, thereby maximizing the probability of sustaining plant abundance over the long-term. In any harvest event, there is a point at which the amount of biomass lost results in serious reduction in plant vigor and reproductive success. To avoid severe plant damage, traditional systems tend to establish limits on the number of leaves harvested and the manner in which they are removed. Traditional techniques also involve *relocation* to new beargrass gathering sites when reduced productivity at previous sites becomes apparent.

The degree of tolerance to herbivory (including human harvesting) may be described as compensation (Stowe et al., 2000:567; Strauss and Agrawal 1999:179). There are three general kinds of compensation: 1) compensation where the fitness remains the same; 2) over-

[128] Tolerance is the degree to which fitness is affected by herbivory (animal consummation of plant material) relative to the plant's fitness if it had not experienced herbivory (Strauss and Agrawal 1999:179).

compensation, where herbivory results in the plant gaining higher fitness; and 3) under-compensation, where herbivory causes a reduction in fitness (Strauss and Agrawal 1999:567).

Since the present study did not measure beargrass fitness (individual plant survival and reproductive success) directly, it is difficult to determine which type of compensation is occurring in response to observed traditional harvest practices. However, both over and under-compensation are unlikely since the percentage of beargrass ground cover did not significantly increase or decrease after harvest events. While we consider it unlikely, the possibility of under-compensation remains if the decrease in harvested stem biomass causes a reduction in the number of flowers or seeds produced. In order to better understand how beargrass tolerates traditional harvest practices, future research might consider how clones reproduced from the same parent respond to harvest compared to growth and seed production patterns of non-harvested clones.

Other Indigenous Management Practices

Maintenance of sustainable beargrass harvests is only one aspect of indigenous management practices. Beargrass is one of many species for which fire was used to manipulate habitat ecology in the past (Anderson 2005:194; Hummel et al., 2012:27; Peter and Shebitz 2006; Shebitz and Crandell 2014; Shebitz et al., 2008:2009; Storm and Shebitz 2006). Plant exposure to low-intensity fire tends to produce leaves better suited for basketry. It also affects leaf pigment, thickness, and strength. Importantly, fire also helps to maintain an early seral stage condusive to beargrass growth and reproduction. The plant's ability to grow after a fire is the result of the meristem position below ground which helps to protect the plant from low-intensity burns (Shebitz and James 2010). By maintaining the integrity of the meristem, Indigenous people could use low-intensity fires to expand conditions best suited to optimal growth. Accordingly, parks might consider working with associated tribes to incorporate low-intensity prescribed burns into fire management plans to maintain beargrass habitat.

Conclusions

In various permutations, studies regarding techniques and ecological effects of traditional beargrass gathering were carried out at Mount Rainier National Park from 2001 through 2012. Combined visual and analytical results suggest that beargrass harvested in the manner employed by tribal gatherers, and in quantities not exceeding those specified in the Nisqually-Mount Rainier plant gathering MOU, can be sustainable if traditional harvest procedures are followed rigorously and revised as need dictates.

Two previous Mount Rainier National Park plant ecologists, Laurie Kurth and Arnie Peterson, observed the effect of traditional beargrass gathering at various points during the course of the present study and/or report preparation effort. Park biological technician and ethnobotanist, David Hooper, and Mount Rainier cultural resource specialist, Greg Burtchard, participated throughout. All have expressed the opinion that visual impacts resulting from the practice are slight to unnoticeable (see photos in Figure 5.6). While none of the experiments in this study found statistically significant differences between control and harvest test plots, none were capable of detecting a change of less than 15 percent; well below the threshold observed in the present study. Accordingly, the experiments do not provide definitive information as to whether or not the Mount Rainier harvests had an effect below that level. *Xerophyllum tenax* grows slowly. The length of time for plants to recover from impact is unknown. However, because the apparent harvest impact is, at worst, slight, we recommend that beargrass gathering using the traditional Indigenous method observed here continue. We suggest that areas in which traditional beargrass harvest takes place be monitored to ensure that cumulative impacts from harvesting over multiple years do not result in unacceptable damage to plant abundance or general community structure.

The principal factors contributing to the success of traditional versus commercial techniques appear to lie in 1) selection of mature plants for harvest; 2) removal of a limited number of leaves (about 15) per plant; 3) avoidance of damage to the central meristem; 4) limited collection quantities; and 5) relatively infrequent collection in a given area (≤ once per year). Since we were unable to study the effects of *repeated* collection from the same plant, we recommend that individual plants not be re-harvested.[129] We also recommend that harvest sites periodically be rotated to allow rest-recovery time sufficient to ensure that plants and habitats remain unimpaired as determined by park and/or tribal environmental monitors.

In sum, present data suggest that by being selective in determining which beargrass leaves are harvested, limiting the number of leaves removed per stem, and avoiding damage to the apical meristem, traditional Nisqually beargrass harvest techniques had no significant negative effects on beargrass cover within detectable limits of the study design. The primary mechanism serving to ensure plant vigor lies in the tendency of traditional gathering techniques to recognize and fall within individual species' capacity to tolerate potentially damaging herbivory. Historical and ethnographic records suggest that these practices were not due to chance, but rather were developed and socially reinforced through time as a means to minimize plant damage and to enhance long-term sustainability. To ensure that continuing beargrass populations truly remain stable, we nonetheless suggest that, when permitted, traditional beargrass harvest be conducted in the limited manner employed by the Nisqually, monitored regularly, and rotated to new harvest areas if decrease in plant vigor, vegetative cover, and/or species composition are detected.

[129] Continuing study may determine the rest period necessary to assure plant recovery sufficient to tolerate additional harvest episodes.

Chapter 6: Traditional Plant Gathering Effects; Pipsissewa

Figure 6.1. Pipsissewa (*Chimaphila umbellata*). (Photo by David Hooper)

Introduction

Taxonomy, Natural History, and Ecology

Two closely related species in the Ericaceae family bear the common name “pipsissewa” – *Chimaphila umbellata* (L.) W.P.C. Barton ssp. *umbellata* and little pipsissewa *Chimaphila menziesii* (R. BR.) Spreng. Both are low growing evergreen shrubs which can co-occur throughout forested habitats in the Pacific Northwest (Biek 2000:192; Mathews 1999:109-110; Pojar and Mackinnon 2014:226-227). *C. umbellata* is a circumpolar species, while *C. menziesii* is endemic to the Pacific Northwest region. Height, leaves, and flowers differentiate the two species. *C. umbellata* can grow up to 35 cm tall. Leaves are whorled and the whitish pink to rose flowers number three to fifteen on a raceme. At 15 cm tall, *C. menziesii* is smaller, it has one to three creamy white or pink flowers and alternating leaves. On Mount Rainier, the upper elevation limit of *C. menziesii* is about 4,000 ft, while *C. umbellata* can occur up to 5,000 ft. During initial observation of *C. umbellata* gathering, David Hooper pointed out the other species, *C. menziesii,* to the harvesters. They did not recognize it as culturally relevant, and thus was not gathered. Consequently, the present study focuses only on harvest of *Chimaphila umbellata.*

Pipsissewa is a rhizomatous plant in which multiple stems grow up from the ground. It is partially myco-heterotrophic, meaning that while it has green leaves it gets some of its nutrients from fungus associated with its roots. Pipsissewa primarily reproduces vegetatively through its rhizomes, with sexual reproduction of secondary importance (Tilford 1997:110). Flowering frequency, however, increases with exposure to light (Lundell et al. 2015). By being able to reproduce in this dual fashion, pipsissewa can persist vegetatively until conditions are favorable for sexual reproduction. Pipsissewa primary pollinators are bumblebees (*Bombus* ssp.) (Standley et al. 1988).

Pipsissewa seeds are small, 0.55 by 0.10 cm. They can be described as *dust seeds* which have limited endosperm tissue, requiring young germinates to rely on fungal associations for carbon sources during establishment. Johansson and Eriksson (2013:23) found that the number of microsites with appropriate fungi limits germination rates. They also found that seeds placed in plots with adults had an 18 percent germination rate. In plots with no adults, the germination rate fell to 8.7 percent (Johansson and Eriksson 2013:21), indicating that pipsissewa relies heavily on presence of appropriate fungi for seed establishment.

In Sweden and Norway, changes in forest management practices have caused pipsissewa populations to crash. In some cases, populations have declined as much as 81 percent during the last century. Indeed, pipsissewa is now listed as endangered in these countries where increased timber extraction has produced conditions favoring grasses and dwarf bilberry (*Vaccinium myrtillus*), both of which outcompete pipsissewa (Johansson and Eriksson 2013; Lundell et al. 2015). It is possible that pipsissewa grows best under a moderate canopy forest and does poorly when the canopy is opened broadly by logging or fire. Forestry practices, along with potential pipsissewa overharvest by herbal and soft drink industries, present threats to pipsissewa in this country as well (Mathews 1999:110; Tilford 1997:110).

Ethnobotany

Traditional uses of pipsissewa are medicinal. Across North America, Indigenous people used teas and infusions made from the leaves and roots to treat kidney and urinary issues, ease colds, assist with childbirth, reduce pain, treat gonorrhea, maintain general health, and purify blood (Mathews 1999:109-110; Moerman 1998:157-158; Tilford 1997:110; Uprety et al. 2012). External uses include applying decoctions to relive sore eyes, muscles, and backs (Moerman 1998:157-158; Uprety et al. 2012). In discussing the use of devil's club (*Oplopanax horridius*), Gunther (1973:41) reports that Skagit tribal members boiled devil's club root with bark, pipsissewa, and cascara to treat tuberculosis. Finally, several studies have demonstrated antimicrobial properties of pipsissewa (Galvan et al. 2008; Uprety et al. 2012).

Pipsissewa Gathering Practices

In 2010 and 2011, we accompanied members of the Nisqually Tribe to observe pipsissewa harvesting near the old Longmire campground southeast of the Nisqually River in Mount Rainier National Park. During the excursion, participants discussed aspects of pipsissewa ecology and harvesting techniques via three semi-structured interviews. Figure 6.2 shows tribal member Joyce McCloud instructing pipsissewa gathering techniques in Mount Rainier's Longmire campground in 2010.

Nisqually traditional use of pipsissewa is predominantly as a medical tea to help with liver function, kidneys, and blood purification. One of Joyce McCloud's grandmothers, for example, made two quarts of pipsissewa infused tea per week. She drank the tea throughout the week for general health benefits and as a pick-me-up (Joyce McCloud 2008). To prepare the tea, one quart of water is boiled, then a handful of dried leaves added and steeped for ten minutes. The final step is to mix a quart of the concentrated pipsissewa tea with one gallon of water. A full paper grocery bag of pipsissewa leaves can last a year (Hanford McCloud 2012; Joyce McCloud 2008).

Figure 6.2. Joyce McCloud (*left*) Instructs Nisqually Tribal Members in Traditional Pipsissewa Harvest Methods. (Photo by David Hooper)

Pipsissewa harvest can occur at any time of year with plant abundance being the most important consideration in selecting a gathering site. In 2010, several harvesters commented on how abundant pipsissewa was at the Longmire site shown above. One said that it was the most they had ever seen.

Availability and abundance of pipsissewa is of concern to many Indigenous gatherers. Nisqually tribal gatherers alluded to a property near their reservation that had provided pipsissewa in the past, but development had destroyed the population. During an interview, Hanford McCloud (2012) noted that "My finding is that it [pipsissewa] is pretty tough to find now-a-days compared to the past where it was always in certain areas 'under the shade next to the moss like my grandmother used to say." In describing the development-related difficulty in finding pipsissewa, he also alluded to his sense that shaded, older forests tended to provide habitat conditions favoring higher pipsissewa abundance.

The principal guideline for selecting individual pipsissewa leaves and above-ground stems is to avoid harvesting plants with flowers or seed heads. If the harvesting area has no flowering or seeding stems at the time of collection, harvesters are expected to leave at least three to five multi-leaf stems within a patch (i.e., spatially distinct plant population dominated by pipsissewa leaves and stems).

Nisqually tribal gatherers harvest pipsissewa by breaking off leaf-stems at ground level, usually by pinching and bending it toward the ground with a twisting motion. The goal is to remove the leaf, or leaf cluster, without damaging the plant's underground rhizome structures. Without care, a few centimeters of the sub-subsurface rhizome could accidentally be removed in the process. When some of the less experienced harvesters from the Nisqually Community Garden group were simply pulling rather than pinching leaves, Joyce's daughter interrupted, explaining how the stem and leaves were to be collected properly (Hooper personal notes). After placing the leaves in a bag, the harvested material is transferred to a location where it can be dried and stored.

During the 2010 pipsissewa gathering trip, standard-sized plastic grocery bags were used to hold the harvested plants. When the Nisqually harvested pipsissewa the following season in 2011, they filled eleven one-gallon Ziploc-brand bags, including the one shown in Figure 6.3. In 2012, the tribe did not harvest at all. In their place, Hooper filled ten one-gallon bags comparable to those used the previous year as an experimental harvest. Leaves and stems were then dried and weighed to estimate the amount of pipsissewa collected the previous year. The average dry weight of one bag was 106.4 grams (g) with standard deviation of 10.5 g. The average dry weight of one stem was 0.7 g. Applying these results, we estimate that harvesters at Mount Rainier gathered approximately 1170 g of dry-weight pipsissewa in 2011, or roughly 1,667 stems –about three stems per square meter.

Figure 6.3. One-gallon Bag Filled with Harvested Pipsissewa. (Photo by David Hooper)

Pipsissewa Harvest Ecology

Methods of Monitoring Pipsissewa Gathering Practises

In 2010, we established a permanent gathering area for harvesting pipsissewa on the mossy, forested landform adjacent to the Nisqually River and the old Longmire Campground in Mount Rainier National Park. The Longmire area was particularly well suited to the study because it supported a substantial pipsissewa population, provided easy access for Nisqually gatherers, and reduced encounters with curious onlookers. Importantly, it afforded a location to monitor plant and habitat effects of pipsissewa harvest in an area large enough to establish discreate areas in which non-harvest control and harvested sample plots could be established.

We anticipated three potential outcomes from traditional Pipsissewa in the harvest plot area: 1) no measurable effect to pipsissewa abundance, 2) decline in pipsissewa abundance, or 3) increase in pipsissewa abundance due to compensatory response. If the second alternative were observed, we expected a measurable *decrease* in stem density, frequency, and percent vegetative cover in cases where harvesting removes both stems and leaves as was the common Nisqually practice. If the third, compensatory response, alternative occurred, we expected to see a measurable *increase* in vegetative cover and/or stem frequency. Given no indication of compensatory response, the third option is not considered further here.

To examine these potential effects, Hooper laid out two 20 m by 30 m study areas, each displaying visually comparable pipsissewa stands –one area for non-harvest control, and the second as a place in which observed Nisqually traditional pipsissewa harvest could take place. In each of these study areas, he established 120 randomly selected 1 m by 1 m plots, along twelve 30 m transects. These were used to characterize the vegetation patterns common to each, and to estimate gathering-related changes in the harvest study area. As with the beargrass study, conservative interpretations of statistical data were used in the evaluating results to account for potential environmental variation between study areas.

To help ensure that the transects and quadrats satisfactorily characterized vegetation across the larger 20 by 30 m study areas, Hooper established 20-meter baselines down the center of the control and harvest study areas. Along these baselines, he randomly selected 12 perpendicular transects, 15 meters to the right and 15 meters to the left of the center baseline. Once selected, five 1 by 1 m quadrats were randomly selected to the right of the centerline along each of the 12 transects and five quadrats to the left; culminating in 120 total quadrats for each of the control and harvest study areas (240 quadrats total). Calculations for frequency and cover were based on the 12 transects. Harvest plot quadrats were sampled prior to pipsissewa harvesting events in 2010 and 2011, and again in the non-harvest year 2012 to measure the impacts of the 2011 harvest. The control plot was sampled throughout the same period to provide a baseline against which to compare harvest plot results.

As can be seen in Figure 6.2, the study area was a moderate canopy stand of mixed tree and near-ground vegetation, including pipsissewa. Since near-ground cover was the primary focus of the study, 1 by 1 m test units were moved to the nearest open unit whenever randomly selected locations coincided with a standing or fallen tree. Unfortunately, location markers for the *control study area* were lost after the first year. Some level of comparative accuracy between years was bound to have occurred. To maintain comparative accuracy as best we could, the control area was reset as precisely as possible the following year using field notes, 2010 photographs, and memory. Given the general environmental uniformity of the landform and structure of the pipsissewa patches, we believe the results to be comparable.

Test procedures were designed to gather data relevant to potential changes in three variables: 1) species frequency (relative abundance of a species in a given area); 2) vegetative cover; and 3) pipsissewa stem density (the number of individual pipsissewa leaf stems per unit area). Estimates for each of these variables were gathered using the nested quadrat frame shown in Figure 6.4.

Figure 6.4. Nested Quadrat Frame Used to Sample Pipsissewa Frequency.
Four tines divide the 1 by 1 m area into 25 by 25 cm, 50 by 50 cm, and 1 by 1m quadrats. The yellow circle shows a point imbedded in each tine to identify individual plants recorded to estimate vegetative cover. (Photo by David Hooper)

As shown above, each 1 by 1 m test unit was divided into three quadrats: 25 by 25 cm, 50 by 50 cm, and the full 1 by 1 m area. *Species frequency* for the unit was recorded by marking the presence of all species occurring within the smallest quadrat, then any additional species occurring in the next two larger sizes that were not present in the smaller quadrats (see Coulloudon et al. 1999:37-38). This nested approach is used to monitor multiple species at one time because the different quadrat sizes are better suited to capture species of different frequencies (Coulloudon et al. 1999:15; Elzinga et al. 1988: 177). Percent species frequency was determined by counting the number of times a species was present in a particular quadrat size divided by the 10 quadrats that made up a transect (Coulloudon et al. 1999:41).

Vegetative cover was estimated by recording the single plant species touched by the fine points fixed to the cap of each of the four tines of each quadrat frame. (Coulloudon et al. 1999:49). This method is a variation of the point intercept methods of measuring percent cover (Coulloudon et al. 1999:80). When these monitoring plots were established, we had yet to observe how the Nisqually gatherers harvested pipsissewa. One possibility was that they would collect leaves while leaving the stems intact. If this was the case, then it was possible that pipsissewa frequency would not be reduced while percent ground cover could be. We felt that, by including both measures, such possibilities would be captured. As with species frequency, vegetative cover components were calculated by summing the number of hits for each species on a transect and dividing by the total. Finally, *pipsissewa stem density*, was generated by counting the number of stems, at any state of maturity, in the 25 by 25 cm quadrat of each of the quadrat frames.

As with beargrass, repeat-measure analysis of variance (ANOVA) was used to test for changes in frequency, stem density, and percent cover of pipsissewa in the data collected by procedures described above (see Elzinga et al. 1998:245-246). Plant species frequency and ground cover provided the data used to calculate detrended correspondence analyses (DCA).

Pipsissewa Monitoring Results

Nisqually tribal members gathered pipsissewa in the harvest plot during 2010 and 2011 harvest seasons. Recall that gatherers harvested leaves by *pinching off* leaf stems at ground level to remove the leaf, or leaf cluster without damaging the plant's underground rhizome structures. Flowering or seeding stems were avoided altogether. A few of the harvesters gathered leaves in their immediate vicinity, most remained standing, moving through the patch gradually as they pinched off pipsissewa stems and bagged the leaves. Our goal was to observe how pipsissewa responded to this traditional harvest technique in a manner that allowed us to discriminate between the two outcomes also noted above –no measurable impact, or decreased pipsissewa abundance.

<u>Effects on Pipsissewa Abundance</u>

Pipsissewa was common in both control and harvest plots. In the control area, an average of 59 percent of the smallest 25 by 25 cm nested plots contained pipsissewa, while 53 percent occurred in the harvest plots. In the 50 by 50 sq samples, average density rose to 84 percent in the control plots and 72 percent in the harvest plots. In the 1 by 1 m samples, pipsissewa frequency was 89 percent of the control plots and 82 percent of the harvest plots. Table 6.1 summarizes these frequencies. Figure 6.5 provides visual reference for all nested quadrat sample sizes.

Results show general consistency in pipsissewa frequency between the quadrat sample sizes, especially in the larger, more inclusive, 50 by 50 m and 1 by 1 m quadrats. *Between* sample years, pipsissewa frequency also appears to remain stable across both harvest and control plots especially in the largest 1 by 1 m quadrat where frequency maintained a constant average of 88 to 89 percent in control plots, and 81 to 83 percent in harvest plots.

As can be seen in Table 6.1 and Figure 6.5, control units had the highest pipsissewa frequency from the beginning; a difference that remained relatively constant throughout the study period. Within both harvest and control plots, interannual frequencies remain relatively stable – especially in the larger quadrats. These results suggest that, while there are slight differences between and within the control and harvest areas, the variance does not appear to change meaningfully over the study's time frame. Accordingly, within the detection limits of the present study, results suggest that traditional harvest methods employed Nisqually gatherers, did not alter pipsissewa test populations.

While these results suggest benign effect, a warning caveat is in order. Coulloudon et al. (1999:24) suggest that to determine change in frequency most accurately, a species must generally constitute as least 20 percent and no greater than 80 percent of the total sample. Table 6.1 and Figure 6.5 show that, while relatively constant in all quadrat sizes, pipsissewa only fell within the 20 to 80 percent range in the 25 by 25 cm plots. Focusing solely on 25 by 25 cm plot values for all three years, two interpretive reservations should be noted. First, the large 8 percent increase in pipsissewa in the control plots between years 2010 and 2011 is probably due to the shift in control plot locations between those years rather than a genuine frequency improvement. Second, the large confidence interval values in those samples suggest that our measuring procedures may not be sufficiently sensitive to detect a less than 33 percent change in population frequency. That said, the preponderance of available data suggest no significant effect from traditional Nisqually pipsissewa collection practices in any of the quadrat sizes.

Table 6.1. Average Percentage of Pipsissewa by Harvest Year.

Year	Treatment Plots	25 x 25 cm	95% CI	50 x 50 cm	95% CI	1 x 1 m	95% CI
2010	Control	53	41, 64	79	72, 86	89	83, 96
	Harvest	53	38, 69	71	58, 83	82	73, 90
2011	Control	61	45, 77	84	72, 96	90	81, 99
	Harvest	51	33, 68	73	61, 84	81	71, 90
2012	Control	64	53, 75	88	77, 98	88	78, 99
	Harvest	55	40, 70	72	60, 83	83	76, 90
Average	Control	59	46, 72	84	74, 94	89	81, 98
	Harvest	53	37, 69	72	60, 83	82	74, 90

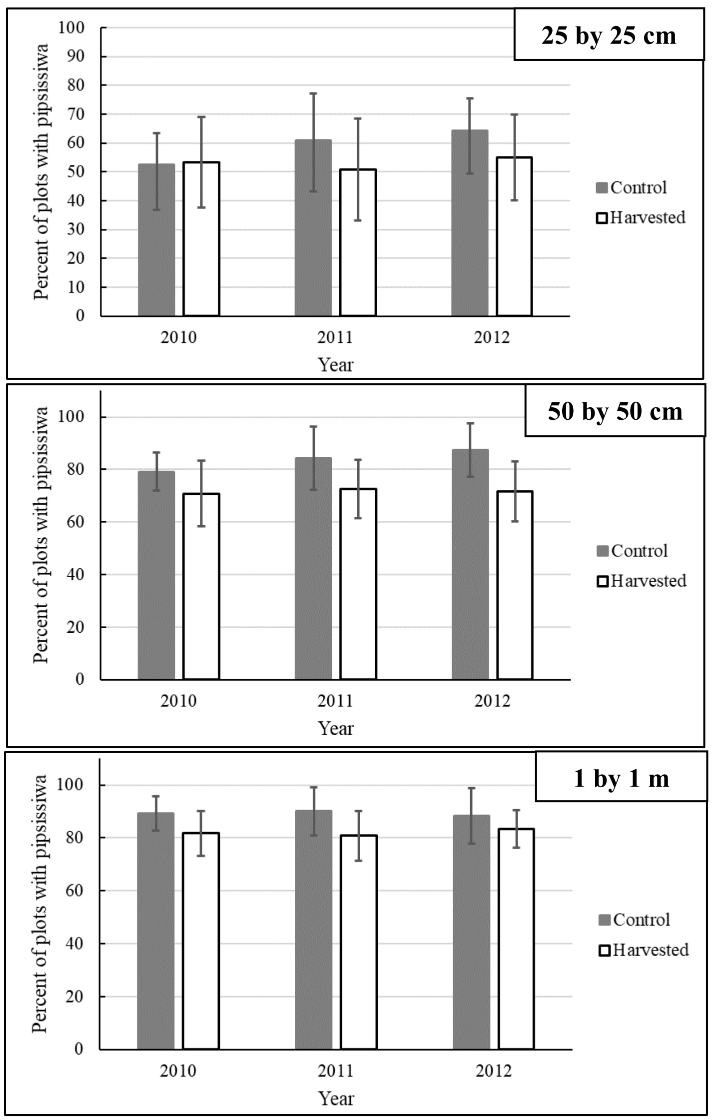

Figure 6.5. Pipsissewa Percent by Year and Quadrat Size. Bars are 95% confidence interval

Results and interpretive limitations noted above were similar for pipsissewa *stem density* as well. Each 25 by 25 cm quadrat contained, on average, approximately 1.6 stems, yielding an average stem count per square meter ranging from 25.1 to 29.3. Overlapping confidence intervals ranged between 5.5 to 7.5 for both control and harvest plots as shown in Figure 6.6.

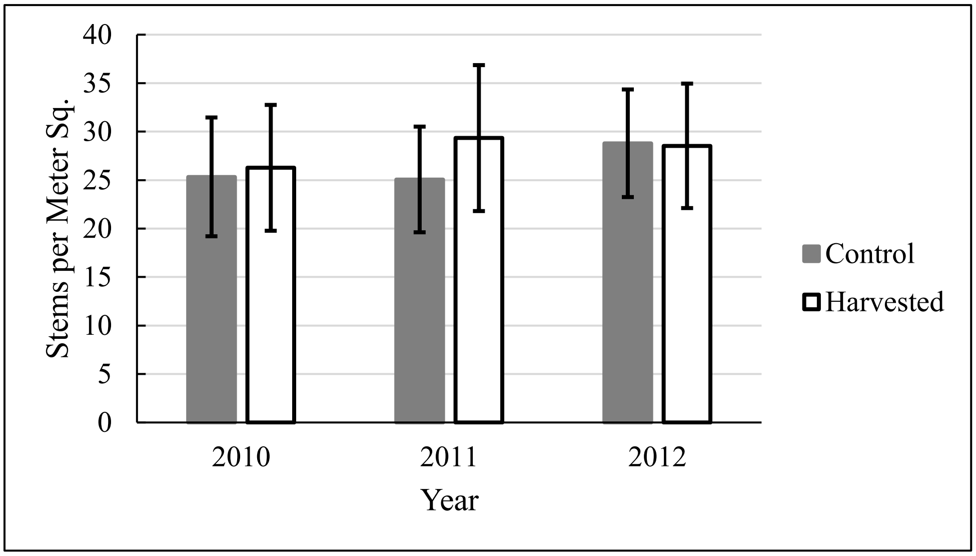

Figure 6.6. Pipsissewa Stem Density per Square Meter. Bars are 95% confidence interval.

These data imply that stem density was not diminished by traditional Nisqually harvest methods over the study period. However, data extracted from 25 by 25 m quadrats multiplied to generate 1 by 1 m sample estimates, combined with pipsissewa slow growth pattern, increase the likelihood of measurement error. An estimated minimum detectable change is 9 stems per square meter, or about a 33 percent change in the number of stems needed to be detectable. Indeed, over half of the control quadrats had a different number of stems in them from one year to the next. Of the 73 control quadrats with pipsissewa in 2011, 32 had fewer pipsissewa stems the following year, while 44 quadrats had more. Accordingly, we suggest that continuing gathering activities be accompanied by monitoring procedures that build on our initial efforts by incorporating longer observation periods and more sensitive sampling strategies.

Effects on Pipsissewa Vegetative Cover

The average pipsissewa vegetative cover in all test units ranged from 6.0 to 10.6 percent over the study years (Table 6.2 and Figure 6.7). Note that these numbers tend to understate actual cover due to the sampling design that favors pipsissewa frequency over vegetative cover. That said, results indicate that, between 2010 and 2011, the percentage ground cover measured by this technique increased by 4.6 in the control plot[130] and by 1.25 in the harvested plot. The changes in cover between 2011 and 2012 were nil in the control and show a decrease of 2.7 in the harvest plots (Table 6.2). Statistical analysis detected no significant difference in vegetative cover between control and harvested pipsissewa plots. Even with the misaligned 2010 control in which measured cover increased from 6.0 to 10.6 (a 75% increase), variation falls within confidence interval margins, if just barely (F=0.018, df=1, p=0.894). Minor changes in pipsissewa cover can

[130] Limited cover in the 2010 control sample may be linked to misalignment in the control baseline between 2010 and 2011. The error does not apply to any of the harvest units or to the 2011 and 2012 control units.

be seen in the harvest plot –increasing 1.7 percent in the first year, dropping 2.7 percent in the second.

Table 6.2. Average Percent Pipsissewa Vegetative Cover. Yearly change is not significant.

Harvest Years	Mean Ground Cover	95% Confidence Interval	Yearly Change
2010 Control Plots	6.0	3.7, 8.4	NA
2011 Control Plots	10.6	6.5, 14.8	+4.6
2012 Control Plots	10.6	7.2, 14	0
2010 Harvest Plots	8.5	4.7, 12.3	NA
2011 Harvest Plots	10.2	5.1, 15.3	+1.7
2012 Harvest Plots	7.5	4, 11	-2.7

Pipsissewa measuring techniques employed in the present project were designed to detect major changes in vegetative cover (i.e., greater than 33 percent). Given that Nisqually harvesters gathered only about 10 percent of the pipsissewa in the harvest area, variation seen in the Figure 6.7 histograms reflects effects that, if present, fall below detectable limits of the study design. Future studies may benefit from greater focus on vegetative cover rather than pipsissewa frequency as noted above.

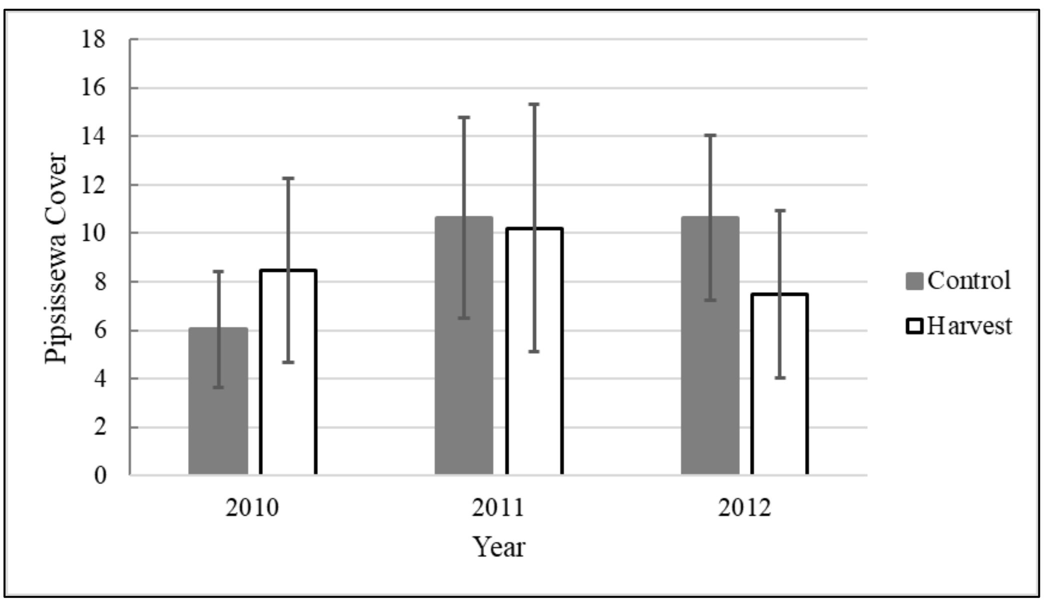

Figure 6.7. Percent Pipsissewa Vegetative Cover. Bars are 95% confidence interval.

Given the various rejoinders regarding monitoring procedures noted above, we offer the following observations. At the 10 percent level of pipsissewa stems removal, harvest pressure from traditional Nisqually practices employed at the park was relatively modest. Visual inspection of the site following harvest did not detect a change in the pipsissewa population. Experiments to determine change in frequency, density, and cover also detected no changes within the range of the sampling method employed.[131] In the future, we recommend that permitted traditional pipsissewa harvest be associated with monitoring procedures designed to 1) recognize pipsissewa slow growth rate, 2) detect change at a low level, and 3) provide for harvest rotation and/or fallow periods sufficient to allow pipsissewa populations to regenerate to pre-harvest levels.

Effects on the General Plant Community

Detrended correspondence analysis (DCA) was used to evaluate the effect of pipsissewa harvest activity on the general plant community (Figure 6.8). If plant communities remained relatively stable during the observation period, then the DCA points should cluster together. Increasing spatial variation from original 2010 observation point would be consistent with increasing variation in plant community composition over time.

Control plot variance between 2010 versus 2011 and 2012 clearly visible in Figure 6.8 simply reflects displacement due to the lost plot location markers that year. Since there was no gathering in the control plot, the 2010 point would otherwise be expected to cluster with the remainder of the control group similar to the beargrass DCA cluster pattern visible in Figure 5.10.

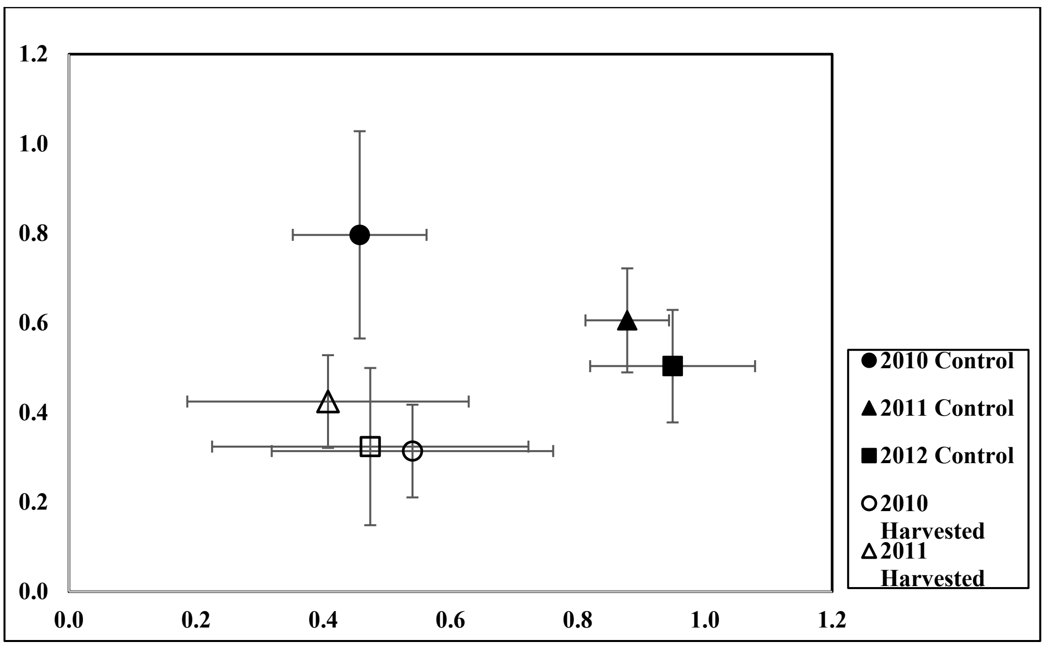

Figure 6.8. Mean Detrended Correspondence Analysis Values of Species Frequency.
Bars are standard error.

The clustered pattern clearly visible in the harvest plot measurements suggests that pipsissewa gathering had no discernable effect on the associated plant community over the sample years. Had there been a notable effect on general plant community composition, the mean points of the 2011 and 2012 measurements would lie further from the 2010 preharvest measurement

[131] Anecdotally, we add that reinspection of the Longmire gathering area during a park meeting with Nisqually tribal members, including Joyce McCloud, in mid-summer 2022, showed a lush pipsissewa cover with plentiful flowering stems; an abundance exceeding that shown in the Figure 6.2 photograph taken in 2010. It seems clear, that pipsissewa populations can thrive under modest traditional harvest pressure, given proper care during the harvest process and fallow periods long enough to restore population abundance.

point. Of course, a longer observation period would test the result more thoroughly. Even so, the pattern achieved in the present short-term test suggests no substantial variation in plant community composition in both harvest and control plots for the observation period available to us.

Experimental Pipsissewa Harvest

Five possible mechanisms could account for apparent stability in average pipsissewa frequency, vegetive cover, stem density, and vegetative cover in the test units discussed above (see Figures 6.5, 6.6, and 6.7). First is the unlikely possibility that pipsissewa germination rates are so high that the seed bank is sufficient to replace the removed stems. The second possibility is that, since harvested stems were pinched off at ground level, leaving the subsurface rhizomes intact, the rhizomes regenerate new stems the following season. Third, is the possibility that new stems grow both from seeds and rhizomes. Fourth, is the possibility that the amount of pipsissewa removed was too small to create a biologically significant effect. Fifth, is possibility that, given the modest harvest pressure to which it was exposed, the above experiments simply were not sufficiently sensitive to detect changes in pipsissewa abundance. In 2013, we began an experimental harvest to examine these mechanisms further.

Pipsissewa Expermental Harvest Methods

For the experiment, Hooper sited 36 transects around the pipsissewa harvest and control study areas discussed above. Each transect measured 2.5 meters long. Each transect had three 50 by 50 cm plots, set at zero, one, and two meters. Each transect was given three treatments, randomly assigned to one of the three plots: 1) a *control* (C) plot where there was no stem removal; 2) a simulated maximum traditional *Nisqually harvest* technique (NH) plot in which all stems without reproductive structures were removed,[132] while those with a seed head or flower were left intact, or if there were no reproductive stems, three non-reproductive stems were left in place;[133] and 3) removal of all stems, or *all-harvest* (AH), from the plot. Before receiving the assigned treatment, all stems in the plots were counted and the presence of reproductive structures recorded. All harvested stems were dried and weighed.

Two years later in 2015, Hooper recounted the number of stems in each plot and evaluated their reproductive status. All above ground pipsissewa biomass was then harvested, dried, and weighed; including both the new growth since 2013 and those plants not gathered in 2013. ANOVA was used to test for variation between the three treatments (see Coulloudon, et al. 1999, and Elzinga, et al. 1998). A pairwise t-test was used to help understand variation between treatments.

The experimental design had three general expectations: 1) *If the rate of seed germination was high*, then after two years, C and NH plots should exhibit a significant number of additional stems than prior to treatment; the AH plot should see a decrease due to removal of flowers and seed heads. 2) *If harvested plants regrow their stems with minimal seed contribution*, the C plot should remain constant while pre- and post-removal treatments in the NH and AH plots should vary. 3) *If traditional Nisqually harvest techniques have no measurable effect on pipsissewa abundance*, we would expect to see variance between the simulated traditional Nisqually harvest plots (NH) and the “all stems harvested” (AH) plots with greater abundance in the NH plots.

[132] Analogous to a tribal member sitting in one place harvesting. While, on average, the Nisqually gatherers, harvested about 10 percent of stems from the overall study area, there were sitting areas that may have been more heavily harvested.
[133] Flowering or seeding pipsissewa occurred in four of the 36 NH treatments.

Pipsissewa Experimental Harvest Results

Figure 6.9 shows the combined mass of plants harvested in year 2013 and plants harvested in year 2015.[134] *In the AH* plots, all of the plants were harvested in 2013; and in 2015, all of the new growth since 2013 was harvested again. *In C plots* no plants were harvested in 2013; and all of the plants, both old and new, were harvested in 2015. Total shoot biomass[135] produced in all three C, NH, and AH harvest treatments after two years suggests that neither of the harvest methods impacted overall pipsissewa productivity due primarily to stem regrowth from intact subsurface rhizomes. In all treatments, pipsissewa continued to grow at a steady rate; suggesting that, over time, even totally harvested stands will recover if 1) pipsissewa is gathered in the traditional Indigenous manner that avoids damage to subsurface rhizomes, and 2) gathering activity is halted to allow for a fallow period in those plots –perhaps by rotation to new areas.

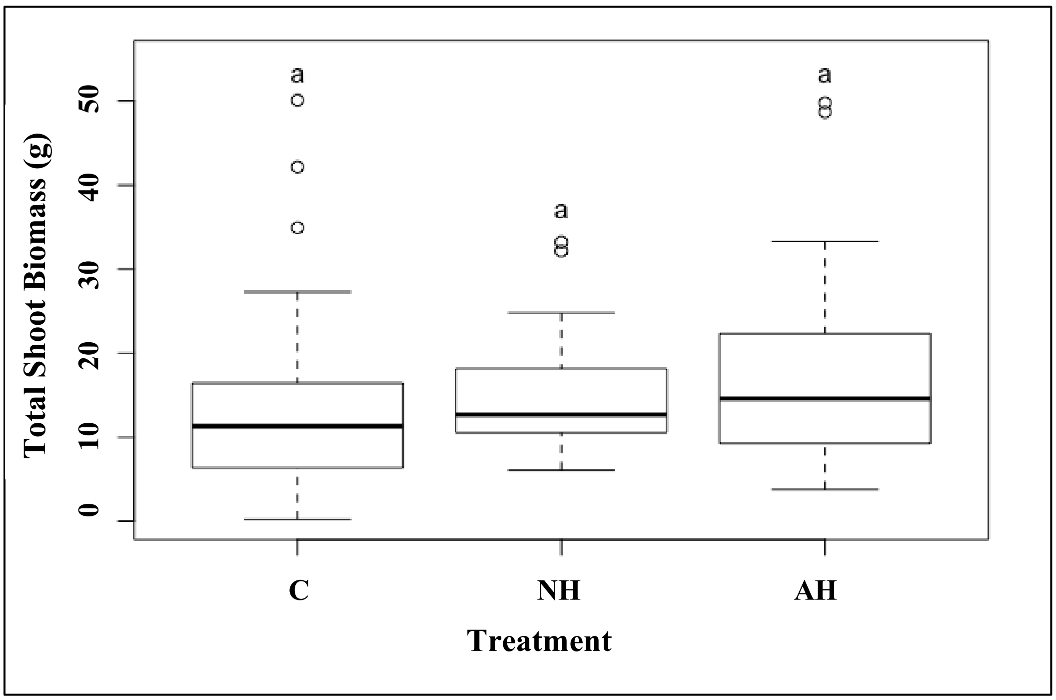

Figure 6.9. Pipsissewa Total Productivity is not Reduced by Plant Removal.
(C: control, NH: traditional Nisqually harvest, AH: all stems harvested.) Bars are standard error.

Figure 6.10 that follows, however, indicates that the amount of *shoot biomass* produced following application of harvested treatments was lower than the control ($F=22.16$, $df=2$, $p=0.000$), indicating that harvesting does not cause pipsissewa to over-compensate by enhancing growth rate. Combined with data cited above, it appears that pipsissewa continues to compensate at a constant, but slow, rate; suggesting that, while plots harvested at the traditional Nisqually

[134] This is a way to test for compensation. The range of biomasses of the control is assumed to represent the possible outcomes if there is no loss of biomass. If the species does not respond to losing biomass the 2013 and 2015, weight of harvested plants should fall within the range of control biomasses. If there is under compensation, then the combined biomass would be lower than the control; overcompensation is observed when the combined biomass is larger than the control.
[135] Total biomass includes that produced after treatment plus original biomass that was not harvested.

harvest level will recover over the long-term, they cannot sustain that rate indefinitely without rotation to new harvest areas while previously harvested areas lie fallow to permit recovery over a multi-year period. The all-harvest system was employed for test purposes only, and should not be a part of permitted traditional harvest activities.

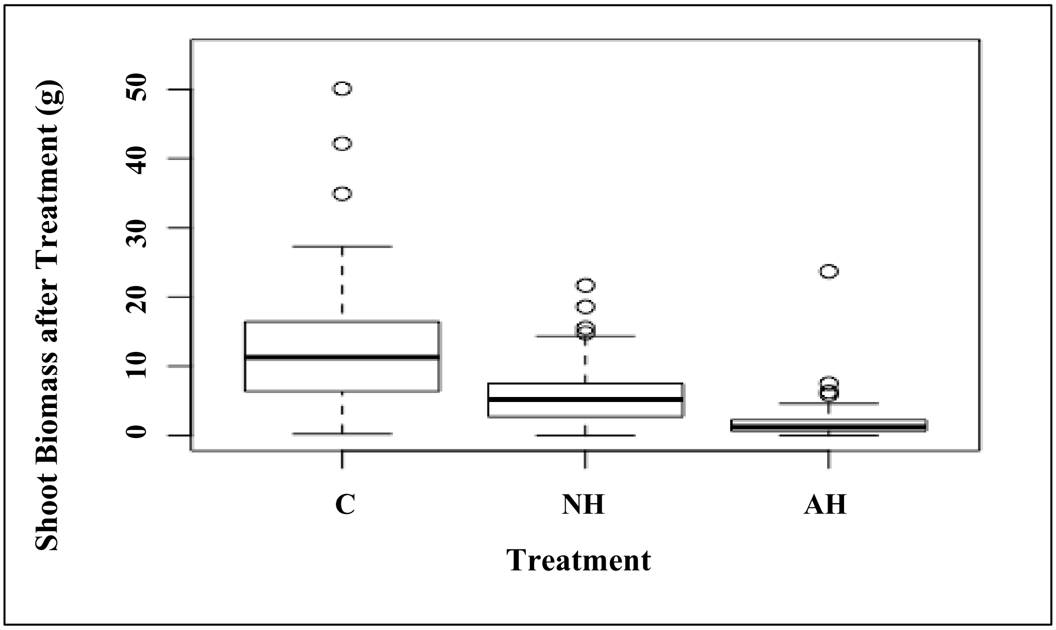

Figure 6.10. Biomass Following Harvest Events Indicate no Over-compensation.
Bars are standard error.

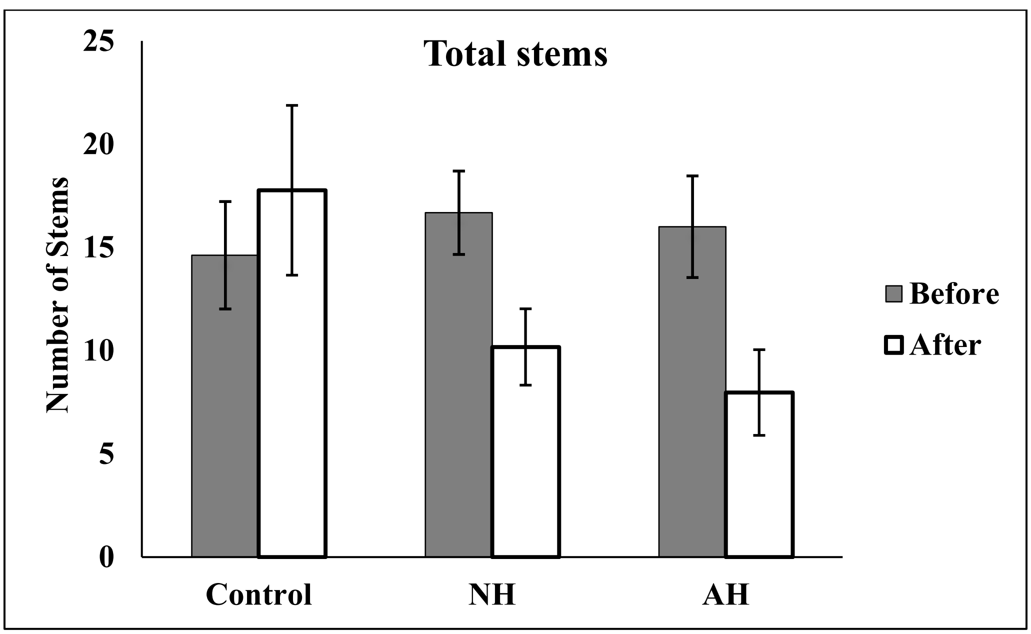

Figure 6.11. Average Number of Stems per Plot. Bars are 95% confidence interval.

While the two approaches to pipsissewa gathering did not affect the amount of *overall biomass* given sufficient time to accommodate the plant's slow growth pattern, we nonetheless observed changes to the distribution of life history stages. Figure 6.11 above shows the result of an ANOVA test indicating that none of the treatment types differed beyond 95% confidence intervals in total stem count *before harvest treatments* ($F=0.809$ $df=2$ $p=0.448$) . *After harvest treatments,* however, exhibited significant differences in the number of total stems between the different treatments ($F=32.01$ $df=2$ $p=1.9^{-11}$). These differences can be seen between the control and both NH and AH harvest treatments (NH $p=0.00072$, AH $p=0.000001$). Of the two harvest treatments, AH reduces stem count slightly, but significantly, more than NH ($p=0.81221$). The result suggests that, probably due to pipsissewa slow growth rate, stem density does not fully recover from harvest within the two-year study period.

In a similar manner, *non-reproductive stem* results shown in Figure 6.12 suggest that, at the end of the study, the number of *non-reproductive stems* in both harvested treatments did not differ from one another ($p=0.812$), but both were significantly lower than the control (NH $p=0.00072$, AH $p=0.00001$); recovering to about 61 percent of the pre-harvest amounts two years after harvest.

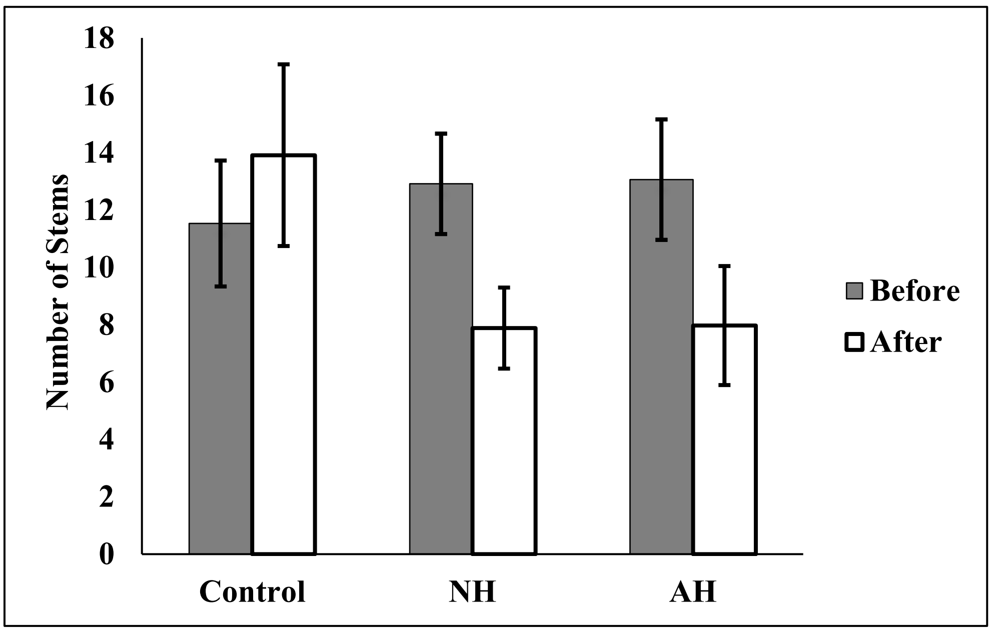

Figure 6.12. Average Number of Non-reproductive Stems. Bars are 95% confidence interval.

Figure 6.13 below displays results relevant to plots containing reproductive structures. Similar to Figures 6.11 and 6.12, NH treatment, after two years, had recovered to about 60 percent of the before treatment level due to the fact that these stems were retained in the NH sample. It indicates that the number of reproductive stems in the Nisqually treatment was lower than control after treatment ($p=0.0821$) due to the fact that these stems were retained in the traditional Nisqually harvest technique. However, the large error bars suggest that the change is not statistically significant. The AH technique reduced reproductive stems to zero, a statistically significant result indicating that new stems require more than two years growth to produce reproductive structures. Probably due to slow growth rate, new growth observed in the NH and AH treatments did not produce reproductive structures within the study's time frame.

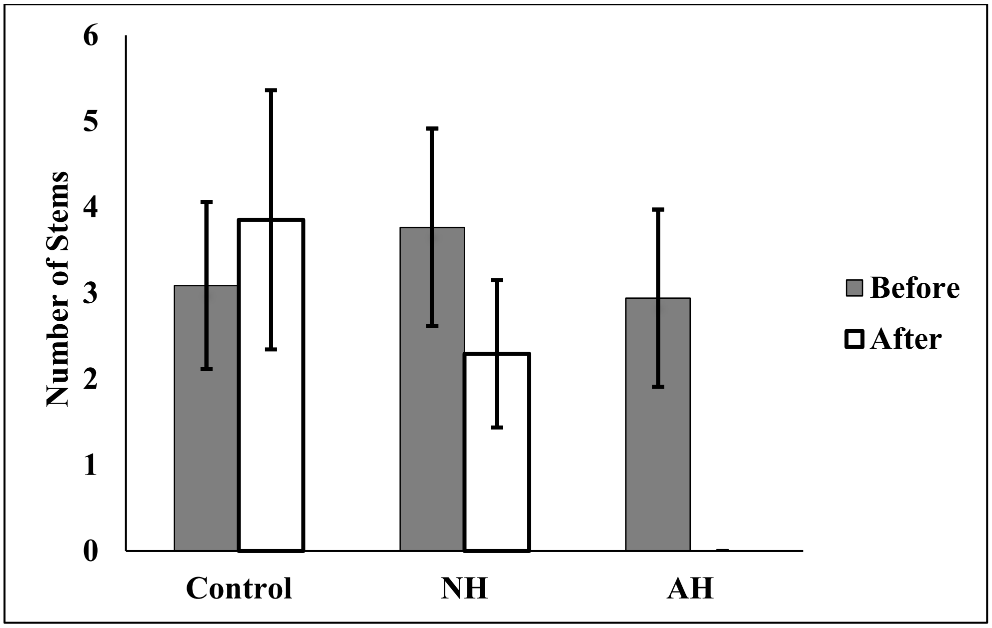

Figure 6.13. Average Number of Stems with Reproductive Structures.
Bars are 95% confidence interval.

Pipsissewa Experimental Harvest Summary

Pipsissewa, in this experiment, demonstrated a capacity to regrow following loss of above ground biomass, albeit slowly. On average, the change in the number of stems in the control plot exhibited a non-significant increase of 3.15 stems. This pattern seems to indicate that seed germination is not driving the production of new stems. Instead, replacements appear to be primarily shoots growing from rhizomes. The relative absence of stems with reproductive structures in all-harvest treatments shows that *more than two years* of growth are required before the new stems begin to produce flowers. The traditional Nisqually approach to pipsissewa gathering tends to minimize damage in the harvesting process by 1) recognizing the slow growth and flowering rate by avoiding plants with visible reproductive stems; 2) preserving subsurface rhizomes; and 3) reserving a minimum of non-reproductive structures to retain photosynthetic capacity sufficient to allow sexual and rhizome-based reproduction to occur over a longer period of time. While harvest using the traditional Nisqually technique of retaining plants with reproductive structures and/or at least three non-reproductive stems will facilitate regeneration of above ground biomass, stem and leaf regeneration is a multi-year process requiring an extended fallow period following harvest at that level.

Discussion

From 2010 through 2012, three metrics were used to evaluate the effects of pipsissewa harvest on plant abundance: frequency of all species in the sampling units, stem density, and percent ground cover. Frequency of pipsissewa and other species was used to evaluate effects of pipsissewa harvesting on community structure. An experiment was implemented to measure the response of pipsissewa to harvest pressure. The metrics used were above ground biomass and stem density. Results suggest that traditional Nisqually pipsissewa gathering techniques will allow for regrowth of plant biomass given a sufficient fallow period following harvest.

We believe that several factors imbedded in traditional Nisqually harvest techniques contribute to this outcome. Perhaps most important among these is the practice of breaking off stems at the plant base rather than pulling from the ground, thereby minimizing damage to the plants' underground structures. Beyond this, there appear to be two additional variables that serve to protect plant viability –harvesters avoid stems with reproductive structures (flowers or seed heads); and, in any collection scenario, at least three stems are left intact within a clustered collection patch.

Based on Hooper's observations of traditional tribal gathering practices in the Longmire pipsissewa stand at Mount Rainier National Park, gatherers invariably collected the amount needed *without reducing the patch* to only three stems and/or the reproductive stems. Here, pipsissewa harvesting did not significantly change pipsissewa abundance over the observed harvest years. This result suggests that either the observed harvest pressure was so low that the impact of harvesting was not detectable with the measurements used, and/or the traditional Indigenous approach to harvesting served to maintain the population structure. We suggest that a combination of the two is the case given the fact that 1) tribal pipsissewa harvest never approached the maximum level used in the 2010 to 2012 study discussed above, and 2) gatherers routinely used traditional techniques serving to sustain the pipsissewa subsurface rhizome structure.

Harvest Pressure

In 2011, Nisqually harvesters collected about 1170g of dried pipsissewa above ground biomass. The average stem, without reproductive structures, was 0.702g. Dividing the average weight of the harvested material by the weight of a stem, it follows that the Nisqually harvested about 1,667 stems in a harvesting area of 600 square meters. The average number of stems per meter was 28, which is about 16,826 stems in the harvesting plot. Accordingly, the 1,667 stems harvested in 2011 constituted roughly 10 percent of the total number of pipsissewa stems available within the study area.

It is more difficult to estimate the amount of biomass collected in 2010 because the gatherers used larger plastic grocery bags instead of uniform gallon-size Ziploc bags. Even so, our observations suggest that the total amount collected was roughly comparable. Accordingly, approximately 20 percent of pipsissewa stems were removed from the harvested plot area over the two-year period. If pipsissewa did not compensate for the loss of biomass in consecutive years, then there should have been an observable, and increasingly large, reduction in abundance. Field observations suggest that stem density remained constant over the study period.

This conclusion is supported by results of the experimental harvest since, at the end of the study, there were, on average, eleven and eight stems in the two harvest treatments. In the experimental harvest, the lack of reproductive structures in the treatment, where all above ground biomass was removed, indicates that pipsissewa stems require more than two years to reach reproductive maturity. In other words, pipsissewa compensates for lost biomass by re-growing the harvested stems and, to some extent, by reseeding the disturbed area; but regeneration following total, or near-total, plant removal requires more than two years to reach the pre-harvest level regardless of collection technique.

Pipsissewa Harvesting and Sexual Reproduction

We believe that Nisqually traditional harvesting guidelines, especially those regarding preservation of subsurface rhizomes, serve to maintain pipsissewa ability to compensate. It also benefits by avoiding the removal of reproductive structures, allowing the area to reseed naturally.

While reseeding is a minor means of pipsissewa reproduction due to low germination rate,[136] at almost 8000 seeds per capsule, and three to five capsules per stem (Johansson et al. 2014), the capacity of the plant to reproduce sexually should not be ignored altogether. At the higher estimate of 18 percent germination rate, about 7,100 seeds could potentially germinate per stem. However, since we did not observe an increase in pipsissewa populations during the present study, it is likely that there either was substantial post-germination mortality or that our observation period was too short to detect new growth. In either case, it is likely that seedling survival rate alone is not sufficient to replace stems harvested by tribal gatherers.

The traditional method of breaking pipsissewa stems at the ground surface (thus keeping subsurface rhizomes intact), coupled with retention of some intact stems, maintains plant viability beyond simply providing a seed source. The practice also enhances seed germination. The low average of 8 percent germination rate reported by Johansson and Eriksson (2013:21) occurred in plots *without* a standing pipsissewa population. The higher germination rate of 18 percent occurred in plots *with* pipsissewa already established in place. It is likely that soil fungi needed to nourish seeds during germination occur in higher abundance in established pipsissewa populations than in pipsissewa-free areas.

Pipsissewa Harvesting and Vegetative Reproduction

The primary method of pipsissewa reproduction takes place through subsurface rhizomes (Ingersoll and Wilson 1990; Tilford 1997:110). Accordingly, an important mechanism underlying the sustainable pipsissewa harvest relates to the traditional practice of keeping rhizomes intact during the harvest process; a practice that enhances the capacity to re-sprout effectively. There is little doubt that rhizome retention made possible by breaking the stems at the surface (rather than simply pulling them from the ground) is of key importance in maintaining stem density.

Beneficial effects of rhizome retention is well documented in a variety of plants. Several studies have observed re-sprouting from rhizomes and other underground plant structures (e.g., Anderson 1999:151, 196-197; Anderson 2005:204-207, 236-237; Shebitz and Crandell 2014:162-169; Turner 2014b). Sweetgrass (*Schoenoplectus pungens*) and tule (*Scirpus acutus*), for example, are rhizomatous species used in basketry throughout their ranges. Harvesting sweetgrass and tule stems leaves rhizomes intact, allowing for future production of these species. Anderson (1999; 2005:236-237) also discusses the harvest and management of woody species such as redbud (*Cercis orbiculata*) used for arrows, basketry, and other items. Coppicing (pruning plants to ground level) helps to retain preferred physical characteristics in the new sprouts, providing more functionally suitable stems per plant. Assuming rhizome maintenance promotes pipsissewa to produce new stems in a similar fashion, new stems should be suitable for renewed harvest in about three to four years.

There may, of course, be significant differences between pipsissewa and other plants that re-sprout from rhizomes. For most other plants, there is a specific time of the year for harvesting (Anderson 2005; Shebitz and Crandell 2014). As an evergreen shrub, however, pipsissewa can photosynthesize whenever conditions are favorable. In principle, then, pipsissewa harvest could occur year-round. Even so, it is possible that harvesting during the prime early summer growing season could reduce the rate of photosynthesis, causing a slower growth rate among harvested plant stands compared to non-harvested stands. Assuming spring harvest is not required for

[136] A study in Sweden, found that only 8 to 18 percent of pipsissewa seeds germinated successfully (Johansson and Eriksson 2013:21). In a greenhouse study, Ingersoll and Wilson (1990:1159) found no germinating pipsissewa in soil samples that came from an Oregon forest.

medicinal purposes, pipsissewa gathering activities should be directed to later in the growing season to enhance plant vigor.

While not undertaken during the present study, testing variation in pipsissewa rhizome regeneration could be accomplished with two common garden experiments. One involves experimental harvest of different plots throughout the year. After about four months, pipsissewa biomass could be compared between control and harvested treatments. The second experiment would be to harvest pipsissewa, then provide fertilizer, water, and light to maximize growing conditions. After a growing season, compare the biomass of the different treatments. Differences in biomass for harvested treatments throughout the year, or under different growing conditions, would indicate how changing abiotic conditions influence pipsissewa capacity to support sustainable harvest. Because of its year-round use and natural history, pipsissewa is a good study species to further our understanding of how environmental variation interacts with the impacts of traditional plant harvest activities.

Traditional Pipsissewa Harvest Methods as Related to Natural Herbivory

Some argue that a plant's ability to tolerate damage is a product of evolutionary interaction between the plant and its herbivores (e.g., Stowe et al. 2000; Strauss and Agrawal 1999). Anderson (2005:299-300) and Turner (2014b:159-161) suggest that Indigenous people may have observed how plants respond to mammalian herbivory and imitated the mammal's behavior when the plant's abundance did not decrease.

While it is possible that pipsissewa capacity to tolerate the loss of biomass due to traditional harvesting is indeed a product of its evolutionary relationship with herbivores, there is no evidence of grazing in the monitoring plots either through direct observation or by grazing damage at Mount Rainier. Furthermore, observed pipsissewa grazing by Columbian Black-Tailed Deer (*Odocoileus hemionus columbianus*) on Vancouver Island indicates that it is minimal and occurs only in February and March (Cowan 1945:122). It is possible that, in other habitats and under different environmental conditions, ungulate herbivory may have been an important selective pressure contributing to a pipsissewa compensation response, but we doubt it. While there may be some connection with herbivory and traditional Indigenous harvest methods, the potential year-round use of the plant suggests that long-term human harvesting may have been of greater ecological importance to pipsissewa than non-human herbivory. If Indigenous people harvested the plant year-round, some patches situated near permanent villages may have provided for use of various harvest approaches; ultimately leading to the development of sustainable harvesting methods such as those employed by the Nisqually, and other, tribal gatherers.

Summary

In this chapter, we have discussed pipsissewa (*Chimaphila umbellata*) growth characteristics, and traditional pipsissewa harvest practices employed by Nisqually tribal gatherers at Mount Rainier National Park. Testing was undertaken jointly by park staff and members of the Nisqually Indian Tribe to determine the effects of traditional pipsissewa gathering practices on pipsissewa abundance. Stem density, frequency, and ground cover percentages were measured in test harvest and unharvested control plots from 2010 through 2012. An experimental harvest was also conducted between 2013 and 2015. In the experimental harvest, above ground biomass and stem density were measured in a manner that contrasted non-harvested control, simulated traditional Nisqually maximum harvest, and all biomass removed plots. All test plots were established in prime, and otherwise undisturbed, established pipsissewa stands in Longmire Campground at Mount Rainier.

Field observations done concurrently with Nisqually gathering activities did not demonstrate significant impact to pipsissewa populations. These results, while suggestive, remain statistically inconclusive in that techniques were structured to detect changes at a higher gathering fraction than the 10 percent observed tribal harvest amount. An experimental harvest done later removed the maximum amount of pipsissewa according to gathering guidelines (see Appendix A), resulting in pipsissewa populations that remained 40 percent below pre-harvest density for two years post-harvest. Accordingly, we recommend that the park, and other agencies, work with the tribal representative to establish harvest guidelines more closely aligned with the lower Nisqually 10 percent harvest fraction. In addition, given pipsissewa slow growth rate, we recommend multiple harvest areas be established to allow rotation to new gathering areas while pervious areas recover over a multi-year fallow period.

The prime element serving to preserve stem density, and hence plant abundance, is the traditional Indigenous practice of pinching off pipsissewa stems at the ground surface, rather than pulling stems directly from the ground. This pinching-off practice minimizes damage to the plant's subsurface rhizome structure, facilitating successful regrowth of harvested stems over a two-to-three-year period. Also important is the fact that traditional techniques preserve a fraction of flowering and/or seed-bearing stems, allowing plants to reseed into the harvested ground. Germination studies suggest that the up to 18 percent germination rate observed in well-established pipsissewa stands, such as those in the Longmire test area, helps plant populations cope with minor rhizome disturbance during collection, and may help to expand established plot boundaries. These observations notwithstanding, it is important to recognize that pipsissewa grows slowly. While stands will recover from gathering using traditional rhizome and seed preserving methods over time, plant stands would benefit from lower than maximum harvest levels –levels comparable those used by Nisqually gatherers in Mount Rainier National Park. We recommend that pipsissewa abundance be carefully monitored in the gathering area(s). In the event plant productivity declines, gathering should be redirected to comparable sites elsewhere until the previous areas recover.

Assuming regular use of *Chimaphila umbellata* extended into the precontact past, it is logical that gatherers would have developed, and socially reinforced, harvesting practices that served to sustain pipsissewa abundance over time. These practices reflect acquired ecological knowledge of the plant's growth characteristics, and accordingly, tend to be those that fall at or below the plant's tolerance range for herbivory damage. These techniques have been passed on as key components of what we now refer to as traditional Indigenous plant gathering practices. It is plausible that, in the Pacific Northwest, the plant's value, widespread distribution, and year-round growth habit created a selective context favoring development of conservative harvest techniques that served to maintain pipsissewa populations near over-winter resident villages, and/or at prime habitat locations where the plant could be collected as needed. We suggest that the current harvesting methods and results reflected in the Nisqually-Mount Rainier study are a continuing reflection of these social responses to past needs to maintain sustainable pipsissewa populations over time.

In the next chapter, we assess the effects of traditional cedar bark collection on tree vigor and reproductive success. As will be seen, we suggest that similar needs to preserve availability of this important resource over the long-term contributed to the development of similarly conservative harvest techniques –techniques that fall within the plant's capacity to tolerate disturbance while maintaining productive growth.

Chapter 7: Traditional Plant Gathering Effects; Cedar

Figure 7.1. A Small Grove of Alaska yellow Cedar at Mount Rainier in 2010.
Greg Burtchard inspects tree at center-right partially bark-peeled two years previously.
(Photo by David Hooper)

Introduction

Taxonomy, and Natural History

Two trees in the Cupressaceae (cypress family) occur within the boundaries of Mount Rainier National Park (Biek 2000:55-57). The higher elevation species of these two is Alaska yellow cedar (*Callitropsis nootkatensis*) shown above. At Mount Rainier, Alaska yellow cedar grows between 3,000 ft and 5,000 ft. Western red cedar (*Thuja plicata*) grows below 3,500 ft (Biek 2000:56-57). Across most of their geographical range, both of these members of the cypress family overlap distribution. Western red cedar's distribution, however, extends eastward into Montana; and Alaska yellow cedar's range reaches further north into Alaska than western red cedar (Pojar and MacKinnon 2013:47).

Both Alaska yellow cedar and western red cedar can grow to be over 50 m in height (Biek 2000:56-57; Pojar and MacKinnon 2013, 47; Pojar and Mackinnon 2014:42-43), though red cedar typically is taller and develops a broader trunk. Life span of both trees can exceed 1,000 years

(Biek 2000:56-57; Mathews 1999:55, 57). Cedar is known for rot resistance, a product of the anti-fungal and anti-insect compounds in the wood. The trees' effectiveness against biological attack contributes to their longevity. At Mount Rainier, Larson and Franklin (2010:71-75) found that both Alaska and western red cedars have low annual mortality rates –between 0.1 and 0.3 percent per year. The major causes of mortality in their study are stem breakage, uprooting, or neighboring trees falling across otherwise unaffected trees (Larson and Franklin 2010:71-75).

Ethnobotany and Archaeology

Western red cedar was of exceptional value to indigenous Pacific Northwest populations in precontact times. Scholars and ethnohistorians have compiled a substantial record of Indigenous use for this versatile tree throughout the region (cf., Burtchard et al. 1993:49). In her book *Cedar: Tree of Life to the Northwest Coast Indians,* Hilary Stewart (1984:26) cites evidence that human use of cedar products extends back over 3,000 years. She notes that nearly every part of the tree had a material or medicinal use. The *wood* was harvested for house planks and posts, storage containers, canoes, ceremonial materials, and religious items. In coastal areas, the *withes*, or thin flexible branches, were made into ropes for whaling and for bindings. The *roots* also were used for binding and basketry. Uses of red cedar *bark* include basketry, clothing, and cordage (Gunther 1973:20-21; Leslie 1992:152-153; Stewart 1984; Turner 1998:70-78). Bark infusions were consumed to help regulate menstruation. An infusion of twigs and bark treated kidney conditions (Gunther 1973:20). Drinking infusions of *boughs* was used to treat colds, coughs, and sore throats (Gunther 1973:20; Turner 2014a:423). Chewing the *buds* served to relive the pain of toothaches.

Alaska yellow cedar wood and bark share many of the same uses as western red cedar (Leslie 1992:153; Turner 1998:67-68). The bark is used in baskets; the wood is carved into spoons, bowls, boxes, paddles, and masks. In its northern range, Alaska yellow cedar was used infrequently for dugout canoes (Turner 1998:67-68). Because of their biological similarities, western red cedar and Alaska yellow cedar are harvested with similar methods.

Historically, methods used for harvesting different parts of these two cedars varied from nation to nation (Mobley and Eldridge 1992; Stewart 1984). Final use of the tree determined, in part, the harvesting technique. When *wood* was the objective for totem poles, canoes, or housing supports and planks; fire and/or adzes were used to bring down entire trees. Some tribes split planks from trees without cutting them down, thus keeping the tree alive (Mobley and Eldridge 1992; Stewart 1984). Wind-blown, dead-fall trees were used preferentially when the wood was not broken beyond utility for the intended purpose. On occasion, flood-washed cedar logs were harvested directly from the rivers (Lewis Squally pers. com.).

Techniques for harvesting cedar bark were generally uniform along the Pacific Northwest Coast, but varied somewhat from precontact to post-contact periods. In their archaeological survey report along northern Oregon's Clackamas River where culturally bark-peeled cedars were common, Burtchard, Werth and Snyder (1993:49-64) offer detailed descriptions of harvest techniques and the distinctive scars left behind. They suggest that, prior to contact and hence prior to general availability of steel tools, soft moist bark typically was loosened below surface contact with the forest floor. Bark, to about one quarter to one third of the tree's diameter, was then pulled up and away from the cambium layer (preferably on the upslope side) until the bark strip tapered off and broke from the tree as high as possible on the trunk. The process created a characteristic "inverted V" shape common to the late historic to protohistoric archaeological record along the Clackamas River, and throughout the Pacific Northwest generally.

As iron and steel tools became more widely available during the historic-period, basal cuts typically were made higher on the trunk with bark separated from cambium and peeled upward and away from the tree in much the same manner as before. On occasion, rectangular slabs were cut from the trees, presumably employing the more effective cutting capacity of steel tools (cf., Mack and Hollenbeck 1985). In Burtchard's experience with maritime Pacific Northwest archaeology, scars on late prehistoric to early historic-period bark-peeled cedar sites rarely exceed circa 40 percent of the trunk diameter and usually less.

Not surprisingly, modern cedar bark-peeling practices essentially duplicate those of the past. The ethnographic record indicates that, during the spring when the sap is running, bark harvesters would select a tree where the bark did not twist around the trunk. They would then make a cut between the ground and waist height and pull upward on the cut bark until it tapered to a point. Some twisting and pulling was required to disconnect the point where the bark was still connected to the tree (Turner 2014a:409). Similar to archaeologically documented peeled cedars, modern techniques also remove bark in a fashion that preserves the basic integrity of the tree (Lepofsky and Lyons 2003; Mobley and Eldridge 1992; Stewart 1984; Burtchard et al. 1993).

Figure 7.2 below shows a rectangular "slab-peeled" scar on a western red cedar in western Montana. Figure 7.l and Figure 7.3 show trees with the "inverted V" scars. While variation in bark harvesting between different groups of people has been little studied, these minor differences probably reflect a combination of social-cultural, functional, and environmental factors.

Figure 7.2. A Culturally Modified Western Red Cedar in Western Montana.
Photo shows where a rectangular piece of bark was removed, possibly for use as a tray or for making a rectangular basket. (Photo in Nicolai 2013)

Figure 7.3. A Bark-peeled Red Cedar Monitored during Mount Rainier Research.
Note the long-tapered scar typical in western Washington. (Photo by David Hooper)

Variation, such as it is, in cedar bark removal styles has been observed in Alaska, western British Columbia, Washington, Oregon and California. Bark slab cedar baskets, perhaps most common in the eastern margin of the plant's range, were made by folding one piece of bark into shape and sewing the sides together. To accommodate this technique, bark was removed in shorter rectangle pieces as shown in Nicolai's (2013:75-140) research of culturally modified trees in western Montana (see Figure 7.2). Notice how this differs from the long tapering strips shown in Figures 7.1 and 7.3. Both types of bark removal appear in the archaeological record, suggesting that both have been employed for an extended period of time.

The scarred area (i.e., the part of the trunk from which the bark was removed regardless of the process used) experiences two different effects –a minor loss of wood through the effects of weathering, and development of a pair of new growth lobes on either side of the scar (British Columbia Archaeology Branch 2001; Turner et al. 2009). Scar lobes are a tree's response to bark harvesting that gradually produces new growth over the scar face, initially creating two vertical ridges along the scar. These are clearly visible in Figure 7.2 above. Given enough time, these lobes may cover the entire scar face; effectively sealing over the original peel.

Current Considerations

Persistence of living bark-peeled cedar trees, even those dating to the late precontact past, attests to the capacity of western red cedar and Alaska yellow cedar to tolerate the bark removal process described here. Even though the visibility of cedar bark scars may negatively influence the public's view of the practice in a National Park setting, there is little evidence that traditional indigenous bark removal described here reduces tree viability or longevity. This issue is of some concern to Mount Rainier National Park since members of the Nisqually tribal community, and others, have expressed interest in collecting cedar bark in the park. In the remainder of this chapter, we address two primary questions concerning bark collection at Mount Rainier: 1) what methods are used by Nisqually tribal harvesters to peel cedar bark; and 2) how does harvesting influence red and Alaska yellow cedar biology? In the discussion section later in the chapter, we also address the relationship between traditional cultural knowledge and cedar biology.

Cedar Bark Harvesting Practices

Ethnographic Methods

David Hooper conducted informant interviews and direct research on the biological effects of traditional cedar bark harvest at Mount Rainier between 2005 and 2012. In four semi-structured interviews, interviewees discussed various aspects of cedar ecology and harvesting practices. In 2007, bark from one Alaska yellow cedar was harvested for basketry purposes. The event allowed us to observe the tools and actions used to peel cedar bark.

Ethnographic Results Describing Cedar Bark Harvesting Practices

The techniques used for harvesting western red cedar and Alaska yellow cedar are the same. Cedar bark generally is harvested in the spring when it is the easiest to separate bark from tree. Nisqually tribal member Jack McCloud (2015), however, suggests that trees at higher elevation can be harvested throughout the summer and into the fall. He suggests that higher, and therefore cooler, elevations are better collecting sites because there are fewer "worms" [bark burrowing insects] in the bark.

Older trees with thick bark typically are not harvested due to peeling difficulty. Younger trees such as those shown in Figure 7.3 are preferred because their size is large enough to supply the desired amount of bark while still thin enough to easily separate from the trunk (Hanford McCloud 2012).

Another factor in selecting a tree is the absence of branches and knotholes near the ground. Branches limit the amount of bark that can be taken because the peel tends to catch or split around them, reducing the amount of usable material that one tree can supply (Hanford McCloud 2012; Jack McCloud 2015). The longer the piece of bark, the easier it is to process it after it has been removed (Hanford McCloud 2012). If the bark twists around the tree's trunk, it is not suitable for peeling because the twisting growth trait increases the chances of girdling the tree.

Preferred trees, then, are those that are tall, relatively young, with no lower branches, and straight growing non-twisting bark.

When possible, trees selected for bark peeling are located on a slope. Hanford McCloud (2012) claims that he prefers to peel the downhill side of the tree. "Uphill is little more like gathering it toward you and bringing it toward you. We have always used the downhill approach, pulling away, going downhill allows for the bark to get away from the tree a little easier" (Hanford McCloud 2012). However, Jack McCloud (2015) prefers peeling the bark in an uphill direction if possible since it allows for the harvest of longer sections of bark. The archaeological record adjacent to northern Oregon's Clackamas River cited earlier (Burtchard et al. 1993) also suggests a predominantly upslope bark removal pattern.

Figure 7.4 shows the tools Hanford McCloud used to peel an Alaska yellow cedar in 2007. The froe is placed at the location of the trunk where the peel is started. An antler billet is then used to hammer the froe and cut the bark. The starting width of the peel is either two hands width or a quarter to one-third of the tree's diameter. The two hands measure is used for larger trees because wider pieces are more challenging to handle. If a person's two hands width is greater than a quarter of the tree's circumference, only a quarter is removed.

Figure 7.4. Cedar Bark Harvesting Tools. Left to right: froe, knife, elk tine, and antler billet. (Photo by David Hooper)

A knife is used to make short vertical cuts upward from the initial froe cut. To start removing the bark from the trunk, an elk tine is inserted in the cuts and used as a wedge. The elk tine is then pushed up the tree separating the bark from the tree's trunk. When the point of contact between the bark and trunk is beyond the harvester's reach, the base of the peel is grasped in both hands and pulled away from the trunk while twisting the bark back and forth; the harvester backing away from the tree as the strip moves upwards. After the peeled bark section tappers to a narrow connection with the trunk, the harvester increases the twisting motion to break the link to the tree.

Once the bark is removed from the tree, a knife is used to separate the outer bark from the inner bark. The outer bark is left on-site. The inner bark is then rolled up in a way that does not cause creases that could break it into shorter pieces. Finally, the recovered section of inner bark is unrolled and allowed to dry. It is then then carefully re-bundled and stored in a dry place for about a year before use. Even though the basic steps taken in removing and storing the bark are relatively straight-forward, the process can be physically demanding during the removal stage and requires concentration throughout to guarantee that the process is completed correctly.

When asked about the tools he uses to peel trees, Jack McCloud (2015) describes traditional tools. "Back then we used like a sharp rock and pounded it through the bark. …to get it started you take anything sharp …, some people would sharpen a horn, something … to get underneath the bark. That is, all you have to do is get it started, then take it by the hand, and start peeling it. And you can peel it, if you are lucky, 50-60 feet… everybody had a different method." His conclusion that "everybody had a different method" suggests that there were no hard rules about the tools used for bark harvesting, but that the basic process was, and remains, consistent in its effect.

Consistency in bark-peeling technique and size of the strip removed is motivated largely by the goal of maintaining tree vigor. "As we were told, take up to a third to a quarter of the bark and it won't kill the tree, and we were taught that. Don't kill the tree and let the tree grow again. It will grow back, some of the bark, not all of it" (Jack McCloud 2015). Joyce McCloud (2007, 2008) and Hanford McCloud (2012) report that they limit the amount of bark peeled to less than 25 percent of tree diameter at the peel's widest point.

In Jack McCloud's quote, there is acknowledgment of the tree's ability to regrow –in this case, referring to a scar lobe growing over the scar face. There also is acknowledgement of the limitations in the tree's ability to heal completely in some cases (i.e., to completely regenerate new bark over the surface of the peel scar). When looking at the peeled Alaska yellow cedar shown in Figure 7.1, Joyce McCloud points out that slow regeneration of new bark over the bark-removed surface is a product of the area's short growing season (David Hooper personal notes). Therefore, while higher elevation Alaska yellow cedar trees generally do not suffer mortality from the bark-harvesting process, there may be an impact on growth performance.

Biology of Western Red Cedar Bark Harvesting

Traditional methods of harvesting described above do not kill bark-harvested cedar trees. This does not dismiss, however, the possibility that peeled trees are affected negatively by increased exposure to attack by insects and diseases, and/or by loss of phloem transport which moves the products of photosynthesis throughout the tree. The loss of photosynthates may reduce secondary growth rate, which is the rate at which the tree increases its girth. To develop a better understanding of the effect of traditional cedar bark removal on secondary growth rate, we monitored girth changes to a cluster of bark-peeled and control western red cedar trees in Mount Rainier National Park from 2011 through 2013.

The monitoring effort involved repeated trunk measurements of diameter at breast height (DBH) of peeled and nearby unpeeled control trees over several growing seasons. Our intent was to determine the extent to which secondary growth was reduced, or enhanced, by partial bark removal relative to immediately adjacent non-harvested trees. To develop a more complete context of how bark peeling affects secondary growth, Hooper also measured the widths of tree rings before peeling occurred and compared them with post-peel growth ring patterns. These procedures are discussed below.

Methods Used to Measure Secondary Growth Rates

Measuring Variation in Trunk Diameter

To measure changing trunk diameter, Hooper attached dendrometer bands (see Cattelino et al. 1986; Keeland and Young 2007) to peeled and nearby control cedars at DBH as noted above. Each dendrometer band was a ¾ inch wide stainless-steel tape wrapped around the tree so that the ends overlap. A collar placed around the overlap allowed the ends to slide past one another. The band was held together with a light stainless-steel spring. At the beginning of the study, a mark was placed next to the collar. As the tree increased in girth, the spring allowed the band to expand, pulling the mark away from the collar. By measuring the distance of the mark from the collar at known intervals, he was able to document growth rates.

The study was conducted in a cedar grove on the Tahoma Creek floodplain at about 2,000 ft elevation; an area in which eight anonymously peeled western red cedar trees were discovered in 2008 (see Figure 7.3). While the identity of the harvester(s) remains unknown, the peeling style was consistent with traditional methods described above. Comparable to the tree shown in Figure 7.3, the length of the horizontal cuts used to begin bark removal in all eight trees were well below the 25 percent of tree circumference limit common to traditional Nisqually techniques. Indeed, of the eight bark-peeled cedars in the grove, the average length of the horizonal cut to tree circumference was less than 14 percent (standard deviation 4 percent). Among these, there appears to be a positive, if non-significant, relationship between tree diameter at breast height and percent of circumference removed as indicated in Figure 7.5 –in essence, the smaller the tree, the shorter the cut.

In 2011, the eight bark-peeled trees were paired with eight neighboring non-peeled control trees of similar size (Figure 7.6). Uniform habitat conditions across the floodplain setting (e.g., solar exposure, sediment structure, moisture, etc.) assured comparably uniform growing conditions for both bark-peeled and control cedars throughout the grove. Dendrobands were installed on the sixteen paired control and peeled trees on July 29, 2011. Using these bands, Hooper recorded 20 measurements over three growing seasons with the last being 839 days after instillation of dendrometer bands.

Growth rates were calculated in mm/day by dividing the distance between the collar and initial mark by the number of days since the bands were installed. This calculation provides a rate of daily change in circumference. The product of dividing this change by π is the daily increase of the tree's diameter. A repeat-measure analysis of variance (ANOVA) statistic was used to test for differences in secondary growth rates between peeled and unpeeled trees (Elzinga et al. 1998:245-246).

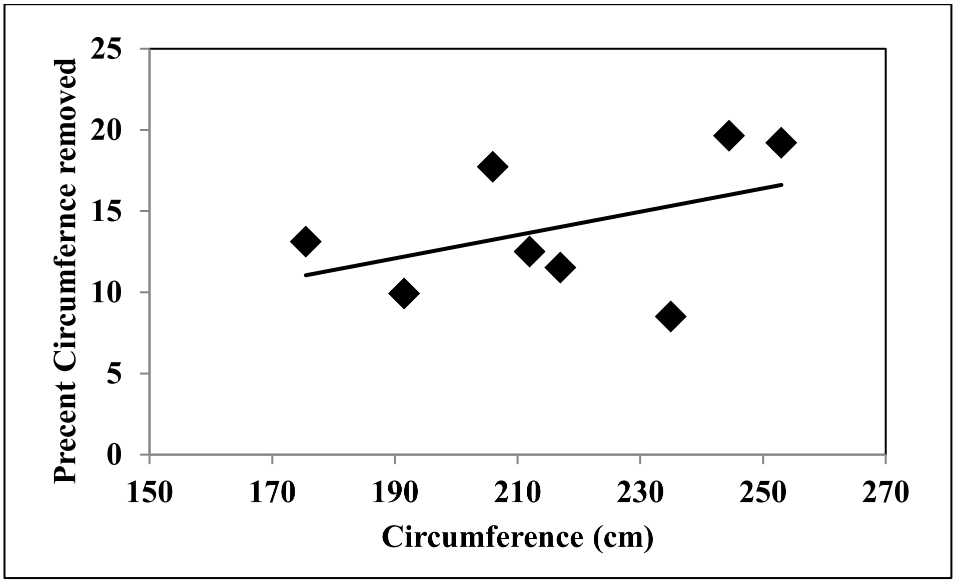

Figure 7.5. Percent Circumference of Bark Removed to Circumference at Breast Height.

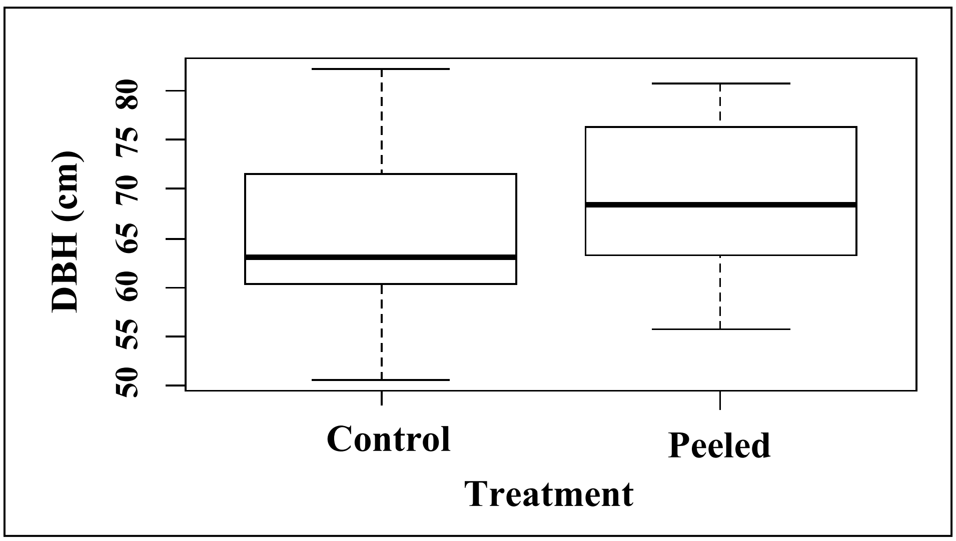

Figure 7.6. DBH of 16 Western Red Cedars Used in this Study. The two treatments have similar diameters with control trees skewed toward slightly smaller size.

Measuring Growth Ring Variation

Measuring pre and post-bark removal growth rings also was used to examine the effect of bark peeling on secondary growth vigor. In 2012, an increment core borer was used to remove growth ring core samples; one from each of the 16 trees examined in the dendrometer band study – both control and bark-peeled. Cores taken from the eight bark-peeled cedars were extracted opposite the scar, beyond the scar lobe. The cores were then mounted on wooden boards, dried, sanded, and width of the growth rings measured (Clark et al. 2007:1944; Ewel and Parendes 1984:40). Since bark removal occurred in 2008, the average ring widths from 2005 to 2007 were used to calculate the pre-peel growth rate. Measurements from 2009 through 2011 were used to measure post bark-peeling effects. Analysis of variance statistics were used to search for variation between the treatments (Elzinga et al. 1998:256). If the pre-peeled growth rates varied significantly from post-peeled growth rates, then harvesting may have affected new wood production. This inference would be especially strong if the growth rates of the non-peeled trees did not vary, and/or if there were changes in the control suggesting that other factors were driving secondary growth rates.

Effects of Cedar Bark Removal on Secondary Growth

The dendrometer band study was conducted over an 839-day period from 2011 through 2013. As shown in Figure 7.7 below, comparison of the mean growth between control and peeled trees indicates that the two groups are parallel with slightly greater secondary growth for the bark-peeled trees; a pattern unrelated to scar formation along the cuts on the bark-peeled trees or size variation between peeled and control trees. Similarity in the patterns suggests that short-term climate variation drives growth in both control and peeled trees.

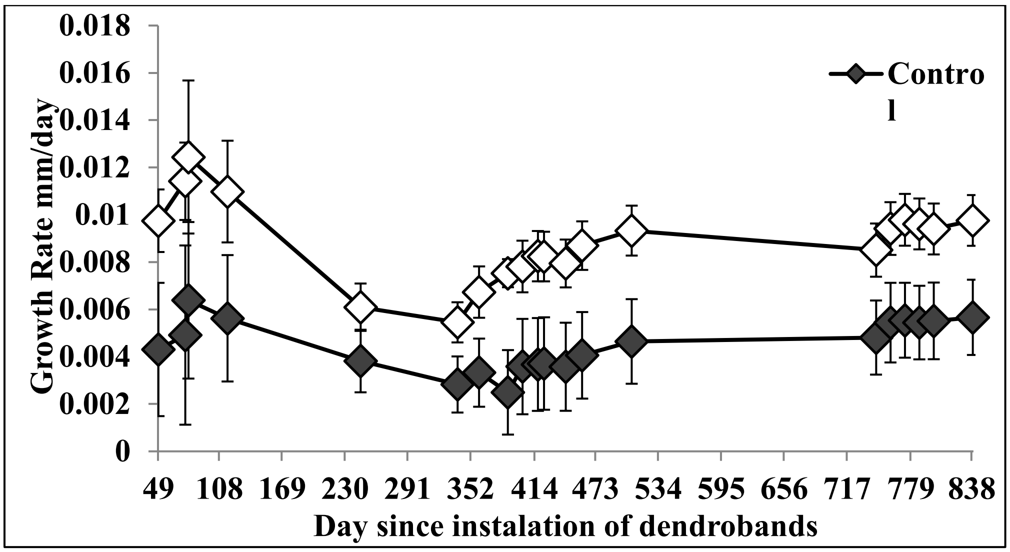

Figure 7.7. Secondary Growth Rate Variation based on Dendrometer Band Measurements. Measurements taken September 1, 2011 to December 3, 2012. Error bars are standard error.

Dendroband results shown in Figure 7.7 begin with day 49 to minimize the effect of band settling that follows initial installation (cf., Cattelino et al. 1986). Beginning at day 49, the mean increase in diameter per day shows clearly that peeled trees increased girth at a somewhat faster rate (0.0089 mm/day, SD=0.0057) than the control trees (mean=0.0045 mm/day, SD=0.0037). Analysis of variance results confirm the difference between treatments (F=65.233, df=1, p<0.00). However, there was no significant change in either control or peeled trees' growth rate over the measurement period (F=0.032, df=1 p=0.859). Nor was there interaction between time and treatment (F=0.634, df=1, p=0.426). These results suggest that, while there is a difference in girth between peeled and control trees, the overall growth pattern was comparable for both throughout the study period.

Superficially, dendroband results suggest that the peeled trees grew faster than the control group, arguably as a response to the peeling event itself. However, since the study was established three years *after* harvest, *increment core growth ring data* provide a more complete alternative means to establish pre- and post-event growth rates closer to the peeling event. Increment core data also provide a means to evaluate growth patterns over a longer time period. If the bark peeling event induced an increase in growth rate as suggested by the dendroband data, then the width of the annual tree rings of peeled trees should be greater than the control trees in the years following bark removal; and the pre-peel rings should show no difference between treatments.

Comparison of growth ring data, however, suggests that bark-peeling had *no appreciable effect on growth* rate at all. Rather, measurements indicate that trees selected for peeling already were growing at a somewhat faster rate than the control trees before the 2008 harvest event (Figure 7.8). Apparently undisturbed by the peeling process, these trees continued to grow at a faster rate (F=11.455 df1 p=0.0013) thereafter. We believe that this unexpected result is a product of either 1) small sample size and/or simple chance that harvesters selected faster growing trees for peeling; or 2) that some characteristic associated with faster growth makes some trees better candidates for peeling than others. In any case, the most salient point to be taken is that combined dendroband and increment core data indicate that peeling western red cedar in the traditional manner employed here has no significant effect on the secondary growth rate so long as trees are not peeled a second time prior to regrowth sufficient to facilitate bark removal below the 25 to 33 percent tree circumference limit.

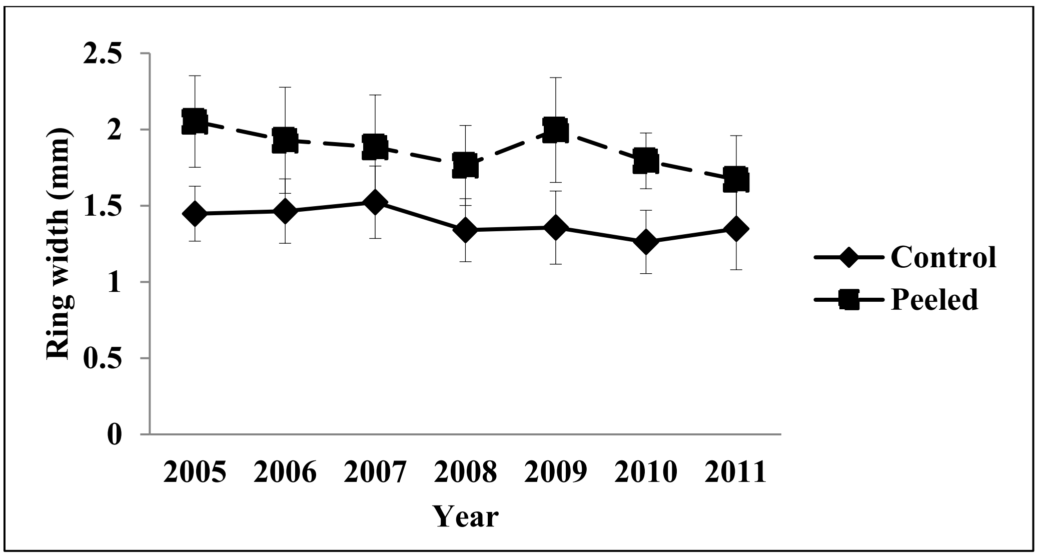

Figure 7.8. Average Tree Ring Width per Year. Peeled in 2008, the analysis used 2005 to 2007 as pre-peel, and 2009 to 2011 as post peel years. Error bars are standard error.

Discussion

The traditional method used by Nisqually tribal cedar bark harvesters begins with a horizontal incision about one meter above the ground. The width of the incision is approximately two hands width apart, or if the tree is small, a quarter to a third of the tree's circumference. Two vertical incisions are then made on each side of the horizontal cut. By peeling the bark strip away from the trunk, the harvester creates a long upward tapering scar. Based on measurements of daily and yearly growth rates discussed above, we conclude that bark harvesting in this fashion does not reduce secondary growth rates of the bark-peeled cedars. These traditional methods for cedar harvest reflect the intended use of the bark, coupled with a desire to maintain long-term tree vigor by limiting damage within trees' biological tolerance limits for continued successful growth.

Use of Bark Determines How it is Harvested

The intended uses of cedar bark are significant factors in determining the manner in which bark is removed. In Montana and western Oregon, a common basket type was made by folding western red cedar bark. Most cedars peeled for this purpose exhibit a square scar (Bergland 1992; Nicolai 2013). Nisqually harvesters represented in the present study, however, used cedar bark primarily for plaited weaving in which bark strips are used as warps and wefts. In this case, removing elongated bark sections was best suited for making warps and wefts of varying lengths and widths that met the weavers' goals.

Traditional Indigenous Bark Harvesting Methods Ensure Tree Survival

A clear goal of the Nisqually cedar bark harvest technique was to remove the bark in a manner that does not girdle the tree; an event that could result in unacceptable tree mortality. Tree survival is an objective commonly expressed by Indigenous people throughout the Pacific Northwest (Turner et al. 2009:250;Turner and Peacock 2005:123). Limiting the amount of bark removed is the most effective method available for maximizing tree survival. This said, several studies suggest that cedar trees are capable of surviving substantial bark loss and multiple peeling events. Mobley and Lewis (2009:262-267), for example, document an Alaska yellow cedar with 75 percent of its bark removed on Ship Island in Alaska. After about 40 years, new growth was harvested a second time from the same tree. Mobley and Lewis suggest that a third of the culturally modified trees on Ship Island have been repeatedly peeled yet continue to grow successfully. Accordingly, it is reasonable to suggest that the amount of bark removed via stated Nisqually cultural practices (i.e., ≤ 33 percent of maximum tree diameter at the base of the peel) falls well within the biological tolerance limits for both western red and Alaska yellow cedar.

It is reasonable to ask why Nisqually tribal members impose the one-quarter to one-third tree circumference peeling limit if people can harvest substantially more with infrequent tree mortality. Two factors seem to underlie this practice. First, by peeling no more than two hands width, harvesters have more control over the bark, making an easier task. The second factor relates to the longer-term health and survival of harvested trees. It may be that mortality increases as a function of the circumference percentage of bark loss. If this is the case, by limiting the amount of bark peeled, the Nisqually appear to strike a balance between maximizing the amount of bark collected per tree while minimizing the probability of reducing growth vigor.

The interval between bark harvest events may also affect tree vigor. On Ship Island, the average time between the first peel and subsequence harvests was about 55 years. There is little doubt that extended time intervals between peelings provides another mechanism to ensure that good quality trees are sustained for potential reuse. To understand the manner in which these factors interact, it is useful to understand how bark harvesting affects cedars' defensive traits which, in turn, influence survival and reproduction.

Defensive Traits Effect of Traditional Bark Harvesting Practices

Beyond bark peeling impacts on simple survival, there are additional issues regarding potential effects on growth, reproduction, disease resistance, and rot. Hennon and Turner (2011) reviewed studies on heartwood chemistry, deterioration in dead trees, and damage caused by bears to explain how cedar trees continue to live for centuries after traditional bark peeling events. Cedar has a number of secondary compounds in the heartwood that prevent fungal growth past the exposed sap wood. These compounds are formed in the sapwood adjacent to the damaged area, limiting the growth of fungi and other pathogens at that point.

Heartwood chemicals are a form of *constitutive defense* in which the chemicals are present before damage occurs (Gurevitch et al. 2002:227). The production of fungal growth resistant chemicals in the sapwood, however, is a form of *inducible defense* in which the plant starts to produce, or increases production, of defensive chemicals after experiencing damage. Plant biologists typically assume that there is a tradeoff between growth and defense (Herms and Mattson 1992; Van Zandt 2007). All plants have limited resources that, when expended, can have negative effects on survival and reproduction. If individual plants use resources to produce defenses at the expense of growth or reproduction, and if they are not attacked, then they are likely to have lower fitness overall. On the other hand, if a plant grows too quickly while not producing defenses and experiences herbivory damage, its resulting fitness can be lowered as well. However, if a plant can switch between growth and defense, it may have the ability to use more resources for growth until it is attacked, at which point growth slows down while defenses increase.

The Mount Rainier cedar monitoring data indicate that secondary growth rates did not change after harvest; suggesting that western red cedar trees, in this location, are either not resource limited or do not upregulate production of defensive chemicals. Because the trees are larger and free of lower branches, it is likely that, as stated by Hennon and Turner (2011), they are located on productive soils. While the Nisqually prefer medium-size trees,[137] it is the absence of peel-limiting lower branches that appears to make these trees particularly well suited for their purposes. Trees growing in soil with higher nutrient content, like the floodplain setting, can more effectively reduce bark loss impact by increasing the production of defensive compounds while not reducing growth. That said, the relatively large number, and environmental variability exhibited in archaeologically documented peeled cedar locations (cf., Burtchard et al. 1993) suggest that western red cedar can maintain post-peeling viability under a variety of circumstances so long as they are within the general habitat range of the plant.

Alaska yellow cedar, since it grows at higher elevations with shorter growing seasons and other climatic stressors, may have lessened ability to regulate the tradeoff between defense and growth. This may be why the Alaska yellow cedar shown in Figure 7.l changed so little in the two years following its peeling event. However, since this was the *only* known peeled Alaska yellow cedar in the park at the time of the study, we were unable to replicate secondary growth studies in a manner comparable to the western red cedar grove at lower elevation. In the future, such a study would help us better understand how environmental stressors and taxonomic differences influence how each genus responds to traditional bark harvesting activities.

While we may speculate about the relationship between tree selection, nutrient levels, and cedar's ability to mitigate harvest damage, the Mount Rainier data suggest that inducible defenses are not a major component. Since there was no significant change in secondary growth rates after peeling, it is probable that resources needed for producing new defensive compounds were not diverted from the production of wood. Instead, peeled trees probably diverted resources from primary growth, or seed production –a situation that could reduce individual fitness somewhat.

The tradeoff that has the highest cost depends on which environmental factors have the greatest impact on survival and reproduction. If increasing storage or structural integrity (products of secondary growth) have higher benefit than out-competing neighbors for light, then diverting resources from primary growth would be expected. Further studies focusing on how traditional bark harvesting affects primary growth and reproduction in a variety of environments would provide information useful for improving our understanding of the tradeoffs between defense, growth, and reproduction following bark harvesting events.

[137] In the present study, bark-peeled trees measured between ca. 60 to 75 cm DBH.

Herbivory and Bark Harvesting

Unlike pipsissewa and beargrass, direct personal observation of the effects of herbivory may have influenced how harvesting cedar bark developed in the past. Turner (2014b:163) implies that the sustainable harvest of bark for basketry was a product of a past discovery that girdling trees lead to tree mortality, while vertical strips allowed trees to heal –information that was then transmitted to subsequent generations. It is also possible that observations of the impact from bears, and other species, feeding on the inner cambium of different trees contributed to an understanding of bark removal impacts. In a study of black bear (*Ursus americanus*) feeding on the cambium of lodgepole pine (*Pinus contorta*), for example, Barnes and Engeman (1995) found that trees with more than 75 percent damage to their circumference suffered high mortality rates. Below that level, the pines typically survived.

The lodgepole data noted above, and cedar peeling data from Ship Island, Alaska (Mobley and Lewis 2009:262-267) indicate that, under proper conditions, western red cedar can survive up to 75 percent bark loss. Even so, more conservative traditional bark-peeling techniques of less than 33 percent of tree circumference appear to better preserve tree survival over the long-term. Whether or not the more conservative approach is the product of long-term personal observation, it is clear that it has become part of Indigenous traditional ecological knowledge in the Pacific Northwest; knowledge that serves to balance material needs with the need to sustain cedar harvest through time.

Summary

Mount Rainier monitoring results, archaeological data, and extant literature relevant to western red cedar tolerance to partial bark removal suggest strongly that traditional Indigenous bark peeling events, limited to 33 percent or less of tree circumference, have no discernable effect on tree survival or secondary growth rate. We believe that limiting the amount of bark removed in a single event to this level, or less, serves to ease the harvest process, facilitates removal of longer branch-free strips, and minimizes the risk of tree mortality. Ultimately, the primary effect of limiting bark harvest to one, relatively narrow, peel per tree (as is the Nisqually practice) is to keep the tree alive and maximize continuing growth rate.

Western red cedar's ability to tolerate limited damage is related to constitutive defenses. It is less likely that inducible defense chemicals resist biological attack of this kind. As seen with beargrass (Chapter 5) and pipsissewa (Chapter 6), traditional cedar bark harvest techniques fall well within cedar's biological tolerance range to external damage, effectively assuring continuing survival of the plant over the long-term.

In the following chapter, we consider how comparable harvest techniques (i.e., those employing species-specific strategies that help to ensure survival and successful reproduction of harvested plants) may be used to guide non-destructive gathering of a broader suite of traditionally used plants common to Mount Rainier. By so doing, we believe that traditional Indigenous plant gathering activities need not be limited to the three plants studied here but extended to a broader suite of plants in a manner that 1) mimics traditional harvest techniques by recognizing unique growth qualities of individual species, and 2) incorporates that knowledge into harvest techniques that fall within the gathered plants' biological tolerance range of for continued growth and reproductive success.

Chapter 8: Traditional Gathering Practices; Additional Plants and Long-term Sustainability

There were three time-periods during which the natural resources of Mount Rainier were used by the Nisqually Indian people. The first was the traditional period …before the Medicine Creek Treaty …[when] the people who lived in the Nisqually River watershed roamed the foothills of the mountain to hunt deer and to gather berries and basket material.

The second period began after the Indian war of 1855-56 when the Nisqually Indian Reservation was established… During this period the mountain natural resources were used by the remnant of Squaitz village [near Bear Prairie south of the mountain], by Indian Henry and his followers and by many of the older families who now lived on the reservation.

The third period encompasses the last sixty years after …the residents of the upper village had moved away or died and Indian Henry's settlement had become but a memory… The main user group became the Indian people who lived on or near the Nisqually Reservation, who made their yearly trek to the mountain to pick the blue huckleberries and to gather the herbal plants. Occasionally a young person traveled mountainward to find an isolated place for his vision quest. – Cecelia Svinth Carpenter, Squalli-absch, 1994.[138]

Mount Rainier's archaeological record indicates that Indigenous people began using mountain resources at least 9,500 years ago; returning routinely for a variety of purposes centered largely on hunting and gathering food, fiber, and material resources of value to them. That use continued into the historic-period and on to the present as documented by a number of historical accounts, ethnographies, park records, and personal experiences. Clearly, the range of plants and plant materials collected from the mountain and its surrounding terrain through time extends well beyond the three plant types discussed in the preceding chapters. Indeed, Turner et al. (2011) list 102 ethnobotanically important Pacific Northwest montane plants. These plants grow in a variety of montane life zones, many in subalpine habitats. It is reasonable to assume that most of these plants, as well as others, were available throughout the thousands of years that people hunted and gathered on Takhóma's slopes. Eleven plants were included in the original 1998 Nisqually-Mount Rainier MOU that reestablished a modicum of plant gathering activities on the mountain (Appendix A).

Among the plants included in the MOU, beargrass, pipsissewa, and cedar were the primary focus of the present field study because they 1) were the species most sought by current Nisqually tribal gatherers; 2) were a number manageable for intensive study; and 3) offered insight into how traditional gathering practices operated within the plants' biological parameters to maximize probability of survival and reproductive success over time. In this chapter, we investigate further the concept of *traditional ecological knowledge* and how it applies to traditional plant gathering activities today. We also apply the basic *gather within biological tolerance range* principle, common to the three plant types studied here, to a broader subset of plants to build recommendations by which these traditionally used plants might be gathered safely. Finally, we consider research options to further improve our understanding of how traditional plant gathering practices might be managed in a manner that enhances long-term sustainability.

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[138] Citation from *Where the Waters Begin; The Traditional Nisqually Indian History of Mount Rainier* (Carpenter 1994:76).

Traditional Ecological Knowledge and Present Traditional Gathering

In essence, traditional ecological knowledge (TEK) is a cumulative body of knowledge, practices, and beliefs concerning the relationships between living beings with one another and their environment (Berkes et al. 2000; Berkes 1999). Since TEK is a body of social and environmental knowledge passed on through generations, it incorporates evolving processes by which human populations adjust socially accepted behavioral patterns to fit critical environmental parameters in which they live, reproduce, and carry on through time.

Resource distribution patterns tend to be uneven across space and variable through time. Changes in the balance between availability of resources critical to human population maintenance at a given point in time, and population density dependent upon them, creates selective pressure favoring development of strategies that conserve those resources. Harvesting in a sustainable manner enhances the probability of maintaining a functional resource balance and tends to conserve energy by shortening resource search time. Sustainable resource use also helps fill larders. For example, *Camassia quamash* camas bulbs, widely used across the Pacific Northwest, were replanted in the process of digging bulbs (Anderson 2005:302; Lyons and Ritchie 2017:348-349). Even though the primary reason for replanting smaller camas bulbs was to ensure subsequent abundance, the action also acted as insurance against other resource failures. During rare occasions that salmon runs were small, for example, it was possible to turn to camas fields to collect the replanted bulbs, thereby decreasing the impact of temporary food shortage. Traditional ecological knowledge, such as that applied to camas harvest, simply is a product of the human capacity to understand environmental processes, and to apply knowledge gained to manage resources in a manner that increases the chances of surviving and reproducing in spatially limited and temporally variable environments.

During the last 9,500 or so years that people have explored Mount Rainier landscapes and collected Mount Rainier resources, Indigenous communities developed detailed ecological knowledge about them. This helped ensure success in the face of the mountain's variable terrain and habitats, and its periodically severe weather. Over time, ecological knowledge of the place became encoded in socially accepted behavior by interpersonal sharing of experiences. Knowledge that served to sustain collected resources was shared with others and passed on to younger generations. Some was incorporated into stories (cf., Hooper 2015:7-9). Other bits of knowledge was encoded in names, songs, and ceremonies (Nabhan 2000; Turner et al. 2000). Each generation added their experiences to the collective knowledge, providing flexibility over time.[139]

It is important to understand that contact with settlers moving into the Pacific Northwest in the mid to late 1800s significantly impacted Indigenous lifeways; including the store of ecological knowledge held by Indigenous people. One well-regarded estimate holds that in the century after European contact, the native populations in the greater Pacific Northwest region were reduced by more than two thirds (Boyd 1990:146; cf., Chapter 1 this volume). The devastation wrought by European diseases diminished the reserve of traditional ecological knowledge through the death of so many knowledgeable elders. In addition, the treaties of the 1850s separated most surviving tribal members from traditional resource gathering lands, thereby increasing dependence on the

[139] Also see *Why Traditional Resource Gathering Practices Tend to be Conservative* in Chapter 4.

wider market economy. Requiring native children to attend residential Indian schools further diminished TEK by reducing contact with surviving elders.[140]

Despite reduction in traditional knowledge, traditional resources continued to be collected by Indigenous people throughout the historic-period to the present. Some of this traditional knowledge continues to be passed on to the younger generations to this day. Hooper (2015:62) found that learning about plant harvesting still begins with the older generations. Instead of hearing traditional stories from their grandparents, however, it tends to be found in biographies, which now play a primary role in conveying TEK. Additional information is gained by collecting and using plants with other tribal members, as well as with people from outside the local community. By exercising treaty reserved rights on public lands, including Mount Rainier National Park, the Nisqually and other traditionally affiliated tribes gain opportunities to maintain knowledge and refine traditional gathering techniques in the modern world.

Traditionally Gathered Plants and Traditionally Conservative Gathering Options

When the Nisqually Indian Tribe first approached Mount Rainier National Park to restore traditional plant gathering activities lost in the early 20th century, the resulting Memorandum of Understanding included 11 traditionally used plant types intended to begin the restoration process (see Appendix A). Tribal negotiators were aware that the list did not reflect the total range of medicinal, food, fiber, and other plants used in their precontact and historical past; but felt that it was an effective means to begin the process while the tribe and park worked to refine gathering and habitat protection procedures. In practice, Tribal gatherers availing themselves of the Nisqually-Mount Rainier MOU focused primarily on a subset from the larger list. This, of course, was beargrass (*Xerophyllum tenax*), pipsissewa (*Chimaphila umbellata*), and cedar (*Thuja plicata* and *Callitropsis nootkatensis*) discussed in previous chapters.

Through studying gathering methods and environmental effects jointly with tribal gatherers, we were able to determine that gathering procedures used were 1) based in traditional ecological knowledge developed and passed down during the precontact to early post-contact past; and 2) tailored to unique biological characteristics of each plant type in a manner that tends to conserve plant and habitat viability. Indeed, results discussed in Chapters 5 through 7 indicate that, when collected in the manner and quantities described, traditional gathering practices can serve to minimize damage to plant populations and associated habitats within biological tolerance limits for continued reproductive success.

Applying the common denominator bridging the three studied plant types (i.e., gathering procedures and quantities that limit plant impact below the tolerance range for reproductive success) allows us to evaluate the effects of comparable procedures applied to a wider range of plant types. In this chapter, we review ethnographic and botanical literature to consider how plants might be gathered in a manner that recognizes traditionally conservative Indigenous techniques by preserving plant viability and associated habitat structure. We focus on plants included in the Nisqually-Mount Rainier plant gathering MOU and several known to have been gathered traditionally at Mount Rainier or the surrounding area. Our intent is to demonstrate how understanding gained during the present study might be applied to address a broader range of traditionally used plants without betraying plant gathering information some Indigenous people may consider confidential.

[140] These processes were not limited to the Pacific Northwest, of course. Ohmagari and Berkes (1997), for example, found that similar factors were responsible for Western James Bay Cree women learning fewer traditional skills.

Table 8.1 includes the broader list of plants evaluated here. Most are drawn from the original Nisqually-Mount Rainier MOU. For each plant type, we offer recommendations regarding feasibility for gathering in a National Park setting; and where needed, for research and monitoring procedures to further improve our understanding of potential ecological impacts of traditional plant gathering activities. Please note, that while we focus on plants indigenous to Mount Rainier or the surrounding area, the list need not be limited to the examples given, or even to the mountain itself. Comparable procedures could be implemented elsewhere so long as they are tailored to meet the environmental characteristics of the region and the biological requirements of the plants in question.

Table 8.1. Traditionally Gathered Plant Species Discussed Here.

Scientific Name	Common Name
Adiantum aleuticum	northern maidenhair fern*
Amelanchier alnifolia	western serviceberry†
Fragaria vesca & F. virginiana	strawberry*
Oplopanax horridus	devil's club*
Lilium columbianum	Columbia lily†
Picea sitchensis	Sitka spruce*
Pinus monticola	western white pine*
Frangula purshiana	Cascara*
Rubus spp.	raspberry, thimbleberry, salmonberry and blackberry*
Sambucus cerulea & S. racemosa	blue and red elderberry†
Taxus brevifolia	Pacific yew*
Vaccinium spp.	blueberries and huckleberries*
Viburnum edule	highbush cranberry*
Ligusticum canbyi & *L. grayi*	lovage†
Gaultheria shallon	salal†

* Included in the Nisqually-Mount Rainier MOU. † Observed & commonly known gathered plants.

Northern Maidenhair Fern (Adiantum aleuticum)

<u>Natural history</u>

Northern maidenhair fern growing on and near Mount Rainier is a member of the Pteridaceae or maidenhair fern family. Northern maidenhair fern occurs throughout temperate forest of North America. Northern maidenhair fern can be found growing throughout the park on wet shaded banks and cliffs, often in cracks of rocks (cf., Biek 2000:40-41). It can be found at elevations as high as 5,000 ft, although generally more abundant below 4,000 ft.

The fronds grow from a subsurface rhizome. The plant has an overall fan shape appearance with leaf blades located on double compound stalks (Pojar and Mackinnon 2014:425). That is, stems (or stipes) branch into two and each of those branches produce multiple leaf blades numbering between 15 to 35 (Hitchcock and Cronquist 2018:55). The sori, clusters of tissue that produce spores, are oblong in shape and occur along the underside of the leaf edges. Those edges curve inward covering the sori.

Figure 8.1. Northern Maidenhair Fern.
(Maidenhair fern images from bing.com/images)

<u>Ethnobotany</u>

The shiny brownish black stipes (often referred to as *stems*) of maidenhair fern are used to imbricate designs into baskets (Gunther 1973:14; Turner 1998:60; 2014a:368). Gunther (1973:14) writes that the Makah, Lummi, and Skokomish soaked the leaves in water and then used the water in their hair. The Quinault burned the leaves and rubbed them in their hair to improve its appearance. The Makah also chewed the leaves to treat sore chests and upset stomachs. Additionally, the leaves were chewed to check internal hemorrhages.

<u>Harvest Ecology</u>

Nisqually gatherers participating in the Mount Rainier-Nisqually plant gathering study were interested primarily in harvesting northern maidenhair fern stems (stipes) for basket decoration (Joyce McCloud 2007). Currently, there is no description of how the species is harvested within its range. Given results from the pipsissewa study (a species which produces stems from subsurface rhizomes), however, it is reasonable to expect traditional harvesting practices to leave the rhizome intact since this would allow maidenhair fern to regenerate its stem-like stipes; especially since the stipes and leaves (see Figure 8.2) are the parts with reported traditional uses.

Maidenhair fern is a deciduous plant. After the above-ground biomass dies, the rhizome produces new shoots the following spring. This type of growth could allow for sustainable harvest if either of two conditions are fulfilled. First, limit the number of stipes (or stems) collected per plant. By leaving some of the above ground biomass intact, the plant should be able to produce and store sufficient energy in the rhizome to generate new stipes over the subsequent growing season(s). The second option is for harvesting to be limited to the fall after the plant has completed that year's growth and reproductive cycle, but before the stipes decay. The second option would not be viable, of course, if the older stipes are not suitable for use.

Figure 8.2. Northern Maidenhair Fern Showing its Black Stipe (often referred to as its *stem* or *stalk*). (Bing.com/images)

<u>Recommendation</u>

Maidenhair fern should be harvested in a manner that protects subsurface rhizomes and retains some leaves to generate energy to support regrowth during the following season as described above. We suggest that harvest quantities should be minimal until a thorough understanding of the desired qualities and preferred harvest times can be gained and documented.

Western Serviceberry (Amelanchier alnifolia)

<u>Natural history</u>

Western serviceberry (also known as Saskatoon serviceberry) is one of several members of Rosaceae (rose family) that produce edible fruit. Its range extends from southern Alaska south into California. Its eastern border extends from Ontario south to Texas (Hitchcock and Cronquist 2018:189). The species is common on Mount Rainier, typically occurring along streams and forest edges (Biek 2000:291). The fruit is consumed by humans and wildlife alike.

Western serviceberry grows as a shrub to small tree, typically ranging between 1 to 5 m in height. The bark is dark gray to reddish in color. The flowers grow in groups of 3 to 20 inch racemes on the ends of branches. The lower flowers develop first and flowers near the branch tips develop last. Each flower is composed of five slender white petals 6 to 23 mm long. The fruits are berry-like pomes, about 1 cm in diameter and covered with a waxy coat (Biek 2000:291; Mathews 1999:79; Pojar and Mackinnon 2014:72).

The main source of western serviceberry regeneration is through vegetative methods, both from resprouting from root crowns and from rhizomes. Layering (rooting of branches after soil contact) can occur. If the above ground biomass is killed, either by fire or by removal, the root crown usually can sprout again (Fryer 1997; Nesom 2006; Pojar and Mackinnon 2014:72).

Figure 8.3. Blooming Western Serviceberry & Fruit
(Photos by Lindsey Wise and Craig Althen)

Ethnobotany

Western serviceberry fruit has long been an important draw to Indigenous people. Fruit consumption was widespread throughout the plants' range, though use by people residing west of the Cascades appears to have been somewhat less than by those residing in drier eastern regions (Gunther 1973:38; Hunn and Selam 1991:178; Turner 2006:111; 2014a:272). Western serviceberry is one of the first fruits to be produced in the summer. People of the Columbia Plateau usually harvest them in late June to early July (Hunn and Selam 1991:128).

The fruit can be consumed either fresh or dried (Hunn and Selam 1991:178; Turner 2006:111; 2014a:300). Individual fruit may be dried similar to a raisin, or by mashing and boiling. The boiled pulp is then spread out to dry into a cake (Turner 2014a:300). Uses for western serviceberry stems include rims for folded baskets, arrow shafts, bows, handles, digging sticks, and other wooden tools (Turner 1998:178; 2014a:341).

Harvest Ecology

The fact that western serviceberry fruits in the early part of the summer, coupled with late snow melt on Mount Rainier, suggests that Indigenous peoples seldom ventured to the mountain for the purpose of gathering this species alone. Rather, the fruit was most probably consumed on the spot in conjunction with more wide-ranging hunting and gathering excursions. In any case, harvesting western serviceberry shoots should produce a similar effect as Anderson (1999; 2005) describes for the management of shrubs by Indigenous people in California (cf., Turner 2014b:196-197). Pruning and coppicing, and burning, induce shrubs to continuously produce shoots that are suitable for arrow shafts, basketry, and other material items. The need to balance maximizing fruit production versus stem growth is a determining factor underlying these management treatments.

Recommendation

Western serviceberry harvest appears to have minimal impact on plant survival. Fruit harvesting effectively has no effect on individual plants, but may decrease reproduction marginally and reduce forage available for wildlife. If requests are made for wood to produce arrows or other traditional items, limited harvesting and periodic rotation to new harvest areas should allow successful regeneration from extant rootstock.

***Strawberry* (*Fragaria* spp.)**

Figure 8.4. Flowering Mountain Strawberry (*Fragaria virginiana*). (Photo by Lindsey Wise)

Natural history

Because of domesticated varieties, strawberries are a well-known food throughout the United States. The genus is in the rose family (Rosaceae) and is found throughout the northern hemisphere. Two species occur throughout much of Mount Rainier National Park: woodland strawberry (*Fragaria vesca* ssp.*californica*), and Virginia, or mountain, strawberry (*F. virginiana* ssp. *glauca*) shown above (Biek 2000:293-294). Within the park, the species range up to 5,000 ft.

Local *Fragaria* spp. share several structural commonalities. The leaves are composed of three leaflets. Flowers have five white petals (Hitchcock and Cronquist 2018:197). Strawberries commonly reproduce vegetatively through stolons (horizontal stems that run along the ground surface, periodically rooting to produce new plants). The other strawberry characteristic is the fact that the red strawberry we commonly think of as its fruit is actually the enlarged base of the flower (receptacle) and the true fruit are achenes (the small hard "seeds" attached to the outside).

Differences in the color of the leaves and the size of the teeth on the leaves are traits used to distinguish the two strawberry species common to Mount Rainier. Mountain strawberry has bluish-green leaves as shown in Figure 8.4. The center tooth of each leaflet is smaller than the teeth next to it, the leaf's upper surface is somewhat waxy, and the under surface is covered in silvery hair. Leaves of the woodland strawberry (Figure 8.5) are yellow-green to medium green, and the central tooth of the leaflets are the same size as the ones adjacent to it. Woodland strawberry flowers are located above its leaves. The mountain strawberry's flowers grow at or below the level of the leaves (Hitchcock and Cronquist 2018:197).

Figure 8.5. Fruiting Woodland Strawberry (*Fragaria vesca*). (Photo by Lindsey Wise)

Ethnobotany

In the Pacific Northwest, harvested strawberry fruit was usually consumed immediately, although some preserved the fruit for future use (Gunther 1973:36; Turner 2006:113). Marian Smith (1940:249) reports that Puyallup and Nisqually tribal members would often mash the fruit before eating. Drying strawberries was dependent on sunlight because excessive heat would cause the fruit to "dry to nothing" (M. Smith 1940:249). The Lower Chinook boil the entire plant. The resulting tea was used to treat diarrhea (Gunther 1973:36). The Cowlitz make a beverage from mountain strawberry.

Harvest Ecology

It took Lepofsky et al. (1985:239) an hour to fill a 250 ml container with mountain strawberry fruit from an 8 by 8 m area with five percent ground cover by the species. The low harvest rate is due to the tendency of berries to grow independently with relatively few berries per plant. Both species prefer forest openings with good sunlight (Mathews 1999:217). To create suitable growth conditions, the Coast Salish and others would, on occasion, clear areas with fire (Turner 2014b:187). Because of strawberry's slow harvest rate and poor storage qualities, it is likely that burning was used to enhance habitat for a wider array of resources that benefit from improved solar exposure rather than simply for strawberries alone.

Recommendation

Because of its vegetative reproduction habit, simple berry harvest is unlikely to harm strawberry productivity. The situation is less clear for harvest of entire plants for medicinal purposes. If local tribes express interest in harvesting leaves or whole plants, we recommend that harvest be limited and effects monitored until regrowth characteristics and other ecological impacts can be evaluated to facilitate more refined harvest guidelines.

Devil's Club (Oplopanax horridus)

Figure 8.6. Devil's Club (*Oplopanax horridus*). (Photo by Lindsey Wise)

Natural history

Devil's club (*Oplopanax horridus*), a member of the Araliaceae (ginseng family), is a common component maritime Pacific Northwest forests. This shrub occurs from Alaska south to Oregon and extends east into Montana and Idaho with populations in Michigan and Ontario (Hitchcock and Cronquist 2018:635). It is associated with mesic forests and stream banks below 3,000 ft (Biek 2000:84). On occasion, devil's club has been observed growing along streams up to 5,000 ft in elevation.

Devil's club can reach 3 m in height. It has large leaves shaped much like maple leaves. The stems and leaf ribs are lined with spines up to 1 cm in length. The white flowers grow together in a dense spike, and it produces red berries (Pojar and Mackinnon 2014:82).

Seed production is not the primary means of reproduction. In a Vancouver Island study, for example, no seedlings were observed at all (Lantz and Antos 2002). In an Oregon study, only two seedlings were observed (Roorbach 1999:54). Layering, however, occurs as vertical steams grow. These stems become top heavy, causing them to bend over until individual stems rest horizontally on the ground. These decumbent stems produce roots. Branches on decumbent stems become new vertical stems (Lantz and Antos 2002:1056). This process of layering is the most common form of reproduction in devil's club (Lantz and Antos 2002:1053; Roorbach 1999:54), with re-sprouting from basal buds being another method of producing clones. In some cases, decumbent stems will rot away, leaving behind two or more live vertical stems (see Figure 8.7).

Figure 8.7. Devils Club Layering. Weight gradually forces vertical stems down (A). Once in contact with the ground, branches (B and C) and roots grow vertically, forming new plants.
(Photo by Lindsey Wise)

Ethnobotany

Throughout the Pacific Northwest, devil's club is used to produce medicines, materials and spiritual items (Gottsefeld 1992; Gunther 1973:41; Turner 1982:28-29). Turner provides a summary of medicinal uses in 18 treatment categories. While uses include treating diabetes, colds, measles, headaches, among others, the most widespread medicinal use is for arthritis and/or rheumatism –the primary interest of Nisqually harvesters. Decoctions made from pieces of stems, roots, or inner bark are drunk; or in some cases used as a wash to relieve the pain of arthritis and rheumatism (Gottsefeld 1992:152; Turner 1982; 2014a:427). In our first interview, Joyce McCloud (2008) talked about harvesting inner bark of the roots to make a tea to treat arthritis. Based on her description, it seems that these "roots" actually were decumbent stems which lose their thorns once covered with soil, making them easier to handle.

Along with inner bark, the 1998 Nisqually-Mount Rainier MOU listed wood, roots, and berries as parts of the plant that the Tribe was interested in gathering. Uses of other parts were not discussed with tribal members. Gunther (1973:41), however, reports that the Green River people steeped the roots and used the decoction for treating colds. In the literature, the use of fruit seems to be limited to the Haida who use them in treating children's hair to control dandruff and lice (Turner 1982:21).

Non-medical uses of devil's club include using the wood to make fish lures, black face-paint, and charms for protection and luck (Gunther 1973:41; Turner 1982). With the intention of not wasting material, the Nisqually will, after the inner bark is removed, carve the root stems into walking sticks for elders suffering from arthritis. By using these walking sticks the elders receive "healing energies" from the plant (Joyce McCloud 2007).

Harvest Ecology

According to Joyce McCloud (2007), devil's club is harvested after producing fruit. Flowering occurs in late spring to midsummer. Four weeks after blooming, fruits are produced and remain on the plant throughout winter (Howard 1993), suggesting that harvesting can occur between midsummer until winter. Usually, harvesters focus on the roots (decumbent stems) to avoid dealing with thorns. At least once, Joyce McCloud (2007) used the bark from vertical stems; scraping off the thorns, then peeling and drying the inner bark.

Depending on how stems are collected, we believe that traditional devil's club harvesting is sustainable. Decumbent stems are often connected to several vertical stems several meters apart (Lantz and Antos 2002; Roorbach 1999). While harvesting decumbent stems may impact one or two stems, it is unlikely to impact all connected stems; allowing the population to recover from a loss of a few individuals.

Devil's club gathering is done by digging around a vertical stem to find and remove decumbent stems (rather than pulling the vertical stem out of the ground); a process that serves to maintain vertical stems, further reducing harvest impact. The minor damage incurred by vertical stems during this process is unlikely to affect survival rate. In a greenhouse experiment investigating how stems reproduce through layering, Roorbach (2002:68) found that 72.5% of the stems survived. Samples with pre-existing roots and shoots averaged a 90 percent survival rate, while stems without other structures had a 40% survival rate (Roorbach 2002:68-69). These rates of root and shoot production in stem pieces 12 cm long indicate that pieces cut from decumbent stems will continue to grow unless harvested in August or September when drier ground may limit production of new roots.

The Halkomelem, among other tribes in the Pacific Norwest, restrict harvest to "daughter" shoots leaving the "mother" shoot intact. These would regrow, and parts of the daughter shoots are replanted (Turner 2014b:189). The Ts'msyen and Haida restrict harvest of stems that are producing flowers or fruit (Turner 2014b:189). In interviews with harvesters from the Nisqually Tribe, there was no discussion regarding limiting types of stems to be harvested, nor whether damaged stems would be replanted as reported by Turner (2014b:189). Even if these management practices were not followed, sustainable harvest of devil's club should occur successfully due to the species' effective method of vegetative reproduction.

Recommendation

To ensure that devil's club harvest produces sustainable outcomes, park staff should document harvesting practices and monitor ecological response. The initial approach to monitoring should be to measure stem density in control and harvested plots, and to continue monitoring for the following two to four years. In the event stem density begins to drop, gathering activities should be redirected to a different location.

Columbia Lily (Lilium columbianum)

Natural history

Columbia lily is one of several members of the Liliaceae family that produce edible bulbs or roots in the Pacific Northwest. This herb occurs on both side of the Cascades in British Columbia south into northern California, and east into Idaho and Nevada. The species grows best in dry meadows, thickets, and conifer forests, in lowland to drier mountains settings (Hitchcock and Cronquist 2018:685). Biek (2000:406) describes Columbia lily's distribution on Mount

Rainier as open woods on dry ground and along park roads. It avoids shady forested settings. Elevation ranges from the park's entrances to about 5,000 ft.

Columbia lily reaches up to 2 m in height (Hitchcock and Cronquist 2018:685). The plant produces one to several blossoms. The six tepals on each blossom are yellow-orange to reddish orange with maroon spots and are strongly recurved. Leaves are narrow and whorled on the lower stems and scattered on the upper stems (Biek 2000:405).

Figure 8.8. Columbia Lily (*Lilium columbianum*) & Bulbs
(Columbia fern image from bing.com/images. Bulb photo by David Hooper)

Ethnobotany

Throughout its range, Columbia lily bulbs traditionally were harvested for food (Anderson 2005; Gunther 1973:25; Hunn 1990:175; Turner 2006:49; 2014a:188). Harvesting can occur in any of the plant's stages of growth. Some groups use stakes to mark plant locations for fall harvest after the above ground biomass has died away. The harvested bulbs generally are consumed after being boiled, steamed, or roasted in earthen ovens (Thoms 2008, 448; Gunther 1973:25; Turner 2006:49; 2014a:271). Indigenous people on Washington's Columbia Plateau east of Mount Rainier used Columbia lilies as a good luck charm by holding the plant's root in their mouth (Hunn 1990:354).

The Skagit Valley Secwepemc and Tsilhqot' of British Columbia burned gathering areas to maintain the size and quality of Columbia lily bulbs (Turner 2014b:188). The Tsilhqot'in would also ritually scatter handfuls of the bulbs after harvest, helping to establish new individuals. Gunther (1973:25) reports that, after harvesting from burned areas, Skagit people would mix the above ground biomass into the soil to help next year's crop. Other methods of managing Columbia lily include transplanting, weeding, and selective harvesting (Turner 2014b:188).

<u>Harvest Ecology</u>

During an interview, Hanford McCloud (2012) said that his family does not harvest Columbia lily because of its low abundance. It is possible, that Columbia lily, like some of its related species, has evolved the capacity to maintain or increase abundance following disturbance, and that Indigenous people used this quality to help maintain a sustainable food source.

Anderson and Rowney (1999; Anderson 2005) argue that blue dicks (*Dichelostemma capitatus*), a smaller member of the lily family with edible bulbs, was harvested by Indigenous Californians in a manner that did not reduce plant abundance. Possible mechanisms were tested in experimental harvests in which limiting the amount of harvested material, along with replanting smaller bulbs, served to maintain numbers comparable to non-harvested controls. To obtain a larger sized plant from these small bulbs, it is possible that tribal people would allow an extra year to enhance grown prior to harvest.

Camas (*Camassia quamash*) is another lily that thrived in seasonally inundated, then desiccated, habitats throughout the Pacific Northwest. Processed in earth ovens, camas could serve as a stored staple resource where stands were particularly abundant and hot-rock processing technology was practical (cf., Thoms 2008). If necessary, camas abundance was managed by seasonal burning, selective harvest, and replanting smaller bulbs coincidental with harvest (Suttles 2005; Turner 2014b:186, 215-216). For the most part, these Indigenous management practices ended because of Euro-American assimilation and curtailment of bulb harvesting and habitat management, and by conversion of camas prairies to intensive grazing land in which camas could not survive in appreciable density (Burtchard personal observation).

Neither blue dicks nor camas grow at Mount Rainier because they require habitat conditions not found on the mountain. They also tend to grow in dense populations while Columbia lily tends to be more sparsely distributed. Accordingly, it is not clear that harvest processing requirements common to either blue dicks or camas apply equally to Columbia lily, although all require digging to remove bulbs from the earth. It is likely that digging effects on individual plants are similar. Hooper (personal observation) attempted to harvest three Columbia lilies outside of the park to photograph the bulbs. The act of harvesting broke apart and spread some of the bulbs (Figure 8.8) through the soil; demonstrating how traditional harvesting methods may have contributed to the establishment of new plants.

<u>Recommendation</u>

Currently, Nisqually tribal gatherers do not collect Columbia lily in the park because of low abundance. Given lack of information that Columbia lily was ever abundant or gathered in the park on a large scale, it does not seem appropriate to recommend artificial management to enhance the populations. Accordingly, to maintain extant populations, we suggest that Columbia lily seeds and bulbs be gathered outside of park boundaries where they may be more readily encountered and gathered with less impact.

***Sitka Spruce* (*Picea sitchensis*)**

Figure 8.9. Sitka Spruce Branch. (Photo by S. McDougall)

Natural history

A member of the Pine family (Pinacea), Sitka spruce is one of two *Picea* species found in Mount Rainier National Park. Generally, its distribution is restricted to land between the Pacific Ocean and lower valleys west of the Cascades, and from Alaska south into northern California (Hitchcock and Cronquist 2018:68; Mathews 1999:37). On Mount Rainier, Sitka spruce generally is limited to the Nisqually, Puyallup, and Carbon River valleys below 2,500 ft (Biek 2000:61); and there, in very low density.

Sitka spruce potentially can be quite large, reaching 80 to 90 m in height and 5 m in diameter (cf., Hitchcock and Cronquist 2018:68). The needles are 1 to 3 cm long with two prominent white stomatal lines on the upper surface. On the lower surface, stomatal lines are reduced or not present (Biek 2000:61-62; Mathews 1999:37; Pojar and Mackinnon 2014:37). Sitka spruce bark is reddish-brown to grey-brown in color and breaks into small scaly pieces. The 5 to 8 cm long cones are brownish in color.

Ethnobotany

In the Nisqually-Mount Rainier gathering MOU, roots are the only part of Sitka spruce listed. Roots are used to produce both twined and coiled baskets (Carpenter 1988:9; Gunther 1973:17; Turner 1998:88; 2014a:342). Gunther limits use of spruce roots for basketry to tribes along the Pacific Coast and implies that use in the Puget Sound region was overshadowed by western red cedar roots. Carpenter, however, suggests that spruce root use was more significant with the Nisqually and other Puget Sound tribes. Some of the baskets made with spruce roots are watertight and used for stone-boiling cooking containers (Gunther 1973:17; Turner 1998:88-89).

Turner notes that the same weaving methods produced hats capable of shedding rain. Gunther adds that roots were also used to sew the corners of bent-cedar boxes together.

Other traditionally used spruce parts include wood, sap, and bark. Uses of spruce wood include blanket pins, wedges, arrows, handles, containers, fish traps, and deadfalls, among other items (Gunther 1973:17; Turner 1998:88; 2014a:340). Warm sap was used to caulk canoes that cracked during production or developed leaks during use (Gunther 1973:17; Haeberlin and Gunther 1930:34). The sap was also consumed throughout the tree's range as a type of chewing gum (Gunther 1973:17; Turner 2006:32-33). Both note that the Makah have been reported to eat young shoots raw. Turner reports that the cambium and phloem layers of inner bark were harvested and scraped in the spring by the Haida, Tsimshian and Alaskan Tlingit to be eaten fresh or dried for winter consumption. There is no evidence of Indigenous people in western Washington eating the inner bark of Sitka spruce.

<u>Harvest Ecology</u>

Turner (2014a:409) notes that Haida and Tlingit harvest Sitka spruce roots. Maximizing the number of suitable roots for basketry requires harvesters to be selective in choosing harvest sites. Sandy areas with well-spaced trees tend to promote long, straight roots. Some sites with an abundance of rocks or closely spaced trees, cause the roots to bend. Once found in appropriate locations, the root is carefully pulled from the ground to maximize the length collected.

The number of roots removed from each spruce is limited to minimize damage to the tree. Once removed, roots are singed in a fire and split into quarters. If the quarters are large enough, they may be split again. The strands are then coiled and allowed to dry until needed (Turner 2014a:409). This harvest method is similar to that for western red cedar roots used for weaving, suggesting that this could be a method used by local gatherers if Sitka root collection is permitted.

Another harvest method is based on western red cedar. Jack McCloud (2015) noted that the method he was taught for gathering cedar roots was to walk along the river looking for trees that had been washed out. Suitable roots would be removed from these with no damage to standing trees. Again, it is likely that this method of harvesting cedar roots could apply to gathering spruce roots under similar circumstances..

<u>Recommendation</u>

If tribal gatherers are able to harvest spruce in a similar manner as cedar roots noted by Mr. McCloud above, harvesting should have little impact on the health of individual trees or populations. However, Sitka spruce is uncommon in the park, occurring only in low areas of the Carbon River floodplain where it is unusually tall for the species. Furthermore, at Mount Rainier, Sitka spruce does not grow in the preferred sandy soils noted by Turner but rather in sphagnum bogs (A. Peterson personal observation). Because of its scarcity and absence of preferred habitat, we recommend that Sitka spruce trees and roots not be harvested in the park except for limited use of erosion felled trees in riverbank context. We urge that, in other cases, trees growing outside the park in preferred sandy soils be used instead.

Western White Pine (Pinus monticola)

<u>Natural history</u>

Western white pine is one of four species of the *Pinus* genus found in Mount Rainier National Park. This pine's northern range is southern British Columbia; extending south to

California, and east to Idaho and Western Montana (Hitchcock and Cronquist 2018:70). Western white pine occurs between 1,700 and 5,000 ft above sea level, though it is most abundant between 3,500 to 4,500 ft (Biek 2000:63).

Reaching heights of 50 m, western white pine is the tallest pine in the park (Biek 2000:63). Needles occur in bundles of five and are four to ten centimeters long. Seed cones are 10 to 25 cm long with a slight curve. Seed cones take up to a year to mature (Griffith 1992). The bark is dark gray, splitting into thin square scales with age (Biek 2000:63; Pojar and Mackinnon 2014:39). Western white pine populations in the park and surrounding forests have been in decline due to white pine blister rust mortality. Blister rust observed within the park, and fungal infections in near-by forests, endanger continued success of extant white pine populations.

Figure 8.10. Western White Pine.
(Western white pine images from bing.com/images)

<u>Ethnobotany</u>

Uses for western white pine bark include baskets and canoes (Turner 1998:92-93; 2014a:342). Turner reports that bark use was more common east of the Cascade Mountains. An infusion made by boiling western white pine bark was used by the Quinault to treat stomach disorders and purify the blood, while the Lummi and Skagit used the same infusion to treat tuberculosis (Gunther 1973:17). Boiled bark was also use by the Skagit to help heal cuts and sores. The sap was chewed as a gum and for coughs by the Hoh and Quileute (Reagan 1934:58).

Western white pine wood was used by the Upper Skagit to make light canoes for river travel though this use was uncommon (Gunther 1973:17). Needles used to sew together cattail or tule mats also were made from western white pine wood (Turner 1998:92-93; 2014a:342).

Writing in Pojar and McKinnon (2014:39) Turner summarizes multiple uses of western white pine as "used as a medicine by the Quinault, Lummi, Skagit, Hoh and Quileute, among other groups. A tea from the bark was drunk for stomach disorders, tuberculosis and rheumatism and to purify the blood, and it was applied externally on cuts and sores. The Kwakwaka'wak[w] used the pitch for stomach aches, coughs and sores. Its gum was chewed to give women fertility… This tree is called 'dancing tree' in Halq'emeylem. The Skagit, and various interior peoples such as the Stl'atl'imx, Secwepemc and Kt'unaxa, used sheets of its bark to make baskets and small canoes… The Sechelt used the pitch for waterproofing and as a cleansing agent."

Harvest Ecology

Harvesting bark from western white pine probably follows similar methods used in harvesting cedar bark described in Chapter 7 where only one-quarter to one-third of the circumference is removed. Since the bark is used medicinally, it is likely that the amount needed would be less than the long cedar bark strips used for weaving, where harvesters try to maximize the length of bark removed from the tree.

Harvesting wood from western white pine for carving could potentially reduce tree viability as the tree does not have a mechanism for vegetative reproduction (Griffith 1992). The maximum diameter of western white pine tends to be about a meter (Pojar and Mackinnon 2014:39). This small size would limit plank harvest from standing trunks in a manner that would maintain tree viability (Mobley and Eldridge 1992; Stewart 1984; Turner 2014b:184).

Recommendation

Inclusion of western white pine on the list of harvestable plants should be reconsidered. Despite documentation of traditional uses, the poor ability of bark-damaged western white pine trees to recover successfully raises concerns about the suitability of harvesting within the park. We recommend that western white pine materials not be gathered in Mount Rainier National Park unless and until populations recover to the point that they can withstand modest harvest without entailing danger to the species' reproductive success and continued presence within park boundaries. Alternatively, cooperative restoration efforts using rust-resistant trees may prove helpful in improving the potential for future harvests and long-term species viability.

Cascara (Frangula purshiana) (formerly Rhamnus purshiana)

Natural history

A member of the buckthorn family (Rhamnaceae), cascara's northern range extends south from British Columbia into California. The outer margin of its eastern range lies in Idaho and western Montana, though it is more common west of the Cascade Mountains in Washington and Oregon. Biek (2000) reports that cascara is rarely seen in the park. Where found, it typically is associated with red alder (*Alnus rubra*) below 3,000 ft.

Cascara can appear as a shrub or small tree reaching a height of 10 m (Hitchcock and Cronquist 2018:218). The flower is small (3 mm) wide, green, and cup shaped. These flowers grow in an umbel formation and produce fruit of black berries.

Ethnobotany

Cascara bark is a well-known laxative used throughout its range (Gunther 1973:40; Turner 2014a:421). The Squaxin made infusions with the bark to cleanse sores. Charcoal made from the bark is mixed with grease and applied to swellings by the Skagit. The Skagit also used bark to produce a green dye for wool. An infusion made from the bark also was used as a general health tonic (Turner 2014a:420). The wood was used to produce tool handles (Turner 1998:218; 2014a:366).

Gunther (1973:40) reports that the Makah would eat ripe cascara berries in July and August. Some Indigenous people believe that the fruit also has laxative qualities (Turner 2006:144). It seems, however, that eating cascara fruit was not a wide-spread practice, probably because the fruit is difficult to collect.

Figure 8.11. Cascara Leaves and Fruit. (Cascara images from bing.com/images)

Harvest Ecology

Some believe that commercial bark harvest for the pharmaceutical market is causing cascara populations to decline (Mathews 1999:73). Turner (2014b:187), however, notes that the techniques used in traditional harvest of cascara bark appear to be sustainable. Mathews writes that the tree dies after bark removal, while the trunk sprouts again if the tree is cut down. Habeck (1992) reports that cascara will re-sprout following both bark stripping and being cut down. The method and timing of harvest may influence why commercial harvesting varies in its impact on the survival of the tree.

At least some Indigenous groups harvested cascara bark by removing vertical strips, a practice that allows the tree to survive (Turner 2014b:187). This harvest method is similar to traditional methods used to harvest cedar bark in a sustainable manner.

Recommendation

Given the rarity of cascara on Mount Rainier and uncertainty of assuring plant viability following bark or wood removal, we recommend that these practices not be undertaken at Mount Rainier National Park unless and until further studies affirm benign effect of these practices. Since the species re-sprouts from rootstock, berry collection should have minimal to no effect on reproductive success. If permitted, berry gathering should retain at least 10 percent of berries on each harvested plant plus regular plant monitoring, rotation to alternative patches for subsequent gathering activities, and additional steps as needed to ensure that berry gathering activities do not affect plant viability.

Raspberry, Thimbleberry, Salmonberry and Blackberry (Rubus* spp.*)

Figure 8.12. Thimbleberry (*Rubus parviflorus)* *(left and right above)* **and Dwarf Bramble (*Rubus lasiococcus*)**
(Images from bing.com/images)

<u>Natural History</u>

Globally, there are about 750 species in the *Rubus* genus (Alice and Campbell 1999:81). Biek (2000:304-308) notes occurrence of nine species from this genus within park boundaries – one species a European introduction (Biek 2000:304-308). Arnie Peterson has observed another introduction (*Rubus bifrons*, Himalayan blackberry) as well. These reflect a wide range of variation in growth forms; including shrubs, vines, and semi-herbaceous plants (Alice and Campbell 1999:81; Biek 2000:304). Common traits linking the genus are flowers with five sepals and five petals. In addition, the fruits occur in an aggregation of drupelets –small single seeds surrounded by a fleshy covering attached to a fleshy receptacle– at the spot on the stem where the flower is attached. With blackberries, aggregations of drupelets and the receptacle remain together when the berries are picked, while raspberries separate from the receptacle when harvested.

<u>Ethnobotany</u>

Indigenous groups gathered red raspberry, blackcap, thimbleberry, salmonberry, and trailing blackberry fruit throughout their respective ranges (Gunther 1973:34-36; Turner 2006:122-124, 126-128). Evergreen blackberries also were adopted after introduction into the area. The smaller dwarf bramble, snow bramble, and five-leaved bramble were likely not a common fruit source. Reagan (1934:62-63) reports that dwarf and snow brambles were commonly gathered by the Hoh and Quileute. The Haida would gather five-leaved bramble fruit, while most other groups in British Columbia did not do so because the fruit was too small (Turner 2006:126). It is likely that these smaller *Rubus* were eaten when found but were not sought out or preserved after harvest.

Most Indigenous groups do not preserve thimbleberries or salmonberries because the moisture content is too high to dry effectively (Gunther 1973:34-35; M. Smith 1940:248); though, in British Columbia, thimbleberries were dried by some people in the past (Turner 2006:124). Historically, the Nisqually dried most berries by placing them on woven cedar bark racks set in sunlight or near fires (M. Smith 1940, 247-248). Blackberries, occasionally mixed with blackcaps, were dried in the same manner, and then mashed, formed into cakes or loaves, and re-dried.

Thimbleberry and salmonberry shoots were important spring greens throughout the Pacific Northwest (Gunther 1973:35; Turner 2006:124,126-127; 2014a:276). Gunther reports that the Klallam ate blackcap shoots. In the spring, before new shoots became lignified, they were harvested and eaten raw or cooked in steam pits.

Table 8.2. *Rubus* Species Occurring in Mount Rainier National Park.

Species	Common Name	Low Elevation	High Elevation
*Rubus bifrons**	Himalayan blackberry		
Rubus idaeus	red raspberry	1,880 ft	3,000 ft
*Rubus laciniatus**	evergreen blackberry	1,880 ft	2,000 ft
Rubus lasiococcus	dwarf bramble		6,000 ft
Rubus leucodermis	blackcap raspberry	1,880 ft	5,000 ft
Rubus nivalis	snow dwarf bramble	2,500 ft	4,000 ft
Rubus parviflorus	thimbleberry	1,880 ft	4,000 ft
Rubus pedatus	strawberry bramble	1,880 ft	5,000 ft
Rubus spectabilis	salmonberry	1,880 ft	5,000 ft
Rubus ursinus	Pacific blackberry	1,880 ft	3,500 ft

* Introduced European species.

Harvest Ecology

The ecological impact of human berry picking is not well known. It is generally assumed that it is not ecologically significant. Several Pacific Northwest tribes would manage plant populations to maximize fruit production (Thornton 2004, 30-31; Turner and Peacock 2005:106, 120-121; Turner 2014b:190). Management activities included periodic burning, weeding, pruning, and, at least with the Huna Tlingits, the use of dog salmon (*Oncorhynchus keta*) eggs as fertilizer (Thornton 2004:30).

While *Rubus* plants are perennial, the canes are biennial. Only the second year-canes produce fruit. Because it takes two years for blackcap and other *Rubus* shoots to produce fruit, it is likely that pruning and setting fires would only be done in blackcap patches after fruit production became low. The value of fire for most *Rubus* species is that it serves to remove other competitive plants and burns up played-out, thorny fruiting stems.

Harvesting salmonberry and thimbleberry shoots as a spring vegetable occurred early in the growing season to allow for production of new stems (Turner and Peacock 2005:120; Turner 2014b:190). This pattern is similar to the partial compensation observed in traditional pipsissewa harvesting described in Chapter 5. Turner's work, however, suggests that thimbleberry and salmonberry compensation is complete (i.e., the harvested plant's fitness is indistinguishable from non-harvested plants). Even so, experimental harvests to measure survival, fruit production, and biomass would help to better understand how well these plants compensate after harvest.

<u>Recommendation</u>

Harvesting *Rubus* spp. *fruit* could be permitted with the understanding that at least 10% of berries present on any affected plant be retained to ensure continuing plant fitness. Requests for harvesting salmonberry or thimbleberry *shoots* could be permitted as part of a research project to study the compensatory response of these plants to gathering.

Blue and Red Elderberry (Sambucus cerulean & S. racemosa)

Figure 8.13. Blue & Red Elderberry
(Sambucus cerulea & S. racemosa)
(Images from bing.com/images)

<u>Natural history</u>

Elderberry species (*Sambucus* ssp.) found in Mount Rainier National Park are members of the adoxa family (Adoxaceae). Blue elderberry occurs throughout western North America from southern British Colombia south into California and eastward into Alberta, through Montana, into Texas (Stevens and Nesom 2003). In Washington, this shrub is most common east of the Cascades (Mathews 1999:79). In the park, blue elderberry is uncommon. Where present, it grows below 3,000 ft in open forests on drier soils (Biek 2000:164).

Red elderberry (*S. racemosa*) is a circumpolar species occurring throughout temperate North America and Eurasia (Gonzalves and Darris 2007). It is reported as being more common on the west side of the Cascade Crest (Mathews 1999:79) where it performs better in wetter habitats, or habitats that have recently experienced disturbance. It is a common plant in the park, growing in wet forests, stream-side settings and roadways below 5,000 ft (Biek 2000:164).

Both species are shrubs, with blue elderberry growing up to eight meters high. Red elderberry is smaller, typically reaching six meters in height. Besides height, there are differences in leaf arrangement, flowers, and fruit. Both have pinnate leaves, though the number of blue elderberry leaflets is typically seven to nine, while red elderberry has five to seven. The difference in flower structure is that red elderberry's inflorescence has a more pyramid shape, while blue elderberry is a flat umbel. The blue berries, often covered with a whitish powder, are typical of blue elderberry. The fruit of red elderberry do not have the whitish powder, and their color can range from red to purplish-black (Hitchcock and Cronquist 2018:627).

Ethnobotany

Throughout the Pacific Northwest, Native peoples consumed the berries of both species (Gunther 1973:47; Turner 1995:67-68). Red elderberry produces fruit between July and August (Turner 1995:68). Blue elderberry produces fruit a few months later (Mathews 1999:76). Even though red elderberry was eaten in large quantities, many people now consider it to be toxic (Mathews 1999:76; Turner 2014a:302). That said, at a late Holocene village on the northern Oregon coast, Losey et al. (2003) estimate finding over 68,000 red elderberry seeds. They conclude that the exceptionally high seed count is the result of separating the more toxic seeds from the fruit. Even so, certain ethnographic sources suggest that the fruit was eaten raw, though cooking was more common for both species (Gunther 1973:47; Turner 1995:67-68; 2014a:302-303) –perhaps because cooking reduced seed toxicity.[141]

Excavations at rockshelter site 45PI0043 in Mount Rainier National Park also discovered red elderberry seeds in archaeological context (Lubinski and Burtchard 2005). Closely associated radiocarbon-dated charcoal at the base of a pit feature in which seeds were found places the age at between 870 and 650 years ago (AD 1180 to 1300), clearly indicating collection and consumption during precontact times.

Ethnographic sources suggest that elderberries were cooked by placing the fruit in steam pits for several hours to overnight. Alternatively, the berries could be boiled in bent-cedar boxes. Marion Smith (1940:248) describes how the Puyallup and Nisqually boiled elderberries then placed them in a basket. Later, the basket would be submerged in water for a month until the berries were a yellow paste to be mixed with other fruit. Cooked berries also were shaped into patties and dried for storage (Gunther 1973:47; Turner 1995:67-68 and 2014a:302-303).

Medicinally, elderberry inner bark, leaves, and roots were used to treat a number of ailments [*be aware that all parts of the plant are toxic*]. Red elderberry leaves were topically applied to abscesses, boils, or joints to reduce swelling, or to treat blood poisoning (Gunther 1973:47). The bark was used by the Cowlitz to reduce swelling. First Nations people in British Columbia made infusions of inner bark and roots to use as a purgative and emetic (Turner 2014b:421). During prolonged deliveries, an infusion of the bark was drunk by the mother to hasten childbirth (Turner 2014b:426, 443). The bark of blue elderberry was made into a tea by the Klallam to treat diarrhea. The Quinault used this tea as an emetic (Gunther 1973:47).

The stems of both species were made into whistles by removing the pith (Gunther 1973:47; Turner 2014a:345).[142] Whistles made from blue elderberry were used by the Quinault for calling elk. Hollowed stems of red elderberry were also used to inflate animal intestines used as food containers.

[141] Please note: **Elderberry plants are reported to be toxic**. People have been sickened from ingesting preparations made from the berries. There is some confusion in the literature about when the plants are safe to eat –e.g., berries of one species are toxic but the other species safe; the flesh of the fruit is safe, but the seeds are toxic; berries toxic when raw but may be safer when cooked. In its on-line source, the National Institutes of Health (https://www.niccih.nih.gov/health/ederberry) state that "*Raw unripe elderberries and other parts of the elder tree, such as the leaves and stem, contain toxic substances (e.g., sambunigrin) that can cause nausea, vomiting, and diarrhea; cooking eliminates this toxin. Large quantities of the toxin may cause serious illness.*" When life and health are on the line, we are not comfortable speculating about what may, or may not, be safe. There is a subtle difference between a food preparation that is safe or toxic so, in evaluating ethnographic statements, do not assume that cited preparations may be safely consumed.
[142] Interestingly, the elderberry genus name derives from the Greek *sambuce*, a wind instrument made by hollowing the stem.

Harvest Ecology

The Nisqually method of harvesting elderberries is to break off clusters of fruit and place them into baskets for transport (M. Smith 1940:248). After returning to camp, or village, the berries are separated from the stems with the use of a fan-shaped comb made out of a cedar branch (M. Smith 1940:277).

Breaking off clusters of fruit appears to be a more common harvest method than picking individual fruit. In a Wisconsin study, Denslow (1987, 1231) found that infructescences (inflorescence after flowers have produced fruit) per red elderberry bush ranged from 4 to 142 for plants growing in a group. Isolated plants had 6 to 144 infructescences per plant. Fruit per infructescences ranged from 51 to 218 berries (Denslow 1987:1231). By breaking off clusters of fruit, gatherers are able to collect larger quantities in a shorter amount of time.

It is not known whether or not this harvest method increases future elderberry fruit production as it seems to do in other plant species (Anderson 2005; Turner 2014b:196). A common assumption is that, by increasing fruit production, there is an increase in reproductive output; resulting in long-term sustainability. Denslow (1987) found that the rate of red elderberry fruit removed by birds was highest with larger crops, a finding in general support of this assumption. The proportion of fruit removed, however, was not correlated with crop size (birds feeding on red elderberry do not focus on larger crops), and increased fruit production may, or may not, result in increased plant population density.

Both red and blue elderberries re-sprout from roots and rhizomes following a fire (Gonzalves and Darris 2007; Fryer 2008). Also, cuttings of roots, rhizomes, or shoots can be used to reestablish elderberries, though success is more common with red than blue varieties (Gonzalves and Darris 2007; Stevens and Nesom 2003). These properties indicate that plants experiencing stem loss should produce new stems successfully. Potential limiting factors to regrowth, however, may include harvesting stems during drier summer months, and harvesting in closed canopy forests. Either a lack of soil moisture or light could inhibit the production of new stems.

Elderberry regrowth from loss of above-ground biomass is a trait seen in several plant species managed by Indigenous people in North America. Pruning and coppicing are methods used on shrubs to increase the number of stems suitable for arrows, baskets, and other items (Anderson 1999; 2005:205, 236-237; Turner 2014b:180, 196-197). There is no documentation, however, of these practices applied to elderberry. Perhaps, the traditional demand for stems is so limited that there simply was no need for these plants to be managed in these ways. Or, more likely, the ethnographic data simply have not been gathered.

Recommendation

The preponderance of available information suggests that harvesting fruit of either elderberry species could be permitted with no significant impact to plant populations. Even so, we recommend that gathering activities and/or effects be monitored periodically to ensure that fruit production and plant recovery remain unharmed. We suggest that, while harvesting is taking place, park and/or tribal monitors record the total number of infructescences per plant, the number harvested per plant, and the number for a set of non-harvested control plants.

Monitors also should determine how clusters of fruit are selected. The number of infructescences per harvested, and non-harvested plant should be recorded for the following three to. Comparing the number produced in the years following harvest between the two treatments five years, along with gathering information as to how infructescences are selected, will help to inform park managers as to how to set gathering limits most effectively, if needed.

Pacific Yew (Taxus brevifolia)

Figure 8.14. Pacific Yew Branch with Female Cones. (Photo by Lindsey Wise)

Natural history

Western, or Pacific, yew is a small tree, sometimes shrubby in appearance, within the Taxaceae, or Yew family. The species occurs throughout northern California into southeast Alaska. Its eastern range extends along the eastern edge of the Rocky Mountains of southern British Columbia, Montana, and Idaho (Hitchcock and Cronquist 2018:73). Pacific yew is an understory tree typically found in forests up to about 4,500 ft. As a slow growing understory tree, yew wood is exceptionally dense. It grows best in shade and tends to be rare in second-growth communities and immature stands. It does not do well in logged areas.[143] Yew is intolerant of fire (Bolsinger and Jaramillo 1998; Tirmenstein 1990), and accordingly is only found in areas with infrequent burns. Given its low tolerance for fire, clear-cuts, and other open early seral stage habitats, Pacific yew populations require continued presence of favorable old-growth (i.e., late seral stage) habitats to thrive.

[143] Former trail-crew member and park trails supervisor Carl Fabiani and his wife Dinni, however, note presence of yew in second and third growth forest on their property northwest of the park, as well as in other second growth stands in the area; Coauthor Arnie Peterson also has seen yew in previously logged areas near park headquarters at Longmire. These observations suggest that yew can reproduce successfully given favorable second-growth circumstances.

Pacific yew is dioecious. Male trees have small pollen producing cones (strobili). Female trees produce a small woody seed surrounded with a fleshy red seed coat, known as an aril, giving the seed a fruit-like appearance. Pacific yew bark is thin, reddish in color and sheds easily. Yew needles are 1 to 2 cm long and lack white stripes seen on many local conifers (Biek 2000:66; Hitchcock and Cronquist 2018:73; Mathews 1999:40; Pojar and Mackinnon 2014:40). On average, trees grow to be 15 meters tall and 30 cm in diameter. Some specimens have reached a height of 25 meters. The stems can grow straight, although it also is common for them to develop a contorted trunk.

Ethnobotany

Yew is strong and resilient. It was, and remains, highly valued for items requiring strength and flexibility (e.g., bows, paddles, woodworking wedges, digging sticks, mat needles, adze handles, and mallets). Other items include snowshoes, bent halibut hooks, dipnet frames, fire tongs and combs (Gunther 1973:16; Turner 1971:72-73; 1973:271; 1998:100-101). For carving, the red heartwood is preferred over white sapwood (Turner 1998:101).[144] Other uses of Pacific yew include lashing branches to a pole of hemlock to collect sea urchins by entangling their spines (Turner 1998:101-102).

The aril, the red fleshy seed coat, was eaten by the Lillooet or Stl'atl'imx, though the seeds themselves are toxic (Turner 1998:183, cf., Turner 1988). Medicinally, Pacific yew leaves were used for cleaning one's body and for treating wounds. At least for the Klallam, water in which yew leaves had been boiled was consumed to relieve lung ailments (Gunther 1973:16) –but note that yew needles and bark are toxic. The Thompson River First Nations peoples, occupying territory near the Thompson and Fraser Rivers (Turner 1998:185), and an unnamed tribe noted by Gunther, would boil the inner bark and use the liquid as a general tonic, or to treat lung conditions.

Taxol, now a prominent chemotherapy drug, originally was discovered in Pacific yew. For several years, its bark was the only source for the drug, raising concern about the tree's capacity to handle this new pressure (Bolsinger and Jaramillo 1998; Mathews 1999:41-42). Eventually, leaves of the related European yew (*Taxus baccata*) began to replace Pacific yew as the primary source for taxol, relieving the pressure of commercial harvesting on Pacific yew.

Harvest Ecology

The type of items made from yew influences the selection of tree-parts for harvest. Snowshoes, fishhooks, needles and other thin items are made from small branches. Larger items such as bows, digging sticks, adze handles, and mallets may require wood from larger branches or the main stem. Turner (2014b:184) notes that *Taxus brevifolia* bark was "removed for medicine from branches or partial harvesting from trunks of living trees; wood cut from standing living trees for bows and other implements; in [a process] called 'begging from' the tree. …" Turner (2014b:194-195) goes on to state that, species (including Pacific yew) whose outer and/or inner bark were required, were only partially harvested so as not to kill the tree. She adds that, since yew has the capacity to regenerate from cut stumps, branches and even trunk sections could be harvested without killing the parent tree, *so long as it is done with care* [emphasis added]."

Tirmenstein (1990) notes that, *beneath a closed forest canopy,* yew can establish by seed or by vegetative means; layering (rooting of branches under soil) often being the primary mode of

[144] The scientific name for yew comes for the Greek word for the tree *taxos*, which is derived from *taxon,* meaning "bow."

reproduction. Multiple individual plants may regenerate when branches and stems come into contact with the soil. Broken stumps can resprout –typically after a tree is flattened by larger falling conifers and debris. We assume that these are the circumstances that Turner refers to when she draws attention to the plant's capacity to regenerate as cited above.

With these constraints in mind, Indigenous people throughout British Columbia and the Pacific Northwest, were able to harvest Pacific yew wood from branches and limited trunk sections, as well as bark from branches or by peeling strips from the trunk so long as the work was carefully done (Turner 2014b:184 and 194-195). Regarding bark harvest, Purohit et al., (2001), in a study of Himalayan yew (*Taxus baccata*), found that a 95 percent survival rate could be maintained if harvested bark strips were limited to a depth not exceeding 0.3 cm, a width of no more than 25 percent of tree circumference, and tree circumference greater than 40 cm –a procedure roughly paralleling traditional cedar bark harvest in the Pacific Northwest. We assume that similar limits to Pacific yew bark harvest would have comparable damage limiting effects.

Recommendation

Given yew bark and branch harvest results noted above, we recommend that permitted *bark harvest* be evaluated on a case-by-case basis and, where approved, be restricted to trees with minimal circumference of 40 cm. Bark peeling should not exceed 25% tree circumference or depth of 0.3 cm. *Branch removal* should be limited to trees greater than 15 cm dbh –roughly half fully mature diameter according to Pojar and MacKinnon (2014:40)– not exceeding three to four branches per tree. Bark and/or branch harvested trees should be monitored during harvest and reinspected for several years following to ensure that the tree's growth pattern is continuing normally. Gathering procedures should be reevaluated periodically based on monitoring results. Given that yew is a very slow growing tree, we suggest that an extended period of time (to be determined by monitoring results) be required prior to consideration for re-harvest.

Figure 8.15. Seasoning Pacific Yew. This piece of western yew was seen at the Nisqually Cultural Center. This piece was planned to be carved into a wood-working tool. The branch is left attached to the stem to be used as handle. (Photo by David Hooper)

Blueberries and Huckleberries (Vaccinium spp.)

Figure 8.16. Cascade bilberry (*Vaccinium deliciosum)* (*upper left*); **Early Blueberry (*Vaccinium ovalifolium*)** (*upper right*); **Red Huckleberry (*Vaccinium parvifolium*)** (*lower left*); **Thinleaf Huckleberry (*Vaccinium membranaceum*)** (*lower right*). (Photos by L. Wise & D. Hooper)

Natural history

The circa 450 species of the *Vaccinium* genus occur throughout temperate and tropical habitats of the Americans, Europe, Asia, and Africa (Kron 2002, 327). Mount Rainier National Park has seven or eight species similar to those shown in Figure 8.16 and listed in Table 8.3.

The genus is comprised of shrubs, some of which are low to the ground and have creeping growth, while others are erect (Hitchcock and Cronquist 2018:409-410). Most of the species occurring in the park are deciduous, though at least one (*V. ovatum*, evergreen huckleberry) is, as the name implies, evergreen (Biek 2000:208). Table 8.3 lists the *Vaccinium* species reported to have been found in Mount Rainier National Park based on Biek's (2000:205-209) descriptions, Allan Smith's (2006:106-123) Mount Rainier ethnography, and the authors' personal observations.

Ethnobotany

It is likely that fruit of all *Vaccinium* species at Mount Rainier was eaten when encountered and/or dried and transported to lowland overwinter villages as described by Mack and McClure (2002) and Mack (2003). Traditionally, fire was used to expand *Vaccinium* habitat (as well as a wider variety of species) by reducing forest cover and enlarging early seral stage meadows.[145] In *Takhoma, Ethnography of Mount Rainier National Park,* Allan Smith (2006:109-110) cites park sources to suggest that three species were major draws to Mount Rainier's subalpine habitats during the historic-period past –Cascade bilberry, thinleaf huckleberry, and oval-leaf blueberry (cf., Blukis Onat 1999:61). The adoption of horse transport in the 18th and 19th centuries substantially enhanced foraging distance and carrying capacity, plausibly increasing the value of the fruit to lowland communities where dried berries could be stored over-winter.

Table 8.3. Known Huckleberry/Blueberry Species on Mount Rainier.

Species	Common Name	Low Elevation	High Elevation
Vaccinium deliciosum	Cascade bilberry, Rainier blueberry, blueleaf huckleberry	5,000 ft	8,000 ft
Vaccinium membranaceum	black, thinleaf, or mountain huckleberry	3,500 ft	5,500 ft
Vaccinium myrtillus	whortleberry, dwarf, or low blueberry	?	?
Vaccinium ovalifolium	oval-leaf, or early blueberry	4,000 ft	5,500 ft
Vaccinium ovatum	evergreen, or California huckleberry	1,880 ft	3,000 ft
Vaccinium parvifolium	red huckleberry	≈3,000 ft	4,000 ft
Vaccinium scoparium	grouseberry	4,000 ft	7,000 ft
Vaccinium uliginosum	bog blueberry, or bog bilberry	?	?

Other uses of *Vaccinium* spp. include production of dyes and medicines. The fruit of several *Vaccinium* species was used to produce purple dyes (Turner 1998:212-213). The Skagit produced a tea from the bark of red huckleberry to treat colds (Gunther 1973:45). The Makah gave an infusion of leaves from several *Vaccinium* species with sugar to mothers following childbirth (Moerman 2006:584-586). The tribes comprising the Flathead Reservation treated heart conditions, arthritis, and rheumatism with teas made from the roots and stems of *V. globulare* (Hart 1996:127) which is synonymous with *V. membranaceum* (Moerman 2006:583-585). The Pomo, and Kashaya use evergreen huckleberry leaves for diabetes. In 2010, Joyce McCloud harvested a small amount of thinleaf huckleberry leaves while gathering beargrass. She said that a tea made from the leaves helped to manage diabetes.

At Mount Rainier and sounding areas, harvesting *Vaccinium* spp. typically took place between August and October (A. Smith 2006:118; Hunn 1995:128-129). Harvest methods included use of a wooden comb and simple hand picking (Hunn 1995:178; Hobby and Keefer 2010:56). While harvesting thinleaf huckleberry leaves, Joyce McCloud explained that she uses the same approach for collecting huckleberry fruit. With a rolling motion of index finger and thumb, she gently strips the leaves, or fruit, as she moves along a stem. This method allows collection at a quicker pace than picking individual berries alone (Hooper personal notes).

If the harvested fruit was not consumed fresh, huckleberry fruits were traditionally dried for later use (Hart 1996:127; Hunn 1995:179; Mack and McClure 2002; Mack 2003; Turner 2014a:97-8, 300). Individual berries and patties made from mashed berries were dried by being

[145] See the *Forest Modification by Fire* section in Chapter 3 for a more thorough consideration of Indigenous use of fire to improve plant and animal productivity at Mount Rainier and surrounding forested landscapes.

placed in sunlight (Hart 1996:127; Turner 2014a:300). Another method of drying huckleberry fruit was using trench fires (Mack and McClure 2002; Turner 2014a:97-8). Today, it is more common for harvesters to freeze the berries or use them to make jams.

Harvest Ecology

Considering the historical, economic, and ecological importance of *Vaccinium* (Kerns, Alexander, and Bailey 2004), research into how animal and human consumption impact fruit production is surprisingly limited. Absence of controlled research, including estimates of fruit production, makes it difficult to predict the ecological impacts of traditional harvesting practices on plant productivity. There are, however, a few studies that measure *Vaccinium* fruit production in relation to disturbance, biotic interactions, environmental gradients, and vegetative herbivory (Eugene and Norton 1984; Fernández-Calvo and Obeso 2004; Fröborg 1996). Results of these studies suggest that the impact of human berry picking at a nominal rate would be minimal. Additional studies addressing how wildlife, recreational, and traditional uses interact to affect productivity and plant viability would be of some use in managing the resource.

Potentially, heavy human harvesting could reduce availability of huckleberry fruit for wildlife. McLellan and Hovey (1995:707) found that between July and October, huckleberries dominated the diet of grizzly bear (*Ursus arctos*), in the Flathead River drainage. Hypothetically, if humans were to over-harvest in this, or comparable areas, bear or other wildlife populations could be impacted in as yet unknown ways.

Local tribal gatherers have expressed concern about huckleberry over-harvested by commercial interests (Hooper personal notes; Nemecek 2014:80) in contrast with a traditional ethic that requires leaving a portion of the fruit on individual huckleberry plants during the gathering process. Furthermore, traditional harvesting events typically do not involve the entire patch. Rather, gathering areas are being restricted to a few hundred square meter area –well below the reported dispersal range of *Vaccinium membranaceum* reported by Yang, Bishop and Webster (2008:378). The combination of limiting the amount of fruit collected and harvesting in a relatively small area should result in no significant impact to *Vaccinium* populations more widely. The fact that huckleberry gathering, processing, and consumption is recognized in historic, ethnographic, and archaeological records –and continued over an extensive time frame– suggests that traditional Indigenous gathering practices can be sustained over time, so long habitat conditions remain optimal as discussed below.

Recommendation

In Chapter 3, we discussed the beneficial effects of periodic burning on plant and animal productivity, emphasizing huckleberries. *Vaccinium* species will grow in shaded contexts but produce the most fruit in settings with greater solar gain. In Pacific Northwest mountains, these tend to be subalpine parklands and other places where dense forest cover has been reduced –most notably by fire. Years of fire suppression on U.S. Forest Service and National Park Service lands not only has increased ground surface fuel-load but has increased ground shading that detrimentally impacts *Vaccinium* productivity as well (cf., Mack 2003 and Nickels 2002).

Indigenous use of fire to maintain plant and animal productivity by suppressing forest encroachment in PNW mountains has been known for some time. Mount Rainier's first Park Supervisor, Grenville Allen (1922:5-6), noted that "old burns in the middle altitudes of the park occupy regions once frequented by the Klickitat Indians. …It was also their custom to systematically set out fires as they returned. …fires kept down the brush and …huckleberry patches spread more widely over the hills." Cultural anthropologist, Eugene Hunn (1991:130-131), also stresses the importance of fire as a forest management tool, noting that "Fire creates sunny openings in the forest …that foster the rapid spread of nutritious herbs and shrubs, most notably the black mountain huckleberry and related species, blueberry and grouseberry."

We do not suggest that Mount Rainier National Park, reintroduce intentional burns to enhance huckleberry habitat. Pacific Northwest maritime forests west of the Cascades tend toward low fire frequencies due to their position relative to moist on-shore air flow from the Pacific Ocean. In the event that agencies, through normal fire management practices, initiate prescribed limited prescribed burns to reduce fuel load, the resulting increase in ground-level light penetration would be likely to enhance huckleberry productivity as a related effect.

In any case, we recommend that Mount Rainier National Park work with the tribal experts in the general fire management consultation process. We also suggest that park staff work with tribal representatives to develop procedures and quantity limits to permit harvesting *Vaccinium* in a manner that sustains existing stands. To ensure that gathering does not negatively impact plant populations and associated habitats, we suggest establishing several harvesting sites that different groups can visit in a given season so that one area is not over-harvested. If concerns about over-harvesting remain, establishing multi-year rotation between sites should be considered. Under a rotation program, a site might be harvested once every other year; or perhaps be allowed to stand fallow two or three years between harvest events. Implementation of a routine monitoring program should provide information useful in establishing rotation periodicity.

Because of the social and economic importance of *Vaccinium* species, there is some concern about the sustainability of harvesting over the long-term. Even so, there presently are relatively few studies on the ecological impacts of commercial, recreational, or traditional Indigenous gathering practices. Presently, recreational *Vaccinium* gathering is allowed at moderately high rates in the park. In the event monitoring indicates decline in productivity, the park may wish to consider limiting public intake prior to imposing similar limitations on tribal gathering activities. Continued monitoring would be helpful in determining whether or not additional restrictions need to be added.

Mount Rainier National Park, Gifford Pinchot National Forest, and Mt. Baker-Snoqualmie National Forest would be ideal settings for studying the ecology of huckleberry harvesting more broadly. We believe that the primary questions that need to be addressed to better understand the ecological effect of huckleberry gathering are 1) does human harvesting reduce plant recruitment through seeds; 2) would human collection significantly reduce the amount of fruit available to local wildlife; and 3) are there significant differences between commercial, recreational, and traditional harvesting on plant and habitat viability?

A final set of issues relate to how environmental conditions impact fruit production, and how to best manage public land to maintain berry production over time. Climate, topography, disturbance, and changes in forest canopy interact to effect huckleberry production (Martin 1983; Minore 1972; Minore and Dubrasich 1978). In the precontact and historic-period past, Indigenous people managed *Vaccinium* habitats by use of fire to reduce forest cover and promote early seral stage vegetation (see Chapter 3 this volume; Mack 2003; and Thornton 2004:30). Relying on a study near Mount Hood, Anzinger (2002:68-70) suggests that it may take up to 25 years after a fire for *Vaccinium membranaceum* to reach peak fruit production, followed by rapid productivity loss as forest cover regenerates. In northwest Montana, globe huckleberry (*V. globulare*), a species synonymous to *V. membranaceum,* has high fruit production on mesic sites with recurrent burn cycles between 25 and 60 years (Martian 1983:163). Designing experiments which incorporate variation in climate, topography, disturbance, and changes in forest canopy cover, with different commercial, recreational, and traditional harvesting, would provide insight into how land may be best managed to maintain sustainable berry yields.

Highbush Cranberry (Viburnum edule)

Natural history

Highbush cranberry is not related to commercial cranberries, which are members of the huckleberry and blueberry (*Vaccinium*) genus. As with elderberries, highbush cranberry is a member of the Adoxa (Adoxaceae) family. The species occurs throughout the northern United States and Canada (Hitchcock and Cronquist 2018:628). Highbush cranberry is found in Mount Rainier National Park, albeit rarely, growing along streams below 4,000 ft (Biek 2000:165).
A multi-stem shrub with reddish bark, highbush cranberry grows to a height of two meters. Its leaves are 3-lobed, toothed, and palmately veined. The white flowers grow in clusters 1 to 2.5 cm across with a roundish shape. These clusters contain up to 50 flowers. The fruit is a red berry-like drupe that remains on the plant throughout the winter (Hitchcock and Cronquist 2018:628).

Figure 8.17. Highbush Cranberry. (Photo by Lindsey Wise.)

Ethnobotany

Highbush cranberry fruit was widely used among Pacific Northwest Indigenous populations. Gathering took place just before the fruit ripens continuing until after first frost (Turner 2006:69 and 2014a:69). After harvest, unripe fruit is placed directly in cedar boxes, and then covered with water for several months. During that time, the fruit softens, turns red, and is ready for consumption (Turner 2006:69). Alternatively, leaving fruit on the plant into late autumn allows frost to ripen it naturally. The Kwakwaka'wakw served these ripened fruits at feasts.

Medicinal uses of highbush cranberry fruit include cough medicine and tea for constipation (Turner 2014a:421 and 425). A tea made from the branches is a treatment for sore throats. Material uses of highbush cranberry seem to be limited. The Ktunaxa used hollowed-out branches as pipe stems (Turner 1998:210). The Dena'ina, and possibly other groups, used the berries as a red dye and the branches as the rims of birch-bark baskets.

Harvest Ecology

Frost ripened fruit is harvested by breaking off stems that support fruit clusters (Turner 2006:69). Presumably, this also is the method for harvesting unripe fruit assuming picking clusters is a more efficient than individual fruit. That said, in their experimental harvest, Lepofsky et al. (1985:236-239) picked individual unripened berries. In this experiment, the authors found that four minutes was needed to fill a 250 ml container from plants averaging 100 berries each.

The difference between picking unripe fruit and clusters of ripe fruit may relate to softness of the berries. Ripe high-bush cranberries are easily crushed, favoring the stem-breaking technique simply to preserve quality. Each of the harvest methods may affect plants somewhat differently. Picking individual fruit should not have long-term impact on the plant. Breaking off fruiting clusters could either reduce or increase future flower production depending on how high-bush cranberries respond to damage of this sort.

In the Pacific Northwest, Indigenous people used several approaches to manage highbush cranberry. Patches of the plant were often controlled by a single person, or one family (Turner 2014b:192), either of which limits the possibility of too many people over-using a population. Some groups pruned highbush cranberry to renew growth (Turner 2014b:192). Individuals established new populations of highbush cranberry by planting seeds or transplanting plants (Turner and Peacock 2005:125; Turner 2014b:192).

Recommendation

Highbush cranberry is rare in the park. We recommend that it be moved from the list of harvestable berries included in the original 1998 plant gathering MOU (Appendix A.) to an individual category to be considered on a case-by-case basis by the park superintendent and plant-ecologist. If after consultation, personal use gathering is permitted, we suggest that quantities be limited in manner consistent with its relative scarcity in Mount Rainier National Park. Fruit gathering practices and plant effects should be monitored to assess effects on plant vigor and continuing reproductive success. If found that human harvesting significantly reduces production, harvest should be halted or, if available, rotated to a new location until productivity recovers.

Lovage (Ligusticum spp.)

Natural history

Gray's lovage or licorice-root (*Ligusticum grayi*) is a member of the carrot/parsley (Apiaceae) family. Its range extends from northern California northward to northern Washington where it grows in the interior plateau and mountains of eastern Washington, eastern Oregon, Idaho, and northern Nevada (Hitchcock and Cronquist 2018:647). Canby's lovage (*Ligusticum canbyi*) is found growing from Oregon to southern British Columbia and east to the continental divide in Montana, Idaho, and Wyoming. Both species occupy subalpine meadows in Mount Rainier National Park. Gray's lovage is the more common of the two, occurring throughout the park between 5,000 and 7,000 ft. Canby's lovage is found on the northern and eastern sides of the park, growing in seasonally mesic, rocky ground above 4,000 ft (Biek 2000:78-79).

The leaves of both species have a parsley leaf appearance. Both are perennial species with basal rosettes growing from a taproot. Their flowers are often white but sometimes pinkish in color. *L. canbyi* is taller, reaching 50 to 120 cm high. *L. grayi* reaches 20 to 60 cm in height. Other differences include the number of flower stalks that make up the umbel, and the placement and size of the leaves on the stalk. Canby's lovage usually has full-size leaves along its stem and 15 to 40 flower stalks per umbel. Gray's lovage has no leaves or a small leaf on the flowering stem. Its umbel is made up of 7-14 flower stalks (Hitchcock and Cronquist 2018:647).

Figure 8.18. Gray's Lovage (*Ligusticum grayi*).
(Photo by Mark Turner, turnerphotographics.com)

Ethnobotany

Garth (1953:137-140) describes various uses of Gray's lovage among the Atsugewi of northern California, including use as a meat substitute when eating acorns.[146] Lovage leaves were

[146] Garth is somewhat unclear as to the identity of the plant in that he uses a common name of "wild parsley", the Atsugewi name "Bóhom," and *Ligusticum grayi* with a question mark. He then continues

harvested in the spring when tender. After soaking in water, these were cooked in an earth oven and stored. The root was either chewed or dried and its scrapings used to make a tea to treat colds, coughs, children's stomachaches, and other ailments. To prevent a cold, a poultice was placed on the chest or back. Gray's lovage also was used by the Atsugewi as a fish poison. The root was pulverized and the powder placed in a pool, causing the fish to float to the surface for collection.

Throughout the southern interior plateau, and Rocky Mountains of Canada and northwestern United States, Canby's lovage was used as a medicinal plant (Turner 2014a:455). The Yakima and other Interior Plateau peoples of British Columbia and Washington would chew the root of Canby's lovage to relieve sore throats, colds, and tuberculosis (Hunn 1990, 197; and Turner 2014a:455-456). Some of these groups also used roots as a poultice to treat cuts and burns (Turner 2014a:422). The dried root was used in smoking mixtures. Fresh or dried root pieces were placed near infants to prevent them from catching colds.

Consumption of Gray's lovage leaves as springtime green has only been reported in northern California (Garth 1953). The primary plant part collected from both Gray's and Canby's lovage is the taproot (Hunn 1990; Turner 2014a; 2014b). In 2001, Burtchard observed several members of the Yakama Nation collecting lovage roots within the eastern park boundary, establishing the plant's presence and its continuing traditional value in this region.

Harvest Ecology

Available information suggests that spring harvest of Gray's lovage leaves can be undertaken in a sustainable manner. Julander (1968:78) concluded that populations of Osha lovage (*Ligusticum porteri*), a related species that does not grow in the Pacific Northwest, could indefinitely sustain loss of 50 percent of its above ground biomass. The majority of lovage leaves are part of the basal rosette. As long as these leaves are harvested in a manner that does not damage the meristem tissue, the harvested plant will produce new leaves and flower stalks. Mooney et al. (2015) also address the issue of sustainability. They found that harvesting 100% of Osha lovage below ground structures did not reduce the number of leaves per stem, although it did cause the leaves to be smaller. It also reduced the number of flowering stalks. Harvesting 50% of the below ground structures, however, did not significantly change either leaf size or number of flower stalks; indicating that Osha can recover from limited harvesting.

That said, there are differences in the underground structures of Osha versus Gray's and Canby's lovage. Osha's rhizomes facilitate vegetative reproduction, whereas the two lovage species in the park have taproots. It is not certain that new plants will re-sprout successfully from remnant taproot sections. Turner (2014:188), however, reports that Secwepemc would be selective in their harvest of Canby's lovage and would leave small segments so that the plant could grow back. Experimental harvest of the two lovage species found in the park could easily be undertaken to resolve the issue. Comparing the method of replanting to non-replanting would clarify how applicable the Secwepemc method is for harvesting Gray's and Canby's lovage at Mount Rainier.

Recommendation

If tribes traditionally associated with Mount Rainier express interest in harvesting lovage, it should be pursued as part of a study to better understand the harvesting ecology of these species. We recommend documenting the manner in which harvesting takes place and how it varies within and between tribes. Information gained will allow for improved approaches to monitoring how

using wild parsley and Bóhom without scientific nomenclature. We assume here that his reference to *L. grayi* is correct.

these species respond to human collection. At a minimum, we suggest collection monitoring to compare lovage frequency and flower production in harvested versus and non-harvested populations so that effects on plant productivity can be assessed accurately.

Salal (Gaultheria shallon)

Natural history

Salal is an evergreen shrub in Ericaceae, the heather family. It is found from British Columbia to California, and between the eastern slopes of the Cascade Mountains to the Pacific Coast (Hitchcock and Cronquist 2018:405). Around Mount Rainier it is common below 4,000 ft, often in dryer forest settings (Biek 2000:194).

Figure 8.19. Salal Leaves and Fruit. (Salal images from bing.com/images)

Salal can reach two meters in height, though it is more common for it to be around 1 meter tall (Biek 2000:194; Pojar and Mackinnon 2014:53). Its leaves are leathery ovate 5 to 9 cm long and 3 to 5 cm wide (Hitchcock and Cronquist 2018:405). At leaf nodes, the stem has a zigzag pattern (Mathews 1999:100). Salal flowers grow on one side of a raceme. Its sepals are fused into an urn shape and white or pinkish in color. The fruit consists of fleshy sepals that become purple-black in color about 10 mm wide.

The main form of salal reproduction is through vegetative growth from the rhizomes (Huffman et al. 1994; Mathews 1999:101). Because of this rhizomatous growth, salal can form a thick undergrowth in forests (Pojar and Mackinnon 2014:53).

Ethnobotany

Because of its abundance, salal was one of the major fruit-producing species harvested by Pacific Northwest Indigenous people (Gunther 1973:43; Turner 2006:77; Turner 2014a:173 and

298). The fruit often was smashed, formed into loafs, and dried for later consumption. Gunther reports that the loaves made in Lower Chinook communities weighed up to 15 pounds. The Quileute and Kwakwaka eat fresh berries by dipping them in oil or grease made from whales or seals (Gunther 1973:43; Turner 2006:77-78). Today, salal fruit is included in jams and preserves.

Salal leaves were used to line pits used for steam cooking (Gunther 1973:43; Turner 2014a:277). Leaves also are used to flavor smoked fish and to reduce the fishy taste of halibut heads (Turner 2014a:277). Medicinal uses of salal focus on leaves as well. To treat burns and sores, individuals would mash, bruise, or chew leaves and apply the resulting poultice to the injury (Gunther 1973:43; Turner 2014a:422. Following his return to Nisqually House from Mount Rainier in 1833, for example, William F. Tolmie used a salal poultice to treat a drained "suppurating tumor" on a Nisqually or Puyallup tribal member. Finally, Gunther (1973:43) reports that the Swinomish and Samish made a tea from salal leaves to treat tuberculosis and coughs. One Quinault told Gunther that the leaves were boiled, and the resulting tea drunk to treat diarrhea. Another reported chewing the leaves to relieve heartburn.

<u>Harvest Ecology</u>

A common traditional method for harvesting salal fruit is to pick individual berries and place them into baskets (Turner 2014a:298). Another approach is to collect clusters by breaking off the flower stem (Gunther 1973:43). Lepofsky et al. (1985:238) found that there are about 10 berries per raceme. In their study, it took about eight minutes for an individual to fill 250 ml container. The area harvested to fill their container was five square meters, suggesting that small harvest patches could be adequate to fulfill personal needs.

The impact of salal fruit harvesting has not been studied. However, based on Nisqually harvest guidelines, leaving some fruit in place, and limiting the harvest area should serve to conserve targeted populations.

We did not find a description of how salal leaves are harvested, but such activities as lining cooking pits requires a substantial amount. An efficient collecting method is to break off branches, rather than collecting individual leaves. Descriptions of medicinal uses suggest that salal leaves typically are used in first aid settings. In such cases, harvest would be limited to a few leaves removed as needed.

Commercial harvest of salal branches for floral displays typically involves breaking branches. Such techniques concern Indigenous people due to the sense that they increase the probability of overharvesting (Turner 2014). Cocksedge and Titus (2006), however, found that plants with biomass removed equivalent to commercial harvest levels had higher regrowth rates compared to non-harvest controls during the first year. After a year, the different growth rates resulted in similar biomass between the harvested and non-harvested treatments.

<u>Recommendation</u>

Currently, salal is abundant at Mount Rainier National Park below 4000 ft where, because of its rhizomatous growth pattern, it locally forms thick undergrowth in forest settings much as suggested by Pojar and Mackinnon (2014:53). Salal harvest was not included in the original 1998 Nisqually-Mount Rainier (Appendix A). Given its rhizomatous growth pattern, it is likely that the plant would respond effectively to moderate harvest pressure. Because harvest effects have not yet been observed, however, we recommend that –as with beargrass and pipsissewa– traditional harvest techniques, if permitted, be observed and monitored in harvest and control plots to improve our understanding of harvest effects. Gathering effects will differ depending on whether leaves, or berries, or both are the primary focus of harvest events. Gathering methods may affect plant vigor as well (e.g., harvesting individual leaves or berries versus branch-breaking methods discussed above). Research should be structured to accommodate these differences. Results could then be used to inform continuing harvest procedures and quantities.

Recommendations: Creating Sustainable Limits

The concept of biological fitness (here referring to an organism's, or population's, success in maintaining the number of offspring from one generation to the next) is key to understanding sustainable plant gathering practices described in this volume. As discussed in Part II chapters, there are a variety of culturally sanctioned traditional approaches to plant gathering that, while they may reduce individual fitness in the short-term, allow the plants to regain biological fitness by limiting harvest quantity, specifying minimally destructive harvest techniques, preserving reproductive structures, and allowing sufficient time for harvested populations to recover –all with the ultimate goal of sustaining species population abundance over the long-term. We found, for example, that traditional gathering procedures and quantities tended to be individually tailored to limit plant impact below the tolerance range for reproductive success over time.

Plant fitness responses to gathering practices vary with the manner in which they are harvested relative to reproductive characteristics of the plants in question. For species that traditionally require harvest of the entire plant, harvesting *after* the plant sets seed can, in the proper circumstances, allow the population to maintain fitness despite removal of parent plants. In cases where plants are harvested *before* they can reproduce, fitness may be maintained by limiting the number of plants harvested within a given population; ensuring that related plants produce sufficient offspring to replace lost individuals over the long-term, assuming that sufficient recovery time is given to ensure that replacement occurs successfully. In short, to be sustainable over the long-term, gathering methods (traditional or otherwise) must be implemented in a manner that does not inhibit successful reproduction of the *population* as a whole from generation to generation.

The Near-term; Hardiest Plants and How to Protect Them

Factors that make traditionally gathered species sustainable include a mix of life history, ecology, and cultural practices. Environmental or cultural changes that deviate from established fitness-maintaining patterns may cause a procedure that was sustainable in the past to become unsustainable in the future. While some plants are more resilient in the face of change than others, resiliency may be enhanced by the gathering techniques employed. In general, plants more resilient to traditional Indigenous gathering are those that are left partially intact during the gathering process. Even plants that have been completely removed may be resilient to harvesting if it takes place after the plant producing seeds or spores, or if vegetative propagules are left intact or replanted (as in the case of replanting small Columbia lily bulbs described above).

It is important to recognize, however, that even hardy plants can be overused. This understanding is the foundation for a basic principle common to traditional Indigenous gathering procedures studied here; that is, strict maintenance of limits on the number of plants, or plant parts, gathered from a given patch (H. McCloud 2012; Jack McCloud 2015; Joyce McCloud 2007 and 2008). If gatherers return to the same patch year after year, even limiting the number of plants or plant parts collected may not be sustainable in the long-term. A clear distinction needs to be made between two meanings of sustainable: 1) yearly harvesting at the same rate as the plants regrow and/or replace themselves, and 2) years of harvest alternating with years of no harvest. The pipsissewa experiment, for example, indicated that stems take at least three years to reach sexual maturity. If the Longmire study site was the *only* place available to harvest pipsissewa, the population could eventually become dominated by non-flowering stems, reducing sexual reproduction. In this case, careful monitoring by tribal and/or park staff would help to notice changes in population structure; facilitating rotation of gathering locations, altering gathering amounts, establishing appropriate fallow periods, or otherwise revising general gathering policy.

There are other situations where the impact of concentrated use could mask increasing damage. For example, the number of western red cedar roots harvested is limited to a couple per tree. Given sufficient time, the tree will replace the lost biomass without significant harm. If, however, only a limited area is used repeatedly, the accumulation of small, individually insignificant, damages could combine to reduce capacity to replace lost roots; thereby increasing water and nutrient stress. Because of the tree's slow physiological processes, by the time signs of stress become evident, it may be too late to recover even if harvesting practices ceased. Tribal and/or park monitoring procedures would facilitate harvest rotation before such problems develop.

In general, the biocultural system underlying harvest resiliency of hardy species is self-maintaining as long as enough space is given to traditional gatherers. This could be accomplished by rotating through a set of gathering sites, or by authorizing single sites large enough to ensure that certain areas within it are not harvested year after year.

The Long-term; How to Add Plants and Protect Them

It should be expected that traditionally associated Indigenous people will, at some point, develop interests in gathering traditionally used plants not included in lists such as the one between Mount Rainier National Park and the Nisqually Indian Tribe (Appendix A). Accordingly, it would be useful for tribal governments and agencies to work to establish protocols for evaluating and adding new plants, or plant parts, to lists of harvestable species. While we do not presume to outline how this might be done in all cases, it may be useful for tribal governments to inquire about potential species for harvest. Agency anthropologists and plant ecologists could then review the literature to identify potential concerns and sustainable gathering strategies. If there are no obvious reasons preventing the resource from being gathered, the next step could involve tribal demonstration and/or discussion of gathering procedures with appropriate park specialists. Working together, park and tribal people should, in most cases, be able to agree on gathering and monitoring procedures that will minimize, or avoid, plant population and habitat damage. After a certain period of gathering and monitoring activities, the tribes and park can modify procedures and/or gathering locations as needed to protect plant populations and habitat viability; much as has been done between the Nisqually Indian Tribe and Mount Rainier National Park.

Recommendations: Continuing Research

Discovering cultural and biological processes underlying sustainable plant use will enhance our ability to predict how plants respond to traditional gathering activity. Application of repeatable processes to a broader range of species would reduce the time it takes to complete research into biological impacts compared to plant-by-plant research undertaken on an ad hoc basis. In order to develop a better understanding of how sustainable plant-use works, it would be useful to continue ethnographic and biological research begun here. We offer a few suggestions:

Working with Tribes; Field and Ethnographic Research

Development, and interpretation, of ecological studies concerning traditional Indigenous plant use is most effectively based on ethnographic data. Ethnographic information is the best means available to assess links between traditional harvest techniques and the precontact past in which most were developed. There are, however, limits to the effectiveness of ethnographic research due to historic-period information loss and Indigenous hesitance to share such information with outsiders. In addition to these issues, are the usual research limitations involving lack of time, money, and personnel. Recognizing these problems, we suggest that traditional plant gathering studies intended to affect public land policy strive to balance 1) inability to collect *all* pertinent ethnographic data with 2) use of modern biological-ecological understanding regarding plant herbivory tolerance in order to 3) establish gathering methods consistent with traditional values of sustaining plant and habitat viability over the long-term.

Variability in Gathering Practices Within and Between Tribes

In the ethnobotanical literature of western Washington, plant uses often are ascribed to individual tribes. On occasion, these can be very different. Gunther (1973:43), for example, reports that the Makah eat bunchberry (*Cornus canadensis*) routinely, while their neighbor to the south, the Quinault, consider it inedible. Narrow application of such data suggests that traditional ecological knowledge varies widely, sometimes incompatibly, between Indigenous communities. It is likely, however, that such variation reflects limitations of ethnographic data, particularly when undertaken long after tribal people have been separated from traditional lifeways.

While it makes sense to be conservative in applying available information on inter-group plant use, it is important to acknowledge that, in traditional Indigenous societies, information tends to move quickly within and beyond community boundaries through trade, marriage, and a variety of other social interactions.[147] It is most likely that, when common value in plant qualities and plant gathering procedures is recognized, it will become common regionally regardless of tribal affiliation or ostensible boundaries. That said, it also is important to recognize that the impacts of colonization, epidemic diseases, forced relocation, and western education have contributed to substantial loss of traditional knowledge, including botanical-ecological knowledge, in many Indigenous communities. We believe that, where it survives, traditional ecological knowledge can be most instructive in developing and applying environmentally benign gathering strategies broadly across a multi-tribal region. In cases where traditional knowledge has been lost, traditionally conservative plant gathering qualities can be maintained by applying modern biological knowledge to develop gathering strategies that, similar to traditional techniques, serve to limit plant population impact below the tolerance range for reproductive success over time.

Learning; Lessons from the Nisqually Study

McCloud family members interviewed during the present study described three primary sources of acquiring plant knowledge, all occurring in the field or via some other form of direct exchange. The initial source is older family members. Hanford McCloud (2012) has been learning from his mother for the last twenty years. “I can remember as far back as being like ten years old when we would come up there (Gifford Pinchot National Forest) …and we would just take the prince’s pine (pipsissewa), the huckleberries and the beargrass at that time.”

[147] See, for example, Allan Smith’s (2006) accounts of the extent of trading and familial ties between the different tribes associated with Mount Rainier, and the ease of inter-tribal movement across ostensible tribal boundaries in a number of the accounts included in Part I of this book.

The second source includes Nisqually community non-family members. For example, Joyce McCloud (2008) and other Nisqually members often collected plants from nearby Fort Lewis. Whoever knew about a particular plant would explain its use to others during the gathering process.

The third information source involves individuals unassociated with the tribe. "When I was pregnant with my youngest son, I had the opportunity to go to an herbal class in Issaquah (Washington), and the teacher was a master herbalist from the University of British Columbia, and her name was Norma Myers" (Joyce McCloud 2008). It is important to recognize that knowledge of plant use is not static. New (or newly rediscovered) plants as well as new uses for plants are being learned continually within the Nisqually and other tribal communities.

The narrow range of opportunities for tribal members to learn about plant gathering processes is of concern to some traditional gatherers. Jack McCloud (2015) relayed a story of a young member of the Nisqually Tribe who wanted to harvest cedar bark. This individual had not taken part in past harvesting events and mistakenly identified a Douglas-fir (*Pseudotsuga menziesii*) as a red cedar and attempted to remove its bark. Jack emphasized that "He did not find the right teacher. And that was an example. And it is not to humiliate him or anything like that. It's just to question the teachers. Where *are* his teachers?"

Questions about how traditional ecological knowledge should, or can, be transmitted raise concerns as to how persistent sustainable practices really are within Indigenous communities. There remains a need to develop a clear understanding as to how tribal community members learn about traditional plant uses and gathering practices. During Nisqually harvesting excursions, Hooper was able to observe how experienced gatherers passed on information to new participants in the field. While these interactions were not common enough to develop a detailed analysis, they hinted that an important aspect of learning proper plant gathering procedures is for inexperienced members to be "corrected" by more experienced individuals while they are harvesting.

One way to pursue information as to how traditional plant use learning occurs, as well as to increase opportunities for tribal members to participate in the learning process, is for agencies and tribes to jointly establish workshops focused on sustainable plant gathering practices. The workshops would provide opportunities for interaction between experienced and inexperienced gatherers as well as with agency personnel. Conducting pre-workshop and post-workshop interviews over an extended period of time would also provide valuable information as to how these experiences affect the gathering process. A long-term study would allow for an investigation into how individuals incorporate TEK into their personal lives and perpetuate it through time. It also would provide information that federal agencies and local tribal governments need to address concerns as to how sustainable harvesting behaviors can be maintained into the future.

Common Garden and Greenhouse Research

Common Garden and greenhouse experiments are used by biologists to unravel how genetics, physical conditions (climate, soil types, etc.), and biotic interactions (herbivory, competition, mycorrhiza associations, etc.) influence phenomena in nature. Of course, it is important to keep in mind that artificial conditions require care in how results are applied to less controlled natural circumstances. As long as this concern is addressed, however, common gardens and greenhouse experiments can be invaluable in furthering our understanding as to how plants respond to gathering activities. This, in turn, can be used to develop management plans serving to ensure long-term access and sustainable resource use.

In common garden experiments, individuals of the same, or closely related, species from different environments are grown together, often in novel environments. By growing individual species under controlled conditions, plants are exposed to a common environment helping to ensure that observed variation is due to genetic rather than environmental variation (cf., Stettler 2009:87). A hypothetical example of the usefulness of common garden experiments involves beargrass (*Xerophyllum tenax*). If, for example, beargrass growing in Mount Rainier's drier White River watershed responds differently to traditional harvest than beargrass common to the wetter west-slope watershed, a common garden experiment could be used to test if the cause is genetically based or related to the climatic differences between the west and east slope habitats.

Greenhouse experiments can be designed to address a number of different factors influencing how plants respond to gathering activities, including genotypic variation, changes in precipitation, variation in growing season, light availability, and soil variation. By selecting different conditions, researchers can identify factors driving outcomes observed in nature.

In the pipsissewa (*Chimaphila umbellata*) monitoring study, for example, the number of stems did not vary significantly between control and traditionally harvested plots (see Chapter 6). Possible factors underlying absence of variation include re-sprouting of damaged stems, elevated seed germination rates in the harvested plots, or both. A greenhouse experiment easily could be developed to investigate the roles vegetative and seed reproduction play in compensating for harvesting practices by splitting greenhouse populations into four treatment groups: no harvest without seed addition, no harvest with seed addition, harvest without seed addition, and harvest with seed addition.

Pipsissewa traditional Indigenous harvest practices can be imitated by clipping stems at the soil line. For the seed addition treatment, a set number of seeds is added to each pot. At the end of the experiment, the number of seedlings in all groups are counted. Variation, or the lack thereof, in seedling germination between control and harvested groups will help us understand the effect, if any, of surface stem removal (as in traditional Nisqually pipsissewa harvest practices) on plant regeneration processes. If seed germination is shown to be a significant contributor to stem production, then implementing a yearly rotation between several harvesting sites would ensure that some plants have enough time to produce seeds. If, however, re-sprouting from intact subsurface rhizomes is the major cause of stem growth, fewer harvest sites with multi-year rotation between them could provide an acceptable means of maintaining plant populations over the long-term.

A minor limitation of common garden and greenhouse experiments –at least for plants discussed in this report– is that most gathered species are long-lived perennials. Accordingly, controlled experiments involving these, or other comparable perennials, could take several years to produce results, potentially taxing available facilities. To minimize the problem, it may be possible to transplant some of the long-lived species rather than planting from seed. After the transplants are established in the greenhouse or garden, the experiment can begin.

In short, use of greenhouses and common gardens allows us to study the details of plant and gatherer interactions in controlled settings without endangering plants in protected park settings. The information gained from these experiments can readily be applied to natural settings and, we believe, can contribute to development of more robust, sustainable plant gathering agreements.

Field Montoring and Experimentation

Measuring the responses of various species to traditional Indigenous gathering practices probably will continue to be the most robust approach to ensure that such practices are sustainable over the long-term. This was the approach taken in the present study. Continuing studies, however, need not be limited to plants considered here. The methods used for beargrass and pipsissewa, for example, would equally be suitable for studies on ferns, forbs, and shrubs.

The beargrass and pipsissewa studies also demonstrate a few choices that need to be considered to make ecological components of TEK studies successful. First is the choice of which *plant attributes* to measure. Since the Nisqually do not dig up or cut beargrass stems while harvesting, selecting plant frequency as metric would not be particularly useful for measuring the impact of traditional collection. Because the target of pipsissewa harvesting is stems and associated leaves, however, plant frequency would be a reasonable choice for studying the ecological impact of gathering practices.

Second, the choice of different *metrics* can influence conclusions. In the beargrass study, individual plant results demonstrated a small reduction in basal dimeter in harvested versus control samples. On the other hand, results from measuring percentage of ground cover demonstrated only limited reduction in the harvest plots compared with controls. Had basal diameter been the only metric used, the conclusion would have produced a misleading inference. The use of multiple metrics allowed us to reach a better-informed conclusion only minor impact to the target species; a conclusion that may have been substantially different if we had relied on stem-width alone. Furthermore, it is important to select analytical procedures fit to the problem at hand. Beargrass analyses employed here were not sensitive to population effects below a threshold of approximately 15 percent variation. In future studies, analytical techniques tailored to finer-grained effects could be useful in fixing gathering limits and rotation strategies more precisely.

The lengths of time field studies are conducted is another choice managers must consider, especially since the majority of traditionally gathered plants are perennial and may take several years before flowering. Since synchronous flowering of beargrass did not occur during the duration of our field work, there was no direct data on how traditional harvesting may impact seed-based reproduction. While we feel that beargrass gathered in the traditional manner resulted in only limited impact to plant viability and potential reproductive capacity, future studies should be designed to provide for sufficient time to capture the entire life cycle of the species.

Understanding how harvesting activities affect berry-producing plants would benefit from studies similar to those of Hunn and Norton (1984:122-123). Part of their sampling strategy involved counting and classifying all of the berries on selected plants. It would be helpful, for example, to measure fruit abundance before and after harvest. If that is not possible, an alternative approach could be to take measurements before, pick three to five sets of a hundred berries, then weigh each set to calculate average berry weight. After traditional gatherers finish gathering berries, the harvest could be weighed. Comparing total weight collected with sample-estimated individual berry weight, it is possible to produce an estimate of how many berries were harvested.

Measuring the impact of traditional use of trees requires more indirect measurement. In the present study of the effects of partial bark removal on western red cedar (Hooper 2015, and this document Chapter 7), secondary growth rate (i.e., dendroband measurements of changes in trunk diameter) proved to be a good indicator of tree performance. Another approach could have been to record percentage canopy cover of harvested versus non-harvest trees. It may, however, take years for harvested trees to show measurable change in canopy, making this approach a long-term endeavor with more complex measurement issues.

In the original plant gathering MOU between Mount Rainier National Park and the Nisqually Indian Tribe (Appendix A), collectable tree parts included wood (red cedar, white pine, and yew), bark (red cedar), and roots (red cedar and spruce). The removal of any of those parts potentially could affect tree physiology, especially movement of water and nutrients through the tree. Root harvest can reduce access to water and nutrients. Bark removal can reduce the volume available for water transport. Wood removal can affect water transport and structural integrity depending on the volume and tree parts taken.

Comparing nutrient abundances in the foliage of harvest and control trees is a possible approach to understanding the impacts of root, wood, and bark harvest. Another method could be to measure sap flow (Smith and Allan 1996). Sap flow can be measured by heating a stem and recording how long it takes for the temperature above the heated area to change. Using this time measurement plus tree diameter facilitates calculation as to how fast water is moving through the tree (Smith and Allan 1996). Such measurements may help to determine the extent to which partial bark removal affects water and nutrient transport beyond the scarred portion of the plant. Measuring sap flow, however, requires use of specialized equipment. Since many plant physiologists will have access to the technology, this approach would benefit from collaboration with academic institutions.

In short, choice of measurement attributes, metrics, and techniques; isolation of questions to be resolved; and solution to practical considerations of budget and time constraints all combine to influence the outcome of studies of this kind. We urge that traditional plant gathering research continue in a manner that enhances our understanding of traditional Indigenous ecological knowledge and traditional plant gathering practices in pursuit of reestablishing these activities in a manner that truly sustains plant populations and habitats to the benefit of generations to come.

Summary Considerations: Sustaining Traditionally Used Plant Populations

Earlier, we introduced the concept of traditional ecological knowledge (TEK) and discussed its relationship to the tendency of traditional peoples to develop conservative resource acquisition strategies, especially in contexts of finite resource abundance and limited opportunity to import alternatives from remote sources. In essence, TEK is a cumulative body of knowledge, practices, and beliefs concerning the relationships between living beings with one another and their environment (Berkes et al. 2000; Berkes 1999). Since TEK is a body of environmental knowledge *and* socially reinforced norms passed on through generations, it is an evolving process by which human populations adjust socially accepted behavioral patterns to fit critical environmental parameters in which they live, reproduce, and carry on through time.

The TEK concept continues to inform us as to how people around the world use and conserve, or abuse, their natural resource base. In regard to plant communities of central interest here, a species' evolutionary history –especially herbivory, human harvest pressure, and their combined effect on vegetative reproductive strategies– can move human gathering strategies toward conservation *when the goal is long-term maintenance* of species population abundance. In such cases, culturally sanctioned guidelines tend to be a developed that encourge people reliant on plant gathering to limit the amount of material removed, directs them to what is harvestable, and specifies where and when harvesting should occur. By understanding a species' life history and ecology, traditional hunting and gathering populations were able to increase the reliability of the resource base upon which they depended, enhancing their probability for continued success through time. Through use of traditional ecological knowledge accumulated in the past, Indigenous people have a tool that, when conscientiously applied, can help to conserve traditionally gathered resources, even though most no longer rely on these products for day-to-day subsistence.

Traditional knowledge of this sort influenced Nisqually tribal gathering practices observed in the beargrass, pipsissewa, and cedar bark studies discussed in Part II of this book. TEK acquired by Nisqually gatherers from their elders, which had been passed down from *their* ancestors, was the central basis for selection of harvest locations, harvest techniques, and harvest amounts from individual plant populations. These examples demonstrate how traditional gathering procedures, developed in the past but applied in the present, help to limit harvest impact below plants' tolerance ranges for reproductive success over time and/or prescribe rotation to new harvest areas allowing time for previously used habitats to recover naturally (cf., Burtchard 2009c:13-26).

Similar to TEK, plant and habitat conserving gathering techniques developed with modern biological understanding, can be used effectively to guide environmentally benign gathering practices so long as plant population and habitat-conserving results remain the same.[148]

The wider range of plants discussed in the present chapter display a correspondingly wide range life histories and ecologies that vary one from another as well as from the three plant types discussed earlier. Even so, findings suggest that wild plant populations traditionally gathered in the precontact past, can, when exposed to some level of harvest pressure in the present, be maintained successfully if gathering techniques 1) recognize and fall within plant-specific biological parameters for continued growth and reproductive success; combined with 2) an understanding that such procedures may not be perfect at all times an cases; requiring 3) park or tribally-based monitoring protocols sufficient to detect declining abundance or habitat damage; followed by 4) rotation to new areas permitting previous gathering areas to recover; or 5) some other jointly-resolved management solution to preserve plant populations and habitat structure through time.

If traditional plant gathering activities are to be implemented and managed effectively, it is imperative that Mount Rainier National Park (or other parks and agencies) and its traditionally associated Indigenous people work together to find solutions that accommodate gathering activities while protecting long-term viability of affected plants and associated habitats. We believe that this can be accomplished by bringing together ethnographic information, traditional ecological knowledge, and modern biological science. Ethnographic data provides cultural background and a general understanding of how TEK is incorporated into traditional gathering practices. Biological data helps better understand the mechanisms by which gathering techniques influence plant viability and reproductive cycles. By combining these sources of information, we believe that it is possible to predict how plants will respond to traditional gathering practices. Procedures recommended here reflect this approach applied to a subset of plants in Mount Rainier National Park. We trust that similar approaches will help to guide similar studies intended to develop and evaluate future sustainable plant gathering practices at the park and other places where traditional plant resources are sought.

[148]This in recognition that some-level of traditionally acquired and transmitted knowledge has been lost with population decline, dislocation, and acculturation processes of the late 18th through mid-20th Centuries.

Part III.

Maintaining a Traditional Gathering Agreement & General Summary

by

Greg Burtchard

Mount Rainier from Spray Park

(Photo by Greg Burtchard)

Chapter 9: Plants, Tribal Traditions, and the Mountain

Elegant and majestic, the mountain still stands, filling the eastern sky above Nisqually country, keeping watch over the Indian dwelling places and fishing weirs, filling the river with life-sustaining water, and causing the gentle rains to fall on the lands.

Clothed in her robes of glistening white, Ta-co-bet, the mountain, has kept faith with the traditional Nisqually Indian people whose descendants continue to offer up their songs of thankfulness, praise and adoration. – Cecelia Svinth Carpenter, 1994[149]

In 1998, Mount Rainier National Park entered into a Memorandum of Understanding (MOU) with the Nisqually Indian Tribe to permit gathering of a suite of traditionally used plants from park landscapes. The intent was to restore part of a long-standing connection between Indigenous people and the mountain –a connection that had been disrupted by population loss, social dislocation, and state and federal policies of the mid-19th through 20th centuries. Tribal and park officials hoped that, in so doing, they could begin to forge a sense of partnership and rebuild some of the tribal values that had diminished over time. Importantly, the MOU contained collection quantity, and annual review provisions that park and tribal officials believed would protect plants and associated habitats from significant damage during the gathering process.

The park and tribe maintained the MOU until it expired in 2003, after which they developed a joint Nisqually-Mount Rainier gathering research project that continued from 2005 through 2015. Throughout that period, and in the years that followed, park staff and tribal representatives worked together to resolve issues of common concern. The most troubling of the issues related to the plant gathering MOU was not long in coming. Shortly after its implementation, an environmental conservation organization challenged the National Park Service's authority to do so; arguing, in essence, that the Treaty of Medicine ceased to apply after Mount Rainier National Park was established in 1899. They also argued that the park had to comply with National Environmental Policy Act (NEPA) requirements prior to entering into such agreements.

In response, park management 1) delayed implementing additional gathering agreements with other associated tribes; and 2) began a research partnership with the Nisqually Indian Tribe to determine environmental impacts, if any, associated with gathering plants in the traditional manner envisioned in the MOU. This report is the product of that partnership and that study.

The report began as a straight-forward account of traditional Nisqually plant gathering methods, Mount Rainier-Nisqually research into possible environmental effects, and management recommendations that resulted from those studies. The book's scope broadened as we recognized the importance of understanding *why* Mount Rainier has been important to the Nisqually and other Indigenous people; *how long* and *in what ways* mountain habitats have been used by Indigenous people; and *how* and *why* traditional gathering techniques tend to function to conserve plant and animal resources as suggested by the present study.

[149] *Where the Waters Begin; The Traditional Nisqually Indian History of Mount Rainier* (Carpenter 1994:105).

The final result is the three-part structure of the present volume. Part I provides archaeological and historical background to long-term Indigenous use of Mount Rainier and the greater Pacific Northwest region of which it is a part. Part II deals more directly with the Nisqually-Mount Rainier plant gathering MOU, opposition to the MOU, the plant gathering study, its results, and its major conclusions. Part III is a single chapter divided into two sections; the first addressing issues related to developing and maintaining traditional plant gathering agreements on National Park lands, and the second providing a general summary of the book as whole. A few closing thoughts conclude the report.

Initiating and Maintaining a Traditional Plant Gathering Agreement

In its recent involvement with tribal people, Mount Rainier National Park has satisfied at least two major elements associated with implementing traditional Indigenous gathering agreements in a manner consistent with NPS mandates. First, park management has acknowledged that Indigenous people ancestral to at least six culturally associated tribes –the Nisqually Indian Tribe, the Puyallup Tribe of Indians, the Muckleshoot Indian Tribe, the Confederated Tribes and Bands of the Yakama Nation, the Cowlitz Indian Tribe, and the Squaxin Island Tribe– have maintained a long-standing involvement with Mount Rainier landscapes and resources that substantially predates the park's founding. Archaeological and historical data indicate use beginning at least 9,500 years ago, continuing to the present (Part I, this document). Indeed, Indigenous people were still hunting and gathering on the mountain when the park was founded in 1899. Organized tribal hunting continued until 1917 when hunting was prohibited in accordance with 1909 park regulations and Washington State game laws. Tribal plant gathering activities were permitted on Mount Rainier until at least 1936 when "destruction of vegetation, and other natural features," was prohibited by NPS regulations.

Second, the Nisqually-Mount Rainier plant gathering research project reported here has demonstrated that traditional plant gathering activities can be managed in a manner that does not significantly impair park resources (Part II, this document). Indeed, applying basic biological principles common to the three plant types gathered on Mount Rainier under the MOU with the Nisqually Tribe –beargrass, pipsissewa, and cedar– it is possible to extend functionally equivalent, non-impactful gathering procedures to a broader range of traditionally gathered plants; assuming gathering techniques, quantity limits, monitoring, and rotation provisions can be agreed-to by Tribal and NPS representatives.

Below, we review 1) foundations of the original 1998 Plant Gathering MOU between the Nisqually Indian Tribe and Mount Rainier National Park; and 2) changes to the Code of Federal Regulations (36 CFR §2.6) implemented in 2016 that established a management framework to allow for gathering and removal of plants or plant parts by members of federally recognized tribes for traditional purposes on NPS administered lands nationwide.

Foundations of the Original Nisqually–Mount Rainier Plant Gathering MOU

Recent changes to the Code of Federal Regulations provide means to permit traditional gathering for enrolled members of federally recognized tribes traditionally associated with specific park areas. The NPS retains authority to work with tribes to manage gathering procedures in a manner that prevents significant adverse impacts to park resources and values, including plant populations and associated habitats.

In 1998, however, when the original plant gathering MOU was signed, treaty-reserved resource use rights were not clear. At the time, Mount Rainier was one of the first NPS units to enter into an agreement that permitted gathering of an otherwise prohibited suite of plants from NPS lands based on tribal cultural association. While park managers felt that the MOU was proper, and that park resources could be protected by its provisions, they had neither prior experience with the issue nor directly comparable agreements to serve as models.

Recognizing the absence of precedents and the importance of the MOU, the NPS contracted a study of available historical, ethnographic, and legal information relevant to Indigenous land and resource uses in the park. The resulting report (Boxberger 1998) informed much of the administrative justification for the 1998 Nisqually-Mount Rainier MOU. A good deal more has happened since. Archaeological, historical, and ethnographic research, for example, has expanded dramatically what we know about human use of the mountain.

<u>Resource Rights – Treaty Rights</u>

Treaty-reserved rights, particularly as they pertain to resource use, played an important role in framing the original 1998 MOU between the park and Nisqually Indian Tribe (York pers. com. 2015).[150] In *The Legal Context of Native American Land and Resource Use in Mount Rainier National Park*, Daniel Boxberger (1998:10-11) emphasizes the importance of treaties because, we assume, of their inclusion in the United States Constitution. Addressing treaty implementation, the second paragraph Article VI reads in part:

> …all Treaties made, or which shall be made, under the Authority of the United States, shall be the Supreme Law of the Land; and the Judges in every State shall be bound thereby, any Thing in the Constitution of Laws of any State to the Contrary notwithstanding.

Under the Constitution, the President can establish treaties with other sovereign states with the advice and consent of two-thirds of the Senate. The Constitution does not address treaty termination directly. By established practice, the President could, in the past, suspend or terminate a treaty with congressional approval, or unilaterally based on treaty terms or international law.[151] The issue became more clearly defined in 2019 when the Supreme Court ruled in *Herrera v. Wyoming* (139 S. Ct. 1986) that plenary power to rescind treaties rests explicitly with the U.S. Congress. The central point to be taken is that since treaties are entered into by and for the United States, they cannot be ended or suspended by lower authority.

Treaty application to American Indian tribes, as opposed to foreign nations, was most effectively stated by the Supreme Court in *Worcester v. Georgia* (31 U.S. 515 [1832]) –a ruling that recognized Indian nations as distinct political communities with territorial boundaries in which they maintained exclusive jurisdiction acknowledged and guaranteed by the United States, i.e., sovereign entities. The *Worcester* ruling expanded on *Cherokee Nation v. Georgia* (30 U.S. 1 [1831]) in which the court recognized the Cherokee, and other distinct Indian tribes, as states; but in contrast with foreign nations, entities that more correctly functioned as "domestic dependent nations" within the sovereign bounds of the United States (cf., Wilkinson 2004:145-151).

[150] Comments associated with Mr. York's presentation *Changing Regulations to Permit Traditional Plant Collection Practices on Park Lands* delivered at Mount Rainier National Park's annual intertribal meeting, May 27, 2015.
[151] Bradley et al. 2017. On-line source: Bradley (https://thealiadviser.org/us-foreign-relations-law/authority-suspend-terminate-withdraw-treaties/)

Closer to home, additional clarification came in 1905 with *United States v. Winans* (198 U.S. 371), a case in which Yakama tribal fishermen had been excluded from traditional Columbia River fishing sites contrary to provisions in the 1855 Treaty with the Yakama. In reversing a lower court opinion, the Supreme Court upheld the superiority of United States treaty provisions over Washington State land and licensing regulations. Importantly, the ruling made it clear that the treaty was not a grant of rights <u>to</u> the Indians, but rather a taking of rights <u>from</u> them. Rights expressly reserved by treaty, as well as those not mentioned, are nonetheless reserved to tribal signatories "in common with citizens of the Territory" (cf., Wilkinson 2004:152-153).

Citing Cohen (1942:123), Boxberger (1998:11) summarizes the effect of these decisions.

> The whole course of judicial deciding on the nature of Indian tribal powers is marked by adherence to three fundamental principles: (1) An Indian tribe possesses …all the powers of any sovereign state. (2) Conquest renders the tribes subject to the legislative power of the United States and, in substance, terminates the external powers of sovereignty of the tribe, e.g., its power to enter into treaties with foreign nations, but does not by itself affect the internal sovereignty of the tribe, i.e., its powers of local self-government. (3) These powers are subject to qualification by treaties and by express legislation of Congress, but, save as thus expressly qualified, full powers of internal sovereignty are vested in the Indian tribes and in their duly constituted organs of government.

Language included in the 367 Native American treaties entered into between 1778 and 1868 stand in equal weight with other U.S. treaties, i.e., the law of the land superseding state laws and other lower-level regulations or agreements to the contrary.

<u>Treaty-reserved Resource Rights at Mount Rainier and other NPS Units</u>

Treaties have played a significant, if not always visible, role in the administration of Mount Rainier National Park for some time. When the park established in 1899, the NPS assumed authority over lands ceded by bands and tribes included in three treaties: the *Treaty of Medicine Creek* (26 December 1854, 10 Stat. 1132) signed by people associated with the Nisqually, Puyallup, Muckleshoot, and Squaxin Island Tribes; the *Treaty of Point Elliott* (22 January 1855, 12 Stat. 927) also signed by people associated with the Muckleshoot Tribe; and the *Treaty with the Yakama* (9 June 1855, 12 Stat. 951) signed by groups associated with Confederated Tribes and Bands of the Yakama Nation. The Cowlitz Indian Tribe, traditionally associated with Mount Rainier and with federal recognition confirmed in 2000, was not signatory to a U.S. ratified treaty.

Often referred to as *Stevens Treaties* (after Washington's first governor) each contains similar provisions regarding off-reservation resource use. With minor variations, Article III of the *Treaty of Medicine Creek* reflects essential resource gathering provisions common to all.

> The right of taking fish, at all usual and accustomed grounds and stations, is further secured to said Indians in common with all citizens of the Territory, and of erecting temporary houses for the purpose of curing, together with *the privilege of hunting, gathering roots and berries, and pasturing their horses on open and unclaimed lands*: Provided, however, that they shall not take shellfish from any beds staked or cultivated by citizens, and that they shall alter all stallions not intended for breeding-horses, and shall keep up and confine the latter [emphasis added].

At the time the treaties were signed, salmon fishing played a critical role in the lives of Pacific Northwest Indigenous people. Local Indigenous communities, however, could not subsist on anadromous fish alone. Hunting and gathering terrestrial food, medicinal, and maintenance resources also played vital roles in the lives of Indigenous people. Mount Rainier, with its high-gradient landforms and natural upstream barriers, offered only limited, seasonally unpredictable fishery resources. Terrestrial plant and animal resources, however, were abundant during the mountain's warm season. Consequently, the treaty phrase of greatest significance to resource use on Mount Rainier is the reference to "…the privilege of hunting and gathering roots and berries …on open and unclaimed lands." Within that simple phrase, two sets of terms have risen to particular importance –the distinction between *privilege* versus *right*; and the meaning of *open and unclaimed lands.* We assume that "gathering roots and berries" is applicable to a wider suite of plant resources.

Privilege versus Right, Open and Unclaimed Lands, and the Canons of Construction

Many modern legal interpretations have found that "rights" and "privileges" were indistinguishable, and hence synonymous in the minds of tribal signatories to treaties that provide for them. The manner in which these, and other, treaty terms have come to be interpreted has been the subject of court action over the years. Now known generally as the "canons of treaty construction," interpretive standards were set, for the most part, in the 19th and early 20th centuries by Supreme Court rulings such as *Worcester* and *Winans* discussed above.[152] In essence, the canons provide that treaties are to be construed broadly in determining the existence of Indigenous rights, but narrowly when considering their elimination or abrogation (Wilkinson 2004:7). Stated another way, the canons of construction hold that a) ambiguities in treaties must be resolved in favor of the Indians; b) Indian treaties must be interpreted as the Indians would have understood them at the time; and c) Indian treaties must be construed liberally in favor of the Indians (Pevar 1992:40 in Boxberger 1998:15).

The canons were reenforced in the 1974 Boldt Decision (*United States v. Washington,* 384 F.Supp. 312) in regard to Indigenous salmon fishery rights in the Pacific Northwest:

> Treaties with Indian tribes must be construed liberally in accordance with the meaning they were understood to have by the tribal representatives at the treaty council and in a spirit which generously recognizes the full obligation of this nation to protect the interests of a dependent people.

In regard to the *open and unclaimed lands* reference in the Stevens Treaties, an Idaho court opined in *State v. Arthur* (261 P.2d 135, 141 [D. Id. 1953]) that "open and unclaimed land, as employed in the treaty, …was intended to include and embrace such lands as were not settled and occupied by whites under possessory rights or patents or otherwise appropriated to private ownership" (emphasis added). The same general finding also was applied to Indigenous hunting on U.S. Forest Service lands in the 1960s and 1980s.[153] In the *Arthur* case, cessation of open and unclaimed status was held to apply only to private ownership as it would have been understood at treaty time, not to federal properties.

One interpretation of these issues was made as early as 1915 by Department of the Interior (DOI) Solicitor Preston West. Responding to an incident involving interception of a Yakama hunting party on Mount Rainier's Sunrise Ridge (see *Prohibition of Indigenous Hunting on Mount Rainier* in Chapter 3), West concluded that, while treaty-reserved hunting was limited by Mount Rainier National Park's 189 Establishment Act (30 Stat. 993), the Act did not prohibit such hunting altogether and allowed "taking of such game as may be reasonably required for their

[152] Department of the Interior (DOI) Solicitor Preston West reviewed these cases in his 1915 opinions regarding treaty-reserved hunting privileges/rights at Mount Rainier National Park (see Appendix D).
[153] *Confederated Tribes of Umatilla Indian Reservation v. Maison* (262 F.Supp. 871 [D. Or.1966]), and *Holcomb v. Confederated Tribes of Umatilla Indian Reservation* (382 F.2d 1013 [9th Cir. 1967]), and *Swim v. Bergland* (696 F.2d 712 [9th Cir. 1983])

subsistence" so long as it did not involve "wonton destruction of fish and game" or "capture or destruction for the purposes of merchandise or profit." The full text of West's response to the park is included in Appendix D.

In any case, arguments relying on treaty abrogation by any means less than "clear evidence that Congress actually considered the conflict between its intended action on the one hand and Indian treaty rights on the other, and chose to resolve that conflict by abrogating the treaty" (*Herrera v. Wyoming* 139 S. Ct. 1686, 1698 [2019]), are unlikely to be successful as indicated by the 1984 *Hicks* and the 2019 *Herrera* rulings.

Treaties, Statehood, and National Parks

The notion that treaty-reserved rights could be extinguished by statehood originated with the 1896 Supreme Court ruling in *Ward v. Race Horse* (163 U.S. 504) challenging the right of a Wyoming Bannock Indian to hunt on ceded off-reservation land contrary to the 1868 Treaty with the Eastern Band Shoshoni and Bannock which states, in part, that

> The Indians herein …shall have the right to hunt upon the unoccupied lands of the United States so long as game may be found thereon, and so long as peace subsists among the whites and Indians on the borders of the hunting districts.

In *Race Horse*, the court ruled, in essence, that such rights were terminated when Wyoming became a state in 1890 (Wilkinson 2004:197). The fact that Bannock were hunting on lands that became part of Yellowstone National Park in 1872 was not germane to the ruling. The same "statehood over treaty" logic was applied again in *Crow Tribe v. Respis* (73 F.3d 982 [1995]) with similar result.

In time, both *Race Horse* and *Respis* cases would be overturned; initially by implications of *Minnesota v. Mille Lacs Band of Chippewa Indians* (526 U.S 172 [1999]) which held that off-reservation hunting and fishing rights <u>were not</u> extinguished by statehood, and definitively by the *Herrera v. Wyoming* ruling in 2019. Federal treaties with Native American tribes could not be voided by statehood. Rather, they could be abrogated only by the express intent of the United States Congress.

<u>Native American Religious Rights and Resource Use in National Parks</u>

AIRFA –the American Indian Religious Freedom Act (42 USC 1996)– is the principal act protecting exercise of religious freedoms in the United States, including use of sacred sites. Together with Executive Order 13007 (May 24, 1996), it directs federal agencies to accommodate access to and ceremonial use of sacred sites to avoid adversely affecting the physical integrity of such sacred sites, and to maintain site confidentiality when appropriate.[154]

While not directly germane to traditional Indigenous plant gathering activities as used here, AIRFA and Executive Order 13007 were cited by Boxberger (1998:18-21) and included as authorizing authorities in the original 1998 Nisqually-Mount Rainier MOU. There is no doubt that AIRFA and Native American religious practices are an important element in the administration of federal lands. Sacred sites found within National Park boundaries clearly warrant protection under

[154] A *Sacred Site* is any specific, discrete, narrowly delineated location on federal land that is identified by an Indian tribe, or individual Indian determined to be appropriately representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion (Boxberger 1998:18).

the Act and other federal mandates. It also is clear that religious activities –including visiting sacred sites– can occur during excursions otherwise directed at gathering subsistence and maintenance resources, or plant materials to be used for religious purposes. The activities are not mutually exclusive. While we consider traditional religious activities and sites to be legitimate, culturally important land-use issues, we do not address them further in the present discussion of *resource-oriented* land-use rights at Mount Rainier. Rather, we regard them as a separate class of activities permitted on their own merit.

Traditional Resource Use and National Park Service Management Polices

Even without treaty or AIRFA provisions, NPS management guidelines encourage park and tribal interaction regarding resource uses by traditionally associated treaty and non-treaty tribes alike. There is little doubt that NPS *Management Policies* (National Park Service 1988) influenced park managers to engage with the Nisqually Tribe to implement the plant gathering MOU ten years later. Relevant clauses of these guidelines include the following:

> The National Park Service, to the extent consistent with each park's legislated purposes, will develop and execute its programs in a manner that reflects knowledge of and respect for the cultures, including religious and subsistence traditions, of Native American tribes or groups with demonstrated ancestral ties to particular resources in parks. *...and*
>
> National Park Service general regulations on access to and use of natural and cultural resources in parks will be applied in an informed and balanced manner that is consistent with park purposes and does not reasonably interfere with Native American use of traditional areas or sacred resources and does not result in degradation of park resources. *...and*
>
> The National Park Service will regularly and actively consult with traditionally associated Native American individuals or groups regarding planning, management, and operation a decision that affect subsistence activities, sacred materials or places, or other ethnographic resources with which they are historically associated.

In short, park administrators believed they had authority to enter into the 1998 traditional plant gathering MOU (Appendix A). Working under a suite of federal acts and directives, treaties, and shared understandings available at the time, Mount Rainier National Park and the Nisqually Indian Tribe agreed to their joint intent to 1) avoid unnecessary disturbance or damage to park-protected natural and cultural resources; 2) work cooperatively to allow access to culturally and religiously important sites; and 3) allow gathering of plant materials in a manner that fostered the sustainability of those resources (see opening "Whereas" clauses in Appendix A). Building on these understandings, the tribe and park executed the MOU to maintain consistency with rights reserved by *The Treaty of Medicine Creek*; provide access for traditional cultural and religious purposes; and build a joint management structure to regulate gathering of culturally appropriate amounts of plants on park lands in a sustainable manner.

These purposes were valued and pursued by the tribe and park in implementing the Memorandum of Understanding. But it was the MOU's plant gathering component, with its more complex administrative and resource protection issues, that attracted the most attention, and concern, from non-Indigenous NPS stakeholders. And it was this component that drew formal protest from the environmental protection organization Public Employees for Environmental Responsibility as described in Chapter 4.

Traditional Plant Gathering in a Research Context

Beginning in 2001 and continuing through 2003 when the original Nisqually-Mount Rainier MOU expired, Nisqually traditional plant gathering activities were conducted under terms of annually renewed Special Use Permits accompanied by NEPA review. No plant gathering activity took place in 2004.

In 2005, to gain a better understanding of effects, if any, associated with traditional Indigenous plant gathering practices at Mount Rainier National Park, park staff and tribal representatives initiated the research effort reported in detail in this report. The research effort was authorized by annually renewed Scientific Research and Collecting Permits accompanied by NEPA review comparable to the preceding plant gathering MOU.

Concurrent with the plant research project, the NPS worked to establish a management framework allowing traditional Indigenous plant gathering activities on NPS lands. These efforts led to subsequent modification of the Code of Federal Regulations to provide "new opportunities for the NPS and tribal governments to work together in support of the continuation of sustainable Indian cultural traditions,"[155] which is what then Mount Rainier National Park Superintendent Jarvis, NPS Anthropologists Patricia Parker and Frederick York, and others began working toward in 2001. Fifteen years later, the process was brought to successful conclusion with introduction of 36 CFR §2.6, *Gathering of plants or plant parts by federally recognized Indian tribes*.

36 CFR §2.6 – Plant Gathering by Federally Recognized Tribes

In its efforts to modify the Federal Code of Regulations, the National Park Service sought to establish a framework through which the agency could respond to requests by federally recognized tribes traditionally associated with specific park areas, treaty and non-treaty alike, to gather plant materials for traditional cultural practices. The final rule establishing this framework was issued July 12, 2016.[156] Appendix E contains complete text of the rule.

The 2016 federal code does not affect any existing statutory or treaty right to gather plants withing areas of the National Park system. Rather it provides an avenue allowing recognized non-treaty tribes –such as the Cowlitz Indian Tribe near Mount Rainier– to exercise traditional plant gathering privileges on an equal footing with treaty tribes. Essential elements of the regulation include the following:

- <u>Authorization</u>: With concurrence of the relevant NPS Regional Director, the park Superintendent may authorize a gathering permit for enrolled members designated by the tribe as traditional plant gathering participants.
- <u>Request Procedures</u>: A tribal official submits a written request to the park Superintendent describing 1) the tribe's traditional association with the park area; 2) the traditional purposes of the gathering activities; and 3) the plants or plant parts to be gathered and related collection methods. Within 90 days after receiving the request, the Superintendent must initiate consultation to develop an agreement. If a Superintendent fails to initiate consultation within 90 days after receiving such a request, the tribe may submit the request to the Regional Director. The Superintendent will also consult with tribes that have

[155] 81 Fed. Reg. 45025 (July 12, 2016).
[156] The authority for 36 C.F.R. Part 2 is the NPS Establishment (Organic) Act (54 USC 100101 et seq). See 81 Fed Reg. 45026 (July 12, 2016).

gathering rights in that park area under a treaty or federal statute, or that have valid plant-gathering agreements for that park area.

- Requirements: Before entering into an agreement, a park Superintendent must 1) determine that a tribe has traditional association with the park area and is proposing to gather plants for a traditional purpose; and 2) assure compliance with applicable federal laws, including: a) a finding of "no significant impact" consistent with the National Environmental Policy Act of 1969; and b) all applicable federal laws, including the National Environmental Policy Act, the National Historic Preservation Act, and the Endangered Species Act.
- Implementation: A plant gathering agreement must include: 1) the name of the involved tribe; 2) the basis for the tribe's eligibility to enter into the agreement; 3) a description of the system to be used to administer the gathering process and listing tribal members who are designated by the tribe to gather; 4) a means for the tribal government to keep the park regularly informed of which tribal members are designated by the tribe to gather; 5) a description of the plants or plant parts to be gathered; 6) specification of the size and quantity of plants or parts to be gathered; 7) the times and locations for gathering; 8) a statement that plants or plant parts will be gathered only by traditional gathering methods (i.e., using hand or hand tools); 9) a statement that the sale or commercial use of natural products (including plants or plant parts gathered under the agreement) is prohibited in the park under 36 CFR §2.1(c)-(3)-(v); 10) protocols for monitoring gathering and removal above which park and tribal management intervention will occur; 11) a periodic review requirement through consultation between the tribe and park; 12) operating protocols and non-compliance remedies; 13) identification, by a permit issued under the agreement, of tribal members designated to gather; 14) a list of key officials; and 15) any additional terms and conditions the parties may agree upon.
- Closings & Agreement Termination: The Superintendent may close park areas to gathering in response public health or safety concerns, to protect environmental or scenic values or natural or cultural resources, to aid scientific research, to implement management plans, or to avoid conflict among visitor use activities; provided written notice is supplied to any tribe that has an agreement to gather plants or plant parts from the closed area. The Superintendent, with written concurrence by the Regional Director, may suspend or terminate an agreement or permit if the tribe or a tribal member violates any term or condition of the agreement or the permit, or if unanticipated or significant adverse impacts to park area resources or values occur. In the event a Superintendent suspends or terminates a gathering agreement or implementing permit, that Superintendent must prepare a written justification and provide a copy to the tribe. Before terminating a gathering agreement or implementing permit, the Superintendent must obtain written concurrence of the Regional Director.
- Appeal: If a Superintendent denies a tribe's request to enter into a gathering agreement, the Superintendent must provide the tribe with a written decision explaining the reasons for the denial. Within 60 days after receiving the Superintendent's written decision, a tribe may appeal, in writing, to the Regional Director. The appeal should lay out factual or legal bases for the disagreement, and any other information the tribe wishes the Regional Director to consider. Within 45 days after receiving the tribe's appeal, the Regional Director will issue and send to the tribe a written decision affirming, reversing, or modifying the Superintendent's decision. The Reginal Director's decision constitutes the final agency action on the matter.

Complex as these provisions may seem on first reading, it is important to note that, once complete, an agreement may stand as written, or be modified relatively easily as unanticipated situations arise. In many ways, issuance of 36 CFR §2.6 was a substantial accomplishment – especially in its capacity to accommodate widely disparate opinions regarding the propriety and environmental risks of traditional Indigenous plant gathering activities on NPS administered lands. Not only were opinions varied among NPS employees, there also were passionately held opinions opposing these activities by environmental organizations such as PEER. Equally passionately held positions in support of traditional gathering were expressed by tribal entities such as the Nisqually Indian Tribe.

In general, environmental concerns centered on the sense that efforts to maintain park ecosystems –already subject to heavy visitation– would be undermined further by gathering practices which many feared could not be managed effectively. On the other hand, alluding to millennia of maintaining viable subsistence and settlement systems on these landscapes, most tribal authorities believed that NPS gathering prohibitions unfairly and unnecessarily prevented resource procurement activities they believed to be conservative in character and reserved to them by extant treaties.

To adherents of both positions, we suggest that results of the Mount Rainier study reported here indicate that traditional Indigenous plant gathering activities can be managed in a manner that preserves the reproductive success of traditionally gathered plant populations as well as the viability of associated habitats. Furthermore, 36 CFR §2.6 requirements, once met, are intended to be durable and flexible. They can result in working agreements capable of modification via continuing NPS-tribal interaction that allows for agreements to be changed as environmental or social issues arise. Tribes pursuing gathering agreements based on consultation under Section (c)(2) of the regulation could show their traditional connection to the land through treaty rights or other federal statutes. Importantly, 36 CFR §2.6 also allows traditionally associated non-treaty tribes to develop plant gathering agreements for their members to acquire permits, subject to the same restrictions applicable to treaty tribes identified in federal statutes, regulations, and park policy.

And finally, we emphasize again that traditional Indigenous plant gathering research reported here suggests that, not only can such agreements be managed successfully without significant environmental effect, but that the joint interaction required to do so engenders a sense of park-tribal partnership and understanding that is difficult to achieve by other means. Based on our experience at Mount Rainier National Park, we believe that well-developed, jointly administered traditional plant gathering agreements –whether founded on treaties, federal law, or 36 CFR §2.6– can sustain environmental integrity, enhance revival of cultural traditions, and promote rewarding cooperative relations between the NPS and people whose ancestors were resident stewards of the land for thousands of years.

General Summary

In this book, we have focused on the long-standing relationship between Indigenous people and the landscapes, plants, and animals of Mount Rainier; and on efforts to re-establish a bit of that relationship—traditional plant gathering—lost to NPS regulations in the early 1900s. We have organized the book into two major sections: the first devoted to archaeological and historical background to indigenous use of the mountain; the second to studies designed to determine the environmental effects of traditional plant gathering at Mount Rainier National Park. After determining that traditional gathering techniques observed during the study served to preserve plant viability, we recommended ways in which comparably benign methods might be extended to a broader suite of traditionally used plants. We also offered research and management recommendations for continuing refinement and application to National Park settings. This chapter has explored issues related to initiating and maintaining traditional plant gathering agreements based on our experience at Mount Rainier. Below, we summarize the book's major elements.

Part I. Understanding Long-term Indigenous Presence on Mount Rainier

We now know that Indigenous people have inhabited the Pacific Northwest region for thousands of years. On Mount Rainier, locally known by linguistic variants of *Takhóma*,[157] archaeological evidence establishes human presence by at least 9,500 years ago with no indication of subsequent abandonment or prolonged periods of disuse prior to the creation of Mount Rainier National Park in 1899. Given the mountain's height and severe winter weather, it is likely that precontact land-use patterns focused on seasonal acquisition of plant and animal resources important to people residing over-winter in surrounding lowland settings. Subsistence and settlement patterns changed as population density and resource needs increased over time, but there is little doubt that, for the most part, these changes occurred in a manner that successfully sustained Indigenous people until their lifeways were disrupted severely by rapidly unfolding events beginning in the mid-1700s.

Preponderance of available data suggest that, beginning in the mid-1700s, Indigenous people throughout the region suffered catastrophic losses from repeated waves of epidemic diseases that originated with European colonization of the Americas. Even before the epidemics subsided about 100 years later, Indigenous ways were challenged further by the arrival of U.S and British traders and settlers, promotion of Indian treaties, and continuing expansion of non-Indigenous enterprises –events that restricted subsistence salmon fishing and removed Indigenous people from much of their previously extensive hunting and gathering territory.

In the 1850s, Indigenous communities using, and ultimately ceding, land on Mount Rainier were grouped into at least five tribal designations by various treaties imposed by the United States. These included the Nisqually Indian Tribe, the Puyallup Tribe of Indians, the Squaxin Island Tribe, the Muckleshoot Indian Tribe, and the Confederated Tribes and Bands of the Yakama Nation. A sixth, the Cowlitz Indian Tribe, was not signatory to a ratified treaty but retained cultural association with the mountain. The Cowlitz regained federal recognition in 2000.

Surviving members of these six traditionally associated Mount Rainier tribes, among others, continued to hunt and gather resources on the mountain, albeit in reduced numbers, until 1917 when the National Park Service formally banned hunting on park lands. Shorn of the hunting component, plant gathering activities withered as well. Ultimately, gathering also was restricted by NPS policy in the mid-1930s.

Buttressed by improving economic conditions, interest in reestablishing tribal traditions gathered momentum in the late 1900s. A notable event in this regard was the Nisqually-Mount Rainier traditional plant gathering Memorandum of Understanding signed in 1998. It was this event, followed by similar tribal requests and opposing environmental concerns, that stimulated the joint Nisqually-Mount Rainier plant gathering research effort reported in Part II of this report.

Part II. Reintroducing Traditional Plant Gathering to Mount Rainier National Park

The 1998 Nisqually-Mount Rainier MOU permitted Nisqually tribal collection of limited quantities of up to 11 traditionally used plant species (Appendix A). It was one of the earliest

[157] Variations such as Tahóma and tkóbɛt (ta-co-bet), among others (see A. Smith 2006:24).

events in the region to mark rejuvenation of Indigenous connections to the mountain. In crafting the MOU, both park and tribal authorities believed that it would have negligible impact on plant populations and habitats; collection limits were in place, use was light, and joint annual meetings provided a mechanism to adjust gathering procedures as needed.

The plant gathering MOU, however, was soon challenged. Within two years of its implementation, an environmental oversight organization contested park management's authority to enter into such agreements, arguing that the authorizing treaty's clause permitting gathering activities on ceded lands terminated with the park's founding in 1899. The complaint also cast doubt on the environmentally conservative character of traditional plant gathering practises.

In response, park management temporarily halted consideration of requests for similar agreements while it sought changes to the Federal Code of Regulations to clarify its authority in this regard. In concert with the Nisqually Indian Tribe, park staff also began a research program to determine the effects of traditional plant gathering on collected plant populations and associated habitats. Initial site monitoring took place from 2001 through 2003 while the original MOU remained in place. Research was renewed with additional field controls in 2005 extending through 2015. Ethnographic study focused on tribal attitudes toward sovereignty, plant gathering as a tribal tradition, traditional and current methods of sharing information, and the origins of gathering techniques employed at Mount Rainier. Field research focused on three plant types most sought-after by tribal gatherers: beargrass, pipsissewa, and cedar bark.

At the close of the project, results indicated that traditional plant gathering methods, involving use of plant-specific harvest practices with appropriate rotation and fallow periods, had benign effect on plant vigor and reproductive success. The same gathering activities also served to protect the integrity of associated habitats. The study helped us better understand how traditional gathering techniques, rooted in the precontact past, functioned to improve the probability of successfully sustaining affected plant populations over time. That is, plants were gathered in such a way that damage to targeted species fell within ranges necessary to sustain viability and reproductive capacity. Coupled with collection limits and periodic rotation to new harvest areas, these techniques exhibited the capacity to sustain gathered plant populations and protect associated habitats indefinitely.[158]

Understanding the common thread linking the three plant types allowed us to employ modern plant physiology to develop functionally comparable, sustainable gathering techniques for a broader suite of traditionally used plants.[159] Using this method, we generated functionally equivalent traditional gathering strategies for the remaining eight plant types included in the Nisqually-Mount Rainier MOU as well as to a few others known to have been gathered on and around the mountain. We did this to demonstrate the potential of applying the approach to permit gathering of a more normal traditional plant range than we were able to study during the limited project period. We believe that a comparable ethnographic-plant physiology approach could be used at other parks where tribes and NPS officials are working toward re-establishing environmentally benign traditional plant gathering agreements that, with cooperative park and tribal oversight, will meet federal regulatory standards.

[158] Given appropriate monitoring effort and adjustment as needed to respond to evidence of declining productivity or changing climatic conditions.
[159] Through no fault of their own, many Indigenous cultural traditions were lost through off-reservation schooling and other federal cultural assimilation policies of the late 19th and early to mid-20th centuries.

Part III. Maintaining a Traditional Gathering Agreement & General Summary

The final chapter –*Plants, Tribal Traditions, and the Mountain*– reviewed issues related to traditional Indigenous gathering agreements as experienced at Mount Rainier National Park. Topics included 1) the foundations of the park's original 1998 plant gathering MOU with Nisqually Indian Tribe; 2) the joint Nisqually-Mount Rainier plant gathering research that followed termination of the MOU; and 3) principal components of 36 CFR §2.6 (*Plant Gathering by Federally Recognized Tribes*) enacted in 2016 to provide avenues for the National Park Service and tribal governments to work together in support of the continuation of traditional plant gathering activities on NPS administered lands, and do so in a sustainable manner.

In crafting the 1998 plant gathering MOU, Mount Rainier National Park officials cited the 1854 Treaty of Medicine Creek, and a wide range of legislative acts, NPS regulations and directives. After the Nisqually-Mount Rainier MOU was signed, it was challenged by the environmental organization Public Employees for Environmental Responsibility (PEER); arguing, among other things, that treaty provisions were voided by loss of "open and unclaimed lands" status when Mount Rainier became a National Park in 1899.

Responding to the challenge, the park temporarily suspended consideration of comparable agreements with other affiliated tribes. After he original plant gathering MOU terminated in 2003, traditional gathering continued as the joint Nisqually-Mount Rainier controlled research effort reported here. While the study of traditional plant gathering effects was ongoing, the National Park Service continued to pursue changes to the Code of Federal Regulations (CFR) to explicitly authorize the NPS to enter into agreements allowing environmentally sustainable traditional plant gathering activities by federally recognized tribes. The result was 36 CFR §2.6 noted above and described in detail in the present chapter. While initially demanding in its application, its provisions provide a durable and flexible means to enter into such agreements –agreements available traditionally affiliated treaty and non-treaty tribes alike.

Closing Thoughts

In this document, we have argued that traditional plant gathering agreements can be administered in a manner that preserves environmental integrity while engendering a sense of partnership and cooperation between NPS and tribal people. In order to develop and maintain these agreements, three essential conditions must be met: 1) demonstration of long-standing tribal association with NPS administered lands predating park establishment; 2) capacity to gather plants in a manner capable of maintaining plant populations and associated habitats over time; and 3) appropriate authority under which to permit traditional plant gathering activities to take place on NPS administered lands.

Archaeological, historical and ethnographic information included in Part I unequivocally establish tribal cultural association substantially predating the establishment of Mount Rainier National Park. In providing such detailed documentation, our intent has been to meet the traditional association requirement, and to provide information on the long-standing relationship between Indigenous people and Mount Rainier heretofore unavailable to the park's interpretive programs. The multi-year Nisqually-Mount Rainer plant gathering research project discussed in Part II helped develop a better understanding as to how traditional harvest methods serve to sustain viable plant populations over time. Part III explored foundations of the original Nisqually-Mount Rainier plant gathering MOU and the evolution of 2016 federal regulations (36 CFR §2.6) permitting plant gathering by federally recognized tribes. We believe that both treaty and statutory authorities can be administered, and regulations implemented, in a manner that preserves environmental integrity consistent with the unimpairment clause of the NPS Establishment (Organic) Act (39 Stat. 535) and all other applicable federal laws.

Regardless of whether or not treaty-reserved rights alone provide sufficient authority to engage in traditional plant gathering on NPS administered lands, it should be noted that treaties apply only to signatory tribes. Traditionally associated non-treaty tribes, such as the Cowlitz Indian Tribe near Mount Rainier, as well as those seeking an alternative to treaty-based authority, may wish to consider applying for traditional plant gathering permits under terms of 36 CFR §2.6, *Plant gathering by federally recognized tribes* discussed in this final chapter.

In closing, we wish to thank readers that have borne with us through this long, complex presentation. We trust that the information presented has helped to promote a better understanding of the role played by Indigenous people in Takhóma/Mount Rainier landscapes, and the mountain's plant and animal communities, over the thousands of years they have been resident in the Pacific Northwest. We also trust that the joint Nisqually-Mount Rainier plant gathering research reported here helps to resolve concerns that traditional plant gathering practices cannot be managed in a way that sustains plant populations and habitat viability over the long-term. Traditional Indigenous gathering techniques developed in the precontact past tend to be conservative because such practices were required to support local populations with limited resource alternatives. Present results suggest that traditional and functionally equivalent plant gathering techniques may be used successfully to reinstate this aspect of tribal traditions in an environmentally sensitive manner. Our experience at Mount Rainier National Park suggests further that, in the process, a spirit of cooperative partnership may be forged between parks and Indigenous people whose ancestors occupied, used, and managed lands and resources long before the NPS assumed its current protective and interpretive responsibilities.

References Cited

Alice, Lawrence A., and Christopher S. Campbell
1999 Phylogeny of *Rubus* (rosaceae) based on nuclear ribosomal DNA internal transcribed spacer region sequences. *American Journal of Botany* 86(1):81-97.

Allan, G. F.
1922 *The Forests of Mount Rainier National Park.* U.S. Government Printing Office. Washington D.C.

Anderson, M. Kat
1999 The edible plant *Dichelostemma capitatum*: its vegetative reproduction response to different Indigenous harvesting regimes in California. *Restoration Ecology* 7(3): 231-240.

2005 *Tending the wild: Native American knowledge and the management of California's natural resources*. University of California Press. Berkeley

Anderson, M. Kat, and David L. Rowney.
1999 The fire, pruning, and coppice management of temperate ecosystems for basketry material by California Indian Tribes. *Human Ecology* 27(1):79-113.

Agrawal, A. A.
2000 Overcompensation of plants in response to herbivory and the by-product benefits of mutualism. *Trends in Plant Science* 5[7]: 309-313.

Bagely, Clarence B.
1915 Journal of Occurrences at Nisqually House, 1833 *The Washington Historical Quarterly* 6(3):179-197.

Barnes, Victor G. Jr., and Richard M. Engeman
1995 Black Bear Damage to Lodgepole Pine in Central Oregon. *Northwestern Naturalist*: 127-129.

Bergland, Eric O.
1992 Historic Period Plateau Culture Tree Peeling in the Western Cascades of Oregon. *Northwest Anthropological Research Notes* 25(2):31-53.

Berkes, Fikret
1999 *Sacred Ecology: Traditional Ecological Knowledge and Resource Management*. Taylor & Francis. Philadelphia, PA.

Berkes, Fikret, Johan Colding, and Carl Folke
2000 Rediscovery of Traditional Ecological Knowledge as Adaptive Management. *Ecological Applications* 10(5): 1251-1262.

Bernard, H. Russell
2006 *Research Methods in Anthropology: Qualitative and Quantitative Approaches*. AltaMira Press Oxford.

Biek, David
2000 *Flora of Mount Rainier National Park.* Oregon State University Press. Corvalis.

Blatner, Keith, et al.
2004 Relationship between Xerophyllum tenax and Canopy Density in the Southern Cascades of Washington. *Western Journal of Applied Forestry,* 19(2):82-87.

Blukis Onat, Astrida R.
1999 *Ethnographic Overview and Assessment of Mount Rainier National Park* . BOAS Research Report No. 9300.2a. Seattle. Report Submitted to National Park Service, Cascades System Support Office, Seattle; and Mount Rainier National Park, Ashford, Washington.

2006 Tahoma Legends: History in Two Voices. *Journal of Northwest Anthropology* 40(1):1-75. Richland, Washington.

Bolsinger, Charles L., Annabelle E. Jaramillo,
1998 *Taxus brevifolia Nutt.: Pacific Yew in "Silvics Manual: Volume 1: Conifers*. Ed. Blum, B.M. United States Department of Agriculture, Forest Service. Washington, DC.

Bowechop, Janine, et al.
2014 Basketry today. In *From the Hands of a Weaver: Olympic Peninsula Basketry Through Time*. Jacilee Wray (ed.), pp 170-177. University of Oklahoma Press. Norman.

Boxberger, Daniel L.
1998 *The Legal Context of Native American Land and Resource Use in Mount Rainier National Park.* Prepared for National Park Service, Columbia Cascade System Support Office, Seattle. Department of Anthropology, Western Washington University. Bellingham.

Boyd, Robert
1975 Another Look at the 'Fever and Ague' of Western Oregon. *Ethnohistory* 22.2 (1975): 135-54.

1990 Demographic History, 1774-1874. In Wayne Suttles (ed.) *Handbook of North American Indians,* vol. 7, *Northwest Coast,* 135-48. Smithsonian Institution, Washington, D.C..

1999 *The Coming of the Spirit of Pestilence: Introduced Infectious Diseases and Population Decline among Northwest Coast Indians, 1774-1874.* University of Washington and UBC Presses. Seattle and Vancouver.

Bradley, Curtis, Edward Swaine, Sarah Cleveland
2017 Authority to Suspend, Terminate, or Withdraw from Treaties. *The American Law Institute Advisor.* April 5, 2017. Philadelphia, PA. On-line publication at: https://thealiadviser.org/us-foreign-relations-law/authority-suspend-terminate-withdraw-treaties.

British Columbia Archaeology Branch
2001 *Culturally Modified Trees of British Columbia a Handbook for the Identification and Recording of Culturally Modified Trees.* Resources Inventory Committee. Victoria, B.C. Canada.

Brown, Allison L.
1920 Ascent of Mount Rainier by the Ingraham Glacier. In *The Mountaineer* [XIII] I:49-50. November 1920.

Burtchard, Greg C.
1998 *Environment, Prehistory and Archaeology of Mount Rainier National Park, Washington.* Report to National Park Service, Mount Rainier National Park. International Archaeological Research Institute. Honolulu.

2005 Administrative Record to the Memorandum of Understanding Regarding the Gathering of Plant Resources between Mount Rainier National Park and the Nisqually Indian Tribe. Unpublished Compilation dated October 7, 2005 on file in Mount Rainier Archives and in files stored at the Natural and Cultural Resource Division, Mount Rainier National Park. Ashford, Washington.

2009a Mount Rainier Sites. In *Archaeology in America, An Encyclopedia, Southwest and Great Basin/Plateau* 3:317-321. McManamon, Cordell, Lightfoot, and Milner (eds.). Greenwood Press. Westport, Connecticut.

2009b Buck Lake Archaeological and Paleoenvironmental Project Research Partnership. Archaeological Reconnaissance Report ARR2009-14 digitally archived in Archaeological Reports Library. Mount Rainier National Park. Ashford, Washington.

2009c Holocene Subsistence and Settlement Patterns: Mount Rainier and the Montane Pacific Northwest. In *Archaeology in Washington* 13:3-44 [dated 2007, but published 2009].

2011 Forgotten Creek Testing. Archaeological Reconnaissance Report ARR2011-16 digitally archived in Archaeological Reports Library. Mount Rainier National Park. Ashford, Washington.

2012 Finding Longmire Springs Hotel. Archaeological Reconnaissance Report ARR2012-07 digitally archived in Archaeological Reports Library. Mount Rainier National Park. Ashford, Washington.

Burtchard, Greg C., Dennis R. Werth and Sandra L. Snyder
1993 *Clackamas Wild and Scenic River Cultural Resource Inventory Project, Hood National Forest, Oregon. Part I: Narrative.* Report to U.S. Department of Agriculture, Forest Service, Mt. Hood National Forest, Gresham Oregon. International Archaeological Research Institute, Inc., Honolulu, Hawai`i.

Burtchard, Greg C., Jacqueline Y. Cheung and Robert McIntyre, Jr.
2017 *Mining Glacier Basin; History of the Glacier Basin Mining District, Mount Rainier National Park.* National Park Service. Mount Rainier National Park. Ashford, Washington.

Burtchard, Greg C., Jacqueline Cheung, Eric Gleason, Benjamin Diaz, Emily Pritchard, and Corrine Michel
in prep. *Ohanapecosh, From Prehistory to Mission 66 at Ohanapecosh Hot Springs Campground, Mount Rainier National Park.* National Park Service. Mount Rainier National Park. Ashford, Washington.

Callaway, Ragan M., et al.
2005 Unpalatable plants protect neighbors from grazing and increase plant community diversity. *Ecology* 86(7):1856-1862.

Carpenter, Cecelia Svinth.
1988 *The Nisqually Indian Traditional Use of the Flora and Fauna of the Nisqually River Watershed*. Report prepared for Western Heritage and Weyerhaeuser Real Estate Company. Washington.

1994 *Where the Waters Begin, The Traditional Nisqually Indian History of Mount Rainier.* Northwest Interpretive Association. Seattle.

2002 *The Nisqually, My People.* Published by Tahoma Research Service. Tacoma, Washington. Printed by Heritage Quest Press. Orting, Washington.

Carpenter, Cecelia Svinth, Maria Victoria Pascualy and Trisha Hunter
2006 *Image of America; Nisqually Indian Tribe.* Arcadia Publishing. Charleston SC, Chicago IL, Portsmouth NH, and San Francisco CA.

Cattelino, Peter J., Charles A. Becker, and Leslie G. Fuller
1986 Construction and Installation of Homemade Dendrometer Bands. *Northern Journal of Applied Forestry* 3:73-75.

Catton, Theodore.
1996 *Wonderland; An Administrative History of Mount Rainier National Park*. National Park Service, Cultural Resources Program. Seattle and Mount Rainier National Park. Washington.

Clark, James S., et al.
2007 Tree Growth Inference and Prediction from Diameter Censuses and Ring Widths. *Ecological Applications* 17(7):1942-1953.

Cohen, Felix S.
1942 *Handbook of Federal Indian Law.* University of New Mexico Press. Albuquerque.

Coues, Elliot (ed.)
1893 *The History of the Lewis and Clark Expedition by Meriwether Lewis and William Clark.* Three volume set published by Dover Publications, Inc. New York.

Coulloudon, Bill, et al.
1999 *Sampling Vegetation Attributes: Interagency Technical Reference*. Bureau of Land Management, National Applied Resource Sciences Center. Denver, Colorado.

Cowan, Ian McTaggart.
1945 The Ecological Relationships of the Food of the Columbian Black-Tailed Deer, Odocoileus hemionus columbianus (Richardson), in the Coast Forest Region of Southern Vancouver Island, British Columbia. *Ecological Monographs* 15 (2):110-139.

Crane, M.F.
1990 *Xerophyllum tenax*. In *Fire Effects Information Systems*. U.S. Department of Agriculture, Forest Service, Rock Mountain Research Station, Fire Sciences Laboratory.

Daugherty, Richard D.
1963 *An Archaeological Survey of Mount Rainier National Park.* Report submitted to National Park Service, Columbia Cascades Support Office, Seattle, and Mount Rainier National Park, Ashford, Washington.

Davis, Leslie B.
1965 *Remnant Forms of the Traditional Folk Narrative Salvaged among the Upper Pend Oreille Indians of Montana.* Master of Arts Thesis, Department of Anthropology, Montana State University. Bozeman.

DeLorme
2010 *Washington Atlas & Gazetteer,* Tenth Edition. DeLorme. Yarmouth, Maine.

Denslow, Julie Sloan.
1987 Fruit removal rates from aggregated and isolated bushes of the red elderberry, *Sambucus pubens*. *Can. J. Bot*. 65*:* 1229-1235.

Diamond, Jared
1999 *Guns, Germs and Steel, The Fates of Human Societies.* W.W. Norton & Company. New York and London.

DiFazio, S.P., N.C. Vance, and M.V. Wilson.
1997 Strobilus production and growth of Pacific yew under a range of over story conditions in western Oregon. *Canadian Journal of Forest Research* 27,(7): 986-993.

Deur, Douglas
2014 *Pacific Northwest Foraging.* Timber Press. Portland, Oregon.

Elzinga, Caryl L., Daniel W. Salzer, and John W. Willoughby
1998 *Measuring & Monitoring Plant Populations*. U.S. Bureau of Land Management.

Ewel, Katherine Carter, and Laurie A. Parendes
1984 Usefulness of Annual Growth Rings of Cypress Trees (Taxodium distichum) for Impact Analysis. *Tree-Ring Bulletin* 44:39-43.

Fernández-Calvo, I.C., and J.R. Obeso.
2004 Growth, Nutrient Content, Fruit Production and Herbivory in Bilberry Vaccinium Myrtillus L. Along an Altitudinal Gradient." *Forestry* 77 [3]:213-23.

Ferry, Joy D.
2015 *Significance Evaluation of the Forgotten Creek Site (45PI0429).* Master of Science Thesis in Resource Management. Central Washington University. Ellensburg.

Ford, Jesse, and Dennis Martinez
2000 Traditional Ecological Knowledge, Ecosystem Science, and Environmental Management. *Ecological Applications* 10(5):1249-1250.

Foster, Steven and Christopher Hobbs
2002 *Field Guide to Western Medicinal Plants and Herbs.* Houghton Mifflin Company. Boston and New York.

Fowler, Catherine S., and Dana Lepofsky
2011 Traditional Resource and Environmental Management. In *Ethnobotony* pp 285-304. Anderson, Pearsall, Hunn, Turner, and Ford eds. Wiley-Blackwell. Hoboken, New Jersey.

Franklin, Jerry F., William H. Moir, Miles A. Hemstrom, Sarah E. Greene, Bradley G. Smith.
1988 *The Forest Communities of Mount Rainier National Park*. Washington, D.C.: National Park Service.

Frazier, Allen
2013 Interview on 08/10/2013. Samantha Nemecek, ed., Ref. Nemecek (2014). Nisqually Tribal Reservation. Washington.

Fröborg, Heléne.
1996 Pollination and Seed Production in Five Boreal Species of Vaccinium and Andromeda (Ericaceae). *Canadian Journal of Botany* 74 [9]:1363-8.

Fryer, Janet L.
1997 *Amelanchier alnifolia*. In*: Fire Effects Information System* [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2015, November 2].

2008. *Sambucus racemosa*. In: *Fire Effects Information System* [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/[2015, September 22].

Galván, Imelda J., N. Mir-Rashed, M. Jessulat, M. Atanya, A. Golshani, T. Durst, P. Petit, V.T. Amiguet, T. Boekhout, R. Summerbell, I. Cruz, J.T. Arnason, and M.L. Smith.
2008 Antifungal and antioxidant activities of the phytomedicine pipsissewa, Chimaphila umbellata. *Phytochemistry* 69 (3):738-746.

Garth, Thomas R.
1953 *Atsugewi Ethnography*. University of California Anthropological Records 14[2]:129-212. Berkeley, California.

General Management Plan (GMP)
2002 *Final General Management Plan Environmental Impact Statement, Mount Rainier National Park, Pierce and Lewis Counties, Washington.* National Park Service, Mount Rainier National Park. Ashford, Washington.

Gibbs, George
1855 Indian Tribes of the Territory of Washington. Report dated 3/4/1854 to Capt. George B. McClellan. Published as Exec. Doc. #91, House of Representatives for 2nd Session of 33rd Congress, pp. 8-42. From *Reports of explorations and surveys, to ascertain the most practicable and economical route for a railroad from the Mississippi River to the Pacific Ocean* Volume I. United States War Department. Government Printing Office. Washington, D.C.

1877 Tribes of Western Washington and Northwestern Oregon. In *Contributions to North American Ethnology* 1[2]:157-361. Report submitted 1865 to J.W. Powell, Geologist in Charge, U.S. Geographical and Geological Survey of the Rocky Mountain Region. U.S. Department of the Interior. Government Printing Office. Washington, D.C.

Gibson, David J.
2002 *Methods in Comparative Plant Population Ecology*. Oxford University Press.

Gonzales, Pete, Dale Darris
2007 Plant fact sheet for red elder (Sambucus Racemosa L.). U.S. Department of Agriculture, Natural Resources Conservation Service, PLANTS database, Corvallis, OR.

Griffith, Randy Scott.
1992 Pinus monticola. In: *Fire Effects Information System* [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2015, November 4].

Gunther, Erna
1973 [orig. published in 1945] *Ethnobotany of Western Washington: The Knowledge and Use of Indigenous Plants by Native Americans.* University of Washington Press. Seattle.

Gurevitch, Jessica , Samuel M. Scheiner, and Gordon A. Fox
2002 *The Ecology of Plants*. Sinauer Associates. Sunderland, Massachusetts

Habeck, R. J.
1992 Frangula purshiana. In: *Fire Effects Information System* [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2015, November 5].

Haeberlin, Hermann, and Erna Gunther
1930 *The Indians of Puget Sound*. University of Washington Publications in Anthropology 4(1):1-84.

Haines, Aubrey L.
1999 *Mountain Fever, Historic Conquests of Rainier.* University of Washington Press. Seattle. Originally published 1962, Oregon Historical Society. Portland.

Hekkers, Michael L.
2010 *Climatic and Spatial Variations of Mount Rainier's Glaciers for the Last 12,000 Years*. Master of Science Thesis in Geography. Portland State University. Portland, Oregon.

Hennon, Paul E, and Nancy Turner
2011 Vitality and Defense Mechanisms in Bark-stripped Cedar Trees. *Tale of Two Cedars: International Symposium on Western Redcedar and Yellow-Cedar*, 2011. Vol. 828, p. 148. Diane Publishing. Darby, Pennsylvania.

Herms, Daniel A, and William J Mattson
1992 The Dilemma of Plants: To Grow or Defend. *Quarterly Review of Biology*: 283-335.

Hitchcock, C. Leo, and Arthur Cronquist
2018 *Flora of the Pacific Northwest; An Illustrated Manual* (Second Edition). University of Washington Press in association with Burke Museum of Natural History and Culture. Seattle.

Hobby, T., and M.E. Keefer.
2010 A black huckleberry case study in the Kootenay region of British Columbia. *BC Journal of Ecosystems and Management* 11[1&2]:52–61

Hooper, David A.
2015 *Cultural and Ecological Relationships between the Nisqually Indian Tribe and Plants of Mount Rainier National Park.* PhD Dissertation, Departments of Anthropology and Native American Studies, University of Montana. Missoula.

Howard, Janet L.
1993 *Oplopanax horridus*. In: *Fire Effects Information System* [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2015, September 10].

Hummel, Susan Stevens, Sarah Foltz-Jordan, and Sophia Polasky
2012 *Natural and Cultural History of Beargrass (Xerophyllum tenax*). General Technical Report PNW-GTR-864. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Portland, Oregon.

Hunn, Eugene S., and James Selam.
1991 *Nch'i-wána," the Big River": Mid-Columbia Indians and their Land.* University of Washington Press.

Huntington, Henry P.
2000 Using Traditional Ecological Knowledge in Science: Methods and Applications. *Ecological Applications* 1095):1270-1274.

Hutchings, M. J.
1986 Plant Population Biology. *In Methods in Plant Ecology,* 2nd Edition. P.D. Moore and S. B. Chapman, eds. Pp. 377-435. Blackwell Scientific. Oxford.

Ingersoll, Cheryl A., and Mark V. Wilson
1990 Buried propagules in an old-growth forest and their response to experimental disturbances. *Canadian Journal of Botany* 68:1156-1162.

Jarvis, Jonathan B.
2021 Personal Communications regarding efforts to revise Code of Federal Regulations provisions regarding Indigenous plant gathering activities on National Park Service lands. Mr. Jarvis served 40 years with the National Park Service and was its 18th Director. He was Superintendent at Mount Rainier National Park from 1999 through 2002.

Native American treaty law and implications for tribal resource uses on National Park Service administered lands. Mr. Wilkinson was the Moses Lasky Professor of Law Emeritus at the University of Colorado, Boulder. Among other achievements, he has taught a series of classes on Indian Treaties and Tribal Law to National Park Service, U.S. Forest Service, and other federal agencies over the past several decades.

Johansson, Veronika A., and Ove Eriksson
2013 Recruitment limitation, germination of dust seeds, and early development of underground seedlings in six pyroleae species. *Botany* 91(1):17-24.

Julander, Odell.
1968 Effect of clipping on herbage and flower stalk production of three summer range forbs. *Journal of Range Management* 74-79.

Kane, Charles W.
2017 *Medicinal Plants of the Western Mountain States.* Lincoln Town Press. Tucson, Arizona.

Keeland, Bobby D., and Patricia Joy Young
2007 Construction and Installation of Dendrometer Bands for Periodic Tree-Growth Measurements: USGS.

Kennedy, K. A., and P. A. Addison
1987 Some Considerations for the Use of Visual Estimates of Plant Cover in Biomonitoring. *Journal of Ecology* 75(1):151-157.

Kerns, Becky K, Susan J Alexander, and John D Bailey.
2004 Huckleberry Abundance, Stand Conditions, and Use in Western Oregon: Evaluating the Role of Forest Management." *Economic Botany* 58 [4]:668-78.

Kiona, Mary
1953 Testimony of Mary Kiona. In *Cowlitz* v. *the United States*. Transcript of proceedings before the Indian Claims Commission, Docket No. 197. Record Group 279, Box 837. National Archives and Records Administration. Seattle, WA.

Kloos, Scott
2017 *Pacific Northwest Medicinal Plants.* Timber Press, Inc. Portland, Oregon.

Kurth, Laurie
2001 Native American gathering study in Mount Rainier National Park plant ecology program final report. Mount Rainier National Park Archives. Ashford, Washington.

2002 Native American gathering study in Mount Rainier National Park plant ecology program final report. Mount Rainier National Park Archives. Ashford, Washington..

2003 Native American gathering study in Mount Rainier National Park plant ecology program final report. Mount Rainier National Park Archives. Ashford, Washington.

Lane, Barbara
2005 Personal Communication regarding a negotiated but unratified U.S. treaty with the Cowlitz Indian Tribe.

Lantz, Trevor C., and Joseph A. Antos
2002 Clonal expansion in the deciduous understory shrub, devil's club (*Oplopanax horridus*; Araliaceae). *Canadian Journal of Botany*, 80[10], 1052-1062.

Larson, Andrew J., and Jerry F. Franklin
2010 Rates and Causes of Western Redcedar and Yellow-cedar Mortality in Old-growth Forests of Mount Rainier National Park. In *A Tale of Two Cedars - International Symposium on Western Redcedar and Yellow-cedar*. C.A. Harrington, ed. pp. 71-75. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Portland, Oregon.

Lepofsky, Dana, and Natasha Lyons
2003 Modeling Ancient Plant use on the Northwest Coast: Towards an Understanding of Mobility and Sedentism. *Journal of Archaeological Science* 30(11):1357.

Leslie, M. Johnson Gottesfeld
1992 The Importance of Bark Products in the Aboriginal Economies of Northwestern British Columbia, Canada. *Economic Botany* 46(2):148-157.

Lundell, Anna, Sara A.O. Cousins, and Ove Eriksson
2015 Population Size and Reproduction in the Declining Endangered Forest Plant *Chimaphila umbellata* in Sweden.

Lubinski, Patrick M. and Greg C. Burtchard
2005 Archaeology of Fryingpan Rockshelter (45PI43) in Mount Rainier National Park. *Archaeology in Washington,* Volume 2.

Lyons N, Ritchie M.
2017 The Archaeology of Camas Production and Exchange on the Northwest Coast: With Evidence from a Sts'ailes (Chehalis) Village on the Harrison River, British Columbia. *Journal of Ethnobiology*. 37[2]:346-367.

Mack, Cheryl
2003 A Burning Issue: American Indian Fire Use on the Mt. Rainier Forest Reserve. In *Fire Management Today*, 63[2], 20-24. U.S. Department of Agriculture, Forest Service. Washington, D.C.

Mack, Cheryl and Barbara Hollenbeck
1985 *Peeled Cedar Management Plan.* Gifford Pinchot National Forest, Pacific Northwest Region, U.S. Department of Agriculture, Forest Service. Vancouver. Washington.

Mack, Cheryl A, James C. Chatters, and Anna M. Prentiss
2010 *Archaeological Data Recovery at the Beech Creek Site (45LE415), Gifford Pinchot National Forest, Washington.* Pacific Northwest Region-U.S. Forest Service, Gifford Pinchot National Forest, Heritage Program. Trout Lake, Washington.

Martin, Gary J
1995 Anthropology. In *Ethnobotany*, 95-135. London: Chapman & Hall.

Martin, P.
1983 Factors Influencing Globe Huckleberry Fruit Production in Northwestern Montana. *Bears: Their Biology and Management* 5:159-65. doi: 10.2307/3872533.

Mathews, Daniel
1999 Cascade-Olympic Natural History: A trailside reference. Raven Editions. Portland, Oregon.

McCloud, Hanford
2012 Interview on 10/19/2012. David Hooper, ed. Nisqually Tribal Reservation. Washington.

McCloud, Jack
2015 Interview on 06/24/2015. David Hooper, ed. Nisqually Tribal Reservation. Washington.

McCloud, Joyce
2007 Interview on plant gathering practices. Notes by David Hooper. Nisqually Tribal Reservation. Washington.

2008 Interview on plant gathering practices 10/28/2008. Transcribed by David Hooper. Nisqually Tribal Reservation. Washington

McCloud, Zelma
2006 Personal Communication regarding Nisqually tribal affairs during her time as Tribal Chair in the 1970s. The 2006 date is approximate.

McIntyre, Robert N., Sr.
1952 *Short History of Mount Rainier National Park*. United States Department of the Interior, National Park Service, Mount Rainier National Park. Ashford, WA.

McWhorter, Luculus V.
1917 Chief Sluskin's True Narrative. In *The Washington Historical Journal* 8(2):96-101.

Meany, Edmond S.
1916 *Mount Rainier, A Record of Exploration.* The MacMillan Company. New York.

Mierendorf, Robert R.
2009a The Cascade Pass Site, North Cascades National Park, Central Washington State; 9000 Years of Use of a Mountain Pass. In *Archaeology in America, An Encyclopedia, Southwest and Great Basin/Plateau*. [3] 322-323. McManamon, Cordell, Lightfoot, and Milner (eds.). Greenwood Press. Westport, Connecticut.

2009b The Newhalem Rockshelter Site, North Cascades National Park, Northwest Washington State; An Ancient and Historic Hunting and Food Processing Site. In *Archaeology in America, An Encyclopedia* Vol. 3 (Southwest and Great Basin/Plateau):324-326. McManamon, Cordell, Lightfoot, and Milner (eds.). Greenwood Press. Westport, Connecticut.

Mierendorf, Robert R. and Kevin E. Baldwin
2015 Toolstone Geography in the Northern Cascades of Washington and Adjacent Areas. In *Toolstone Geography of the Pacific Northwest* T.L. Ozbun and R.L. Adams (eds.):76-106. Archaeology Press. Simon Frazer University. Vancouver, British Columbia.

Mierendorf, Robert R. and Franklin F. Foit, Jr.
2018 *Holocene Geochronology and Archaeology at Cascade Pass, Northern Cascade Range, Washington.* Journal of Northwest Anthropology, Memoir 16. Richland, Washington.

Minore, Don
1972. The Wild Huckleberries of Washington and Oregon: A Dwindling Resource. U.S. Department of Agriculture, Forest Service Research Paper [143].

Minore, Don, and Michael E Dubrasich.
1978 *Big Huckleberry Abundance as Related to Environment and Associated Vegetation near Mount Adams, Washington*. Vol. 322: Dept. of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station.

Mobley, Charles M., and Morley Eldridge.
1992 Culturally Modified Trees in the Pacific Northwest. *Arctic Anthropology* 29(2):91-110.

Mobley, Charles M., and Michael Lewis
1992 Tree-ring Analysis of Traditional Native Bark-stripping a Ship Island, Southeast Alaska, USA. *Vegetation History and Archaeobotony* 18(3):261-268.

Moerman, Daniel E.
1998 Native American ethnobotany. Portland, Or.: Timber Press.

Molenaar, Dee
2011 *The Challenge of Rainier; A Record of the Explorations and Ascents, Triumphs and Tragedies on one of Northe America's Greatest Mountains.* The Mountaineers Books. Seattle. Originally published in 1971 by The Mountaineers.

Mooney, Emily H., Andrew A. Martin, and Robert P. Blessin.
2015 Effects of Light Environment on Recovery from Harvest and Antibacterial Properties of Oshá Ligusticum porteri (Apiaceae) *Economic Botany* 69 [1]: 72-82.

Moore, Michael
1993 *Medicinal Plants of the Pacific West.* Museum of New Mexico Press. Santa Fe.

Nabhan Gary Paul.
2000 Interspecific relationships affecting endangered species recognized by O'odham and Comcaac cultures. *Ecological Applications.* 10[5]:1288-1295.

National Park Service
1988 *Management Policies*. Most recent edition published August 31, 2006. U.S. Department of the Interior, National Park Service. Washington, D.C.

Nemecek, Samantha J.
2014 *Resource Sovereignty: The Indigenous Value of Mount Rainier within Activities of Traditional Resource Harvesting.* Master of Arts Thesis, Faculty of Social Sciences, University of Denver. Denver, Colorado.

Nesom, Guy
2000 Plant guide for saskatoon (*Amelanchier alnifolia* (Nutt.) Nutt. ex Roemer). U.S. Department of Agriculture, Natural Resources Conservation Service, Plant Materials Center, Baton Rouge, LA. http://plants.usda.gov/plantguide/pdf/pg_amal2.pdf [2015, November 2].

Nickels, Adam M.
2002 *History Under Fire: Understanding Human Fire Modification of the Landscapes at Mount Rainier National Park.* Master of Science Thesis in Resource Management. Central Washington University. Ellensburg, Washington.

Nicolai, Dean Sonneah
2013 *The Archaeological Investigation of Cedar Bark Basket Trees in Western Montana: Background, Methods, and Trial Study of Culturally Modified Trees.* Master of Arts Thesis, Department of Anthropology, The University of Montana. https://scholarworks.umt.edu/etd/962.

Nolan, Justin M., and Nancy J. Turner
2011 Ethnobotany: The study of the people-plant relationships. In *Ethnobiology*. E.N. Anderson, D.M. Pearsall, E.S. Hunn, N.J. Turner, and R.I. Ford, eds. Pp. 133-147. Wiley-Blackwell. Hoboken, New Jersey.

Ohmgari, Kayo, and Fikret Berkes
1997 Transmission of Indigenous Knowledge and Bush Skills among the Western James Bay Cree Women of Subarctic Canada. *Human Ecology* 25(2):197-222.

Pearce, Tristan, et al.
2011 Transmission of Environmental Knowledge and Land Skills among Inuit Men in Ulukhaktok, Northwest Territories, Canada. *Human Ecology* 39(3):271-288.

Peter, David, and Daniela Shebitz
2006 Historic Anthropogenically Maintained Bear Grass Savannas of the Southeastern Olympic Peninsula. In *Restoration Ecology* 14(4):605-615.

Pevar, Stephen L.
1992 *The Rights of Indians and Tribes.* Southern Illinois University Press. Carbondale.

Pojar, Jim, and Andy MacKinnon
2013 *Alpine plants of the Northwest: Wyoming to Alaska. Edmonton, Alberta, Canada*: Lone Pine Publishing.

2014 *Plants of the Pacific Northwest Coast; Washington, Oregon, British Columbia & Alaska*. Lone Pine Publishing. Vancouver, British Columbia.

Purohit, Aditya, R.K. Maikhuri, K.S. Rao, and S. Nautiyal.
2001 Impact of bark removal on survival of *Taxus baccata L.* (Himalayan yew) in Nanda Devi Biosphere Reserve, Garhwal Himalaya, India. *Current Science-Bangalore-* 81(5): 586-590.

Ramenofsky, Ann F.
1987 *Vectors of Death, The Archaeology of European Contact.* University of New Mexico Press. Albuquerque.

Reagan, Albert B.
1934 Plants used by the Hoh and Quileute Indians. *Transactions of the Kansas Academy of Science*. 37:55-70.

Rice, David G.
1965 *Archaeological Test Excavations in Fryingpan Rockshelter, Mount Rainier National Park.* Report of Investigations no. 33. Washington State University Laboratory of Anthropology. Pullman.

Roorbach, Ashley. H.
1999 *The ecology of Devil's club (Oplopanax horridum (JE Smith) Miq.).* Ph.D Dissertation. Western Oregon University. Monmouth, OR.

Schalk, Randall F.
1988 *The Evolution and Diversification of Native Land Use Systems on the Olympic Peninsula, A Research Design.* Report submitted to the National Park Service, Olympic National Park, Port Angeles, Washington; and Columbia Cascades System Office, Seattle.

1996 Personal Communication regarding Indigenous salmon capture and storage patterns, and population regeneration following catastrophic habitat destruction. Schalk is a Northwest regional archaeologist with substantial research background in salmon ecology and associated human land-use patterns.

Schensul, Stephen L., Jean J. Schensul, and Margaret Diane LeCompte
1999 *Essential ethnographic methods: Observations, interviews, and questionnaires*. Volume 2. Walnut Creek, Calif.: AltaMira Press.

Schlick, Mary Dodds
1994 *Columbia River Basketry: Gift of the Ancestors, Gift of the Earth*. University of Washington Press. Seattle.

Schmoe, Floyd
1999 *A Year in Paradise.* The Mountaineers. Seattle. Originally published 1959 by Harper and Brothers.

Schullery, Paul
1987 *Island in the Sky; Pioneering Accounts of Mount Rainier 1833-1894.* The Mountaineers. Seattle.

Servheen, Christopher, and Robert Klaver
1983 Grizzly Bear Dens and Denning Activity in the Mission and Rattlesnake Mountains. *Montana. Bears: Their Biology and Management* 5:201-207.

Shebitz, Daniela, and Caren Crandell
2014 Weaving cultural and ecological diversity. In *From the Hands of a Weaver: Olympic Peninsula Basketry Through Time*. Jacilee Wray (ed.), pp 156-169. University of Oklahoma Press. Norman.

Shebitz, Daniela, and Justine E James
2010 When Smokey Says "No:" Fire-less Methods for Growing Plants Adapted to Cultural Fire Regimes. *National Proceedings: Forest and Conservation Nursery Associations*:15-21. RMRS-P-62. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Fort Collins, Colorado

Shebitz, Daniela Joy, Sarah Hayden Reichard, and Peter W Dunwiddie
2009 Ecological and Cultural Significance of Burning Beargrass Habitat on the Olympic Peninsula, Washington. *Ecological Restoration* 27(3):306-319.

Shebitz, Daniela Joy, Sarah Hayden Reichard, and Wolde Woubneh
2008 Beargrass (*Xerophyllum tenax*) on the Olympic Peninsula, Washington: Autecology and Population Status. *Northwest Science* 82(2):128-140

Smith, Allan H.
1964 *Ethnographic Guide to the Archaeology of Mount Rainier National Park.* Draft prepared for the National Park Service. Washington State University. Pullman.

2006 *Takhóma: Ethnography of Mount Rainier National Park.* Pullman, Washington: Washington State University Press.

Smith, Marian W.
1940 *The Puyallup-Nisqually.* Columbia University Contributions to Anthropology, Volume XXXII. Columbia University Press. New York.

Spier, Leslie
1936 *Tribal Distribution in Washington.* General Series in Anthropology 3. Menasha, WI: George Banta publishing company.

Splawn, A.J.
1958 *Ka-mi-akin, Last Hero of the Yakimas*. Third printing. Caxton Printers, Ltd.. Caldwell, Idaho. First edition copyright 1917, Mrs. A.J. Splawn.

Squally, Lewis
n.d. Nisqually Tribal member personal Communication to Greg Burtchard circa 2004 via talk presented at the Mount Rainier Jackson Visitors Center. Paradise, WA.

Stabler, H.O.
1911 Grazing report. Unpublished report on file at the U.S. Department of Agriculture, Forest Service. Gifford Pinchot National Forest. Trout Lake, WA.

Standley, Lisa A., Sarah S. H. Kim, and Ingrid M. Hjersted
1988 Reproductive biology of two sympatric species of chimaphila. Rhodora 90(863):233-244.

Stark, Nellie, and Stephen Patrick Baker.
1992 *The Ecology and Culture of Montana Huckleberries: A Guide for Growers and Researchers.* Montana Forest and Conservation Experiment Station, University of Montana.

Stettler, Reinhard F.
2009 *Cottonwood and the river of time: on trees, evolution, and society*. University of Washington Press.

Stevens, M., and D. Darris.
2000 *Plant Guide for Salmonberry (Rubus spectabilis).* U.S. Department of Agriculture, Natural Resources Conservation Service, Plant Materials Center. Corvallis, Oregon.

Stevens, Michelle, Guy Nesom
2003 Plant guide for blue elderberry (*Sambucus nigra* L. ssp. *caerulea* (Raf.) R. Bolli.) U.S. Department of Agriculture, Natural Resources Conservation Service, PLANTS database. Davis, California.

Stewart, Hilary
1984 *Cedar: Tree of Life to the Northwest Coast Indians.* University of Washington Press, Seattle.

Storm, Linda, and Daniela Shebitz
2006 Evaluating the purpose, extent, and ecological restoration applications of Indigenous burning practices in Southwestern Washington. *Ecological Restoration* 24(4):256-268.

Stowe, Ki, Robert J. Marquis, Cris G. Hochwender, and Ellen L. Simms
2000 The evolutionary ecology of tolerance to consumer damage. *Annual Review of Ecology and Systematics* 30:565-595.

Strauss, Sharon Y, and Anurag A. Agrawal
1999 The ecology and evolution of plant tolerance to herbivory. *Trends in Ecology & Evolution* 14(5):179-185.

Suttles Wayne P.
1987 Variation in Habitat and Culture on the Northwest Coast. In *Coast Salish Essays.* Ralph M., editor. Vancouver: Talonbooks: Seattle: 26-44.

Thompson, Erwin N.
1981 *Mount Rainier National Park Washington Historic Resource Study.* Denver, CO: Denver Service Center, Historic Preservation Branch Pacific Northwest/Western Team, National Park Service, United States Department of the Interior.

Thompson, Nile, and Carolyn Marr
1983 *Crow's Shells: Artistic Basketry of Puget Sound*. Dushuyay Publications. Seattle, Washington.

Thoms, Alston V.
2008 The fire stones carry: Ethnographic records and archaeological expectations for hot-rock cookery in western North America. *Journal of Anthropological Archaeology*, *27*, 443-460.

Thornton, Thomas F.
2004 The cultural ecology of berries in Glacier Bay. In Piatt, J.F., and Gende, S.M., eds., *Proceedings of the Fourth Glacier Bay Science Symposium*, October 26–28, 2004: U.S. Geological Survey Scientific Investigations Report 2007-5047, p. 29-34.

Tilford, Gregory L.
1997 Edible and medicinal plants of the west. Missoula, Mont.: Mountain Press Pub.

Tirmenstein, D.A.
1990 *Taxus brevifilia.* In: Fire Effects Information System [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). http://www.fs.fed.us/database/feis/ [2015, September 29].

Thompson, Erwin N.
1981 *Historic Resource Study, Mount Rainier National Park, Washington.* Report prepared for the National Park Service, Mount Rainier National Park. Ashford, Washington.

Tolmie, William Fraser
1939 *Private Diary of William Fraser Tolmie, Aug, 1833 - Dec. 1833.* Royal British Columbia Museum Archives. Victoria, British Columbia, Canada. Available on-line at https://search-bcarchives.royalbcmuseum.bc.ca/. Select *Advanced Search* then type *A/B/40* in Search box, select *and* in “Add new criteria” then type *Tolmie* in the new Search box, then select *Search;* in the resulting list, select the file for 1832-33, then choose File MS-0557.5.1 from the resulting list.

1963 *The Journals of William Fraser Tolmie Physician and Fur Trader*. Mitchell Press Limited. Vancouver, British Columbia.

Toothman, Stephanie, Susan Begley, and Ethan Carr
1997 *Mount Rainier National Park National Historic Landmark Nomination*. National Park Service, Mount Rainier National Park. Ashford. National Register of Historic Places. Washington D.C.

Turner, Nancy J.
1988 Ethnobotany of Coniferous Trees in Thompson and Lillooet Interior Salish of British Columbia. In *Economic Botony* 42[2]:177-194.

1991 Burning Mountainsides for Better Crops: Aboriginal Landscape Burning in British Columbia. In *Archaeology in Montana* 32[2]:57-73.

1998 *Plant Technology of First Peoples in British Columbia: Including Neighbouring Groups in Washington, Alberta, and Alaska*: Royal BC Museum Handbook. University of British Columbia Press.

2006 *Food Plants of Coastal First Peoples*. Royal BC Museum Handbook. No. 34. University of British Columbia Press.

2008 *The Earth's Blanket: Traditional Teachings for Sustainable Living.* D&M Publishers. Vancouver, British Columbia, Canada.

2014a *Ancient Pathways, Ancestral Knowledge: Ethnobotany and Ecological Wisdom of Indigenous Peoples of Northwestern North America.* Volume 1: McGill-Queen's Press-MQUP.

2014b *Ancient Pathways, Ancestral Knowledge: Ethnobotany and Ecological Wisdom of Indigenous Peoples of Northwestern North America.* Volume 2: McGill-Queen's Press-MQUP.

Turner, Nancy J., Douglas Deur, and Carla Rae Mellott
2011 Up on the Mountain: Ethnobotanical Importance of Montane Sites in Pacific Coastal North America. *Journal of Ethnobiology* 31(1):4-43.

Turner, Nancy J., Marianne Boelscher Ignace, and Ronald Ignace
2000 Traditional Ecological Knowledge and Wisdom of Aboriginal Peoples in British Columbia. *Ecological Applications* 10(5):1275-1287.

Turner, Nancy J., and Sandra Peacock
2005 Solving the Perennial Paradox: Ethnobotanical Evidence for Plant Resource Management. In *Keeping It Living: Traditions of Plant Use and Cultivation on the Northwest Coast of North America*. D. Deur and N.J. Turner, eds. Pp. 101-150. Vancouver: University of British Columbia Press.

Turner, Nancy J., Y. Ari, F. Berkes, I. Davidson-Hunt, Z. F. Ertug, and A. Miller.
2009 Cultural Management of Living Trees: An International Perspective. *Journal of Ethnobiology* 29(2):237-270.

Uprety, Y., H. Asselin, A. Dhakal, and N. Julien.
2012 Traditional use of medicinal plants in the boreal forest of Canada: Review and perspectives. *Journal of Ethnobiology and Ethnomedicine* 8:7.

USDI
1910 Reports of the US Department of the Interior for the Fiscal Year Ended June 30, 1909 Vol. 1. US Government Printing Office Washington, D.C.

U.S. Geological Survey
1978 *Indian Land Areas, Judicially Established, 1978*. Map published by United States Geological Survey. Boulder, Colorado and/or Reston, Virginia.

U.S. Secretary of the Interior
1908 *Laws and Regulations relating to the Mount Rainier National Park, Washington.* Compiled by the office of the Secretary of the Interior, Department of the Interior. Washington, D.C..

Van Zandt, Peter A.
2007 Plant defense, growth, and habitat: A comparative assessment of constitutive and induced resistance. *Ecology* 88(8):1984-1993.

Vander Kloet, S.P., and Nicholas Hill.
2011 *The Paradox of Berry Production in Temperate Species of Vaccinium*. *Canadian Journal of Botany* 72 [1]:52-58.

Walsh, Megan K., Michael L. Lukens, Patrick T. McCutcheon, and Greg C. Burtchard
2017 Fire-climate-human interactions during the postglacial period at Sunrise Ridge, Mount Rainier National Park, Washington (USA). *Quaternary Science Reviews* 177:246-244.

Wilcox, A.
1911 The Columbia National Forest, its resources and their protection. Unpublished report on file at the U.S. Department of Agriculture, Forest Service. Gifford Pinchot National Forest. Trout Lake, WA.

Wilkinson, Charles
2000 *Messages from Frank's Landing; A Story of Salmon, Treaties, and the Indian Way.* University of Washington Press. Seattle and London.

2021 Personal Communications regarding Native American treaty law and implications for tribal resource uses on National Park Service administered lands. Mr. Wilkinson was the Moses Lasky Professor of Law Emeritus at the University of Colorado, Boulder. Among other achievements, he has taught a series of classes on Indian Treaties and Tribal Law to National Park Service, U.S. Forest Service, and other federal agencies over the past several decades.

2024 *Treaty Justice: The Northwest Tribes, the Boldt Decision, and the Recognition of Fishing Rights.* University of Washington Press. Seattle.

Wilkinson, Charles and the American Indian Resources Institute
2004 *Indian Tribes as Sovereign Governments; A Sourcebook on Federal-Tribal History, Law, and Policy* (2nd Edition). 1st Edition published 1988. American Indian Lawyer Training Program, Inc. (www.IndianLawReporter.org). Oakland, California.

Yang, S., JG Bishop, and MS Webster.
2008 Colonization Genetics of an Animal-Dispersed Plant (*Vaccinium Membranaceum*) at Mount St Helens, Washington. *Molecular Ecology* 17 [3]:731-40.

York, Frederick F.
2015 Personal Communications regarding the importance of treaty-reserved rights in framing the 1998 plant gathering Memorandum of Understanding between Mount Rainier National Park and the Nisqually Indian Tribe. Mr. York was Pacific Northwest and, later, Pacific West Regional Anthropologist for the National Park Service from 1991 to 2014.

Appendix A: 1998 Nisqually–Mount Rainier Memorandum of Understanding

with

1999 Regulations Regarding Traditional Plant Gathering on National Park Lands

Nisqually Indian Tribe and Mount Rainier National Park

In 1998, the Nisqually Indian Tribe and Mount Rainier National Park signed a Memorandum of Understanding (MOU) to provide for tribal gathering of a suite of 11 traditionally used plants on park lands. At the time, there were few such agreements on National Park Service administered lands in the United States. The MOU was intended to restore a modicum of tribal traditions that had been lost in the decades following the establishment of Mount Rainier National Park in 1899. Recognizing park obligations to preserve the integrity of plant and animal resources as required by the National Park Service Establishment Act (39 Stat. 535 [1916]), park and tribal negotiators imbedded collection clauses and annual review procedures they believed would protect continuing viability of gathered plants and plant habitats. Following are the original text of the 1998 MOU, and regulations for the first gathering season in 1999.

1443-MU9450-99-002

MEMORANDUM OF UNDERSTANDING

REGARDING THE GATHERING OF PLANT RESOURCES FOR AMERICAN INDIAN TRADITIONAL CULTURAL-RELIGIOUS PURPOSES FROM NATIONAL PARK LANDS
between
Mount Rainier National Park and the Nisqually Indian Tribe

Whereas, the National Park Service (NPS), Mount Rainier National Park (hereafter referred to as the "PARK") recognizes the past and present traditional cultural affiliation with certain park land and resources by the Nisqually Indian Tribe (hereafter referred to as the "TRIBE") and rights reserved through the *Treaty of Medicine Creek* of December 26, 1854, 19 Stat 1132; and

Whereas, the National Park Service seeks to build on its positive and productive relationship between the PARK and the TRIBE through the establishment and maintenance of Government-to Government relationships in accordance with the President's Directive to Federal Agencies (F.R. vol. 59, No. 85; Wednesday, May 4, 1994); and

Whereas, the National Park Service recognizes its responsibilities under Executive Orders Nos. 12875 ("Enhancing the Intergovernmental Partnership") and 12866 ("Regulatory Planning and Review") to design solutions and tailor Federal programs, in appropriate circumstances, to address the specific or unique needs of tribal communities; and

Whereas, the PARK recognizes the constitutional religious rights of the TRIBE as reiterated and reinforced by the American Indian Religious Freedom Act of 1978 (AIRFA, P.L. 95-341); and

Whereas, the PARK recognizes its responsibility under various laws and agency policies [National Historic Preservation Act, as amended (16 U.S.C. 470), the American Indian Religious Freedom Act (P.L. 95-341), Executive Order (13007), and NPS Management Policies] to consult with park associated American Indians regarding PARK lands and resources that are important to their cultural heritage and religious practices; and

Whereas, the PARK, in its role as the federal steward of national park land and resources, recognizes the need to protect and preserve natural and cultural resources for the enjoyment of future generations; and

Whereas, the PARK recognizes the TRIBE'S interest in preserving and protecting their cultural and religious traditions which involves, but is not limited to, the gathering of culturally appropriate quantities of plants on PARK lands; and
Whereas, the PARK and the TRIBE both recognize the PARK's responsibilities and obligations to protect natural and cultural resources under provisions of the National Park Service Organic Act (P.L. 64-235; 16 U.S.C. 1, 39 Stat 535), the Archeological Resources Protection Act (P.L. 96-95; 16 U.S.C. 470aa, 93 Stat 712), the Endangered Species Act (P.L. 93-205, 87 Stat 884; 16 U.S.C. 136, as amended), the National Historic Preservation Act, as amended (P.L. 89-665, 80 Stat 915-919, U.S.C. 470, as amended); and various NPS Management Policies; and

Whereas, the PARK recognizes its responsibilities under the Native American Graves Protection and Repatriation Act of 1990 (P.L. 101-601; 25 U.S.C. 3001-3013) (NAGPRA) to consult with Indian tribes on issues related to the culturally appropriate means of treating NAGPRA defined objects and human remains; and

Whereas, it is the intent of the PARK and the TRIBE to avoid any unnecessary disturbance or damage to park protected natural and cultural resources, and to work cooperatively to allow access to culturally and religiously important sites and to allow the gathering of plant materials in a manner that allows and fosters the sustainability of these resources.

NOW, THEREFORE, the PARK and the TRIBE agree that the following procedures will be adhered to for the purpose of ensuring tribal member access to areas in the PARK that have cultural/religious significance, and to create a management climate for the PARK within which the TRIBE can decide to continue (or not to continue) the gathering of culturally appropriate amounts of plants in the PARK for the purpose of engaging in and maintaining cultural practices, and transmitting to tribal youth cultural practices and beliefs.

Definitions

For the purposes of this Agreement, the following definitions shall apply:

1. **TRIBE**: As used in this document this term refers only to the federally recognized Nisqually Indian Tribe.

2. **PARK**: As used in this document this term refers only to Mount Rainier National Park.

3. **Tribal Government**: The formal governing body of the federally recognized Nisqually Indian Tribe.

4. **Tribal Government Representative**: The individual or individuals designated by the Nisqually Indian Tribe that are party to this agreement to act on behalf of their tribal government.

5. **Park Representative**: The individual or individuals designated by the National Park Service to act for the PARK as parties to this agreement.

6. **Culturally Appropriate Amounts**: This phrase refers to those amounts of plants which are used for personal, family, or community use to engage in traditional, cultural, or religious activities. Non-traditional use of these materials is excluded from this definition.

7. **Collecting**: The hand gathering of plants by traditional means.

Section I

General Agreements Regarding the Collection of Plants in the PARK by Authorized Members of the TRIBE

The PARK agrees to allow the collection of limited quantities of plants and plant material by authorized members of the TRIBE under the following stipulations:

1. General Limitation on Amount of Materials Collected:

    Collection of resources is limited to traditionally appropriate amounts of plants for personal, family, or community use. The amount of materials collected, individually or totally, shall not affect the sustainability of existing ecological relationships in those areas in which collection takes place.

2. Individuals Authorized to Collect in the PARK:

    Under terms of this agreement, only members of the Nisqually Indian Tribe are authorized to collect or gather plants within the PARK.

3. Size of Gathering Groups:

    The TRIBE agrees to adhere to existing policies of the PARK pertaining to park visitor group size in any particular area within the PARK. Special arrangements may be discussed with the PARK to allow for the visitation of larger groups under special circumstances.

4. Authorized Collection Areas:

   The TRIBE will have access to all areas of the PARK for the purpose of collection of plants. However, collection shall take place in a manner that will avoid, whenever possible, being within the sight of other visitors to the PARK. As a result of the joint monitoring process (described elsewhere in this agreement), or as a result of other administrative or resource management decisions, areas may be determined to be temporarily closed or otherwise restricted from gathering due to the condition of the resource. In all cases, the TRIBE will be consulted before areas are restricted or closed.

5. Plant Materials Available for Gathering:

   Plants and plant parts available for gathering by the TRIBE shall be those traditionally collected in the PARK by the TRIBE for cultural or religious purposes and whose status is not listed as "sensitive," "threatened," or "endangered" as determined by the PARK.

6. Limitations on Use of Material Collected:

   The use of all gathered material is limited to non-commercial, traditional use. The term "non-commercial" is not meant to preclude traditional aspects of exchange activity between tribal members or between members of different American Indian tribes. "Traditional" in this sense refers to a type of small-scale exchange of plant materials which may take place between tribal members for religious, medicinal, or other customary purposes.

Section II

Notification

1. The TRIBE will issue individual authorizations to tribal members who wish to collect or gather plants in the PARK. Such authorization and a tribal enrollment card will be presented to the designated park representative when a tribal member wishes to enter the PARK for the purpose of gathering and will exempt the individual from payment of the park entrance fee.[1]

[1] Tribal representatives will design a form to be used for this purpose and make these forms available at the tribal office. At a minimum the form will consist of a tribal authorization section, a park authorization section, and a preliminary means of recording, to the extent practical, plants to be collected, estimated quantity of collection, and an identification of the areas where the collection will take place. The TRIBE will share a copy with the PARK for keeping on file. These records will be used as an aid to implement the joint monitoring activities to be undertaken by the PARK and the TRIBE.

2. The PARK agrees to promptly notify the TRIBE of any special restrictions, considerations, or changes related to collection activities resulting from monitoring activities or from any special park management considerations.

3. The PARK agrees to provide the TRIBE with the name of principal park representative with the responsibility for administering the provisions of this agreement. The TRIBE shall provide the PARK with the name of principal tribal representative to serve as the primary contact to facilitate the implementation of this agreement.

4. The TRIBE shall promptly notify the PARK regarding any special requests or concerns related to collection activities.

Section III

General Agreements on Joint Monitoring of Impacts Resulting From Collection Activities

The PARK has a mandated responsibility to determine any potential impacts resulting from approved actions within PARK boundaries. Under this agreement, plant species to be collected and the maximum quantity of collection will be determined annually in consultation with the TRIBE and the PARK will issue a special use permit annually for same to the TRIBE. Any impacts resulting from tribal gathering will be determined through a park monitoring program. It is the intent of this agreement that the PARK and the TRIBE enter into a resource protection partnership to jointly accomplish these monitoring activities and to determine special resource management needs, if any, that result from resource gathering. The details and conditions of this partnership are to be determined in consultation with the TRIBE. This agreement constitutes a foundation for such a partnership.

Section IV

Confidentiality

Information shared with the PARK by the TRIBE or individual tribal members, related to gathering activities, shall be considered sensitive and confidential. As such, the PARK shall protect such information from public disclosure to the maximum extent practicable under law and regulation.

Section V

Dispute Resolution

1. Should any actions taken under the provisions of this agreement be disputed by either party, said party shall promptly notify by phone or in writing the other party of this dispute.

2. It is agreed between both parties that initial efforts to resolve a dispute shall make use of personal discussions among staff or representatives of the TRIBE and the PARK to identify elements of the dispute and the mutual benefits of expedient dispute resolution.

3. If the dispute cannot be resolved through discussions, then a meeting between the designated representatives of the TRIBE and the PARK shall be convened no later than 30 calendar days following receipt of the notification of the dispute.

4. In the event that the dispute cannot be resolved at the staff level, a second meeting will be convened between the PARK Superintendent, or his/her designated representative, and the Tribal Chairperson, or his/her representative no later than 30 calendar days.

Section VI

Term and Amendment

1. The PARK and the TRIBE acknowledge that this Agreement is a "living" document and may require changes or alterations to meet new or changing circumstances.

2. This Agreement shall remain in effect for a term of five (5) years and may be amended only with the written consent of both parties hereto at the time of such amendment.

3. Either signatory party may terminate their participation in this Agreement upon 30 days written notice to the other signatory.

Section VII

Multiple Counterparts

This document may be executed in multiple counterparts, and when taken together, shall be deemed as one instrument

MOUNT RAINIER NATIONAL PARK

By: William J. Briggle Date: November 23, 1998

Title: Superintendent

NISQUALLY INDIAN TRIBE

By: Stephanie Scott Date: November 23, 1998

Title: Chairperson

NISQUALLY INDIAN TRIBE

1999 REGULATION REGARDING THE GATHERING OF CERTAIN PLANTS WITHIN THE BOUNDARIES OF MT. RAINIER NATIONAL PARK

Purpose: The Nisqually Tribal Council hereby adopts this regulation in order to establish procedures for implementation of the *Memorandum of Understanding Regarding the Gathering of Plant Resources for American Indian Traditional Cultural-Religious Purposes From National Park Lands between Mount Rainier National Park and the Nisqually Indian Tribe* entered into on November 23, 1998. This regulation shall be effective from the date of adoption and shall remain in effect until December 31, 1999.

Article 1: Definitions

For the purposes of this regulation, the following definitions shall apply:

1. **TRIBE**: As used in this document this term refers only to the federally recognized Nisqually Indian Tribe.

2. **PARK**: As used in this document this term refers only to Mount Rainier National Park.

3. **Gathering or Collecting**: The hand gathering of plants or plant materials by traditional means.

Article 2: Eligibility.

Any enrolled member of the Nisqually Indian Tribe may be issued a Harvesting Permit, which will authorize him/her to gather specified amounts of certain authorized plants under this Regulation. Authorized harvesters may be assisted by non-Tribal members provided that the enrolled Tribal member to whom the Permit is issued is present at all times and all other provisions of this Regulation are adhered to.

Article 3: Permit Required

Any Tribal Member wishing to gather plant materials within the boundaries of Mount Rainier National Park is required to obtain a permit from the Nisqually Natural Resources Department prior to gathering any plant materials. The permit shall specify the type of plant to be collected, the amount of the plant that may be collected, and when applicable, the specific area from which the plant may be collected. Permits shall authorize a collection period of up to 30 days.

Article 4: Groups

Groups engaged in gathering may not exceed twelve individuals, except that special arrangements may be discussed with the PARK to allow for the visitation of larger groups under special circumstances.

Article 5: Permitting Process

1. Permits will be issued to Tribal Members by the Natural Resources Office of the Nisqually Indian Tribe during regular Tribal office hours.
2. Individuals requesting a permit will be issued a Harvesting Permit designating the type of plant, authorized quantity to be collected, and if applicable, the area in which the plant may be collected. Individuals must utilize traditional methods of collecting plant materials, and plant materials may not be used for non-traditional commercial purposes.
3. When entering Mount Rainier National Park, the Permit holder shall display his/her Tribal identification and the Harvesting Permit to Park personnel at the entrance gate. This will ensure that no entrance fee will be required, and that Park personnel know that authorized gathering activities will be taking place that day. This will also assure that the persons who are gathering will not be mistaken for individuals engaging in unlawful conduct.
4. Permit holders will be required to return the "Reporting" Section of the Harvesting Permit on or before the close of the 30 day authorization period. Information to be reported includes, but is not limited to, the date of the harvest, the amount of plant material harvested, the approximate area of the harvest, and the condition (i.e. abundance) of the resource in the harvesting area.

Article 6: Areas Designated for Gathering

Pursuant to the *Memorandum of Understanding*, and Special Use Permit # PWR MORA 9500 009, gathering of certain plants is permitted in all undeveloped areas of Mount Rainier National Park by eligible persons, providing that the requirements of this regulation are met. However, collection shall take place in a manner that will avoid, whenever possible, being within the sight of other visitors to the PARK. As a result of the joint monitoring process or as a result of other administrative or resource management decisions, areas may be determined to be temporarily closed or otherwise restricted from gathering due to the condition of the resource.

Article 7: Plant Materials Available for Gathering:

Plants and plant parts available for gathering by the TRIBE shall be those traditionally collected in the PARK by the TRIBE for cultural or religious purposes and whose status is not listed as "sensitive," "threatened," or "endangered" as determined by the PARK. Plants that are approved for harvesting and the maximum amounts to be harvested will be negotiated annually by the TRIBE and the Park. Plants, plant parts, and annual quantities approved for harvest in 1999 are:

Bear Grass (Basket Grass, Squaw Grass, Pine Lily) *Xerophyllum tenax.*
Outer Leaves
Annual Quantity: twenty (20) 33-gal. plastic bags

Berries (Blueberry, Huckleberry, Highbush Cranberry, Wild Gooseberry, Salmonberry, Serviceberry, Strawberry) V*accinium, Viburnaum, Ribes, Rubus, Amelanchier,* and *Fragaria* ssp.
Fruit
Annual Quantity: unlimited for personal use.

Cascara *Rhamnus purshiana*
Bark
Quantity: ten (10) 33-gal. plastic bags

Western Red Cedar *Thuja plicata.*
Wood, bark, and roots
Annual Quantity: Wood and bark: submit individual requests to Park Superintendent for consideration.
Roots: one (1) 33-gal plastic bag (3 bundles/bag, no more than 2 roots/tree.

Devil's Club *Oplopanax horridum.*
Bark, root, wood, fruit
Annual Quantity: ten (10) 33-gal. plastic bags

Maidenhair Fern *Adiatum pedatum.*
Entire plant.
Annual Quantity: ten (10) 33-gal. plastic bags

Western White Pine *Pinus monticola.*
Wood
Annual Quantity: submit individual requests to Park Superintendent for consideration.

Pipsissewa (Princess Pine, Prince's Pine) *Chimaphila umellata, C. menziesii.*
Leaves and roots
Annual Quantity: five (5) 33-gal. plastic bags.

Spruce *Picea sitchensis*
Roots
Annual Quantity: roots from five (5) trees (no more than two roots/tree)

Tiger Lily *Lilium columbianum.*
Roots

Annual Quantity: one (1) 33-gal. plastic bag.

Western Yew *Taxus brevifolia*
Wood
Annual Quantity: submit individual requests to Park Superintendent for consideration.

Article 8: Limitations on Quantities of Materials Collected:

Each Harvesting Permit shall be issued for a limited quantity of the plants and plant parts listed above. The maximum quantity authorized for gathering under each permit shall generally be one-tenth of the total annual listed above, except for plants with a extremely limited annual quantity*. Individuals may request more than one permit each year, but may hold only one valid permit at any given time. The maximum quantity authorized for each plant listed above shall be:

Bear Grass (Basket Grass, Squaw Grass, Pine Lily) (10 Permits Available)
Quantity per Permit: two (2) 33-gal. plastic bags

Berries (Blueberry, Huckleberry, Highbush (Unlimited Permits Available) Cranberry, Wild Gooseberry, Salmonberry, Serviceberry, Strawberry)
Quantity per Permit: unlimited berries for personal use.

Cascara (10 Permits Available)
Quantity per Permit: (1) 33-gal. plastic bag of bark.

Western Red Cedar* (3 Permits Available)
Quantity per Permit: Roots: one/third (1/3) 33-gal plastic bag (one bundle/bag, no more than 2 roots/tree).
Wood and bark: submit individual requests to Park Superintendent for consideration.

Devil's Club (10 Permits Available)
Quantity per Permit: one (1) 33-gal. plastic bag of bark, roots, wood, and/or fruit.

Maidenhair Fern (10 Permits Available)
Quantity per Permit: one (1) 33-gal. plastic bag.

Western White Pine *
Quantity per Permit: submit individual requests for wood to Park Superintendent for consideration.

Pipsissewa (Princess Pine, Prince's Pine (10 Permits Available)
Quantity per Permit: One-half (1/2) 33-gal. plastic bag of leaves and/or roots.

Spruce * (5 Permits Available)
Quantity per Permit: roots from one (1) tree (no more than two roots/tree)

Tiger Lily * **(7 Permits Available)**
Quantity per Permit: One (1) paper grocery bag of roots.

Western Yew *
Quantity per Permit: submit individual requests for wood to Park Superintendent for consideration.

Article 9: Limitations on Use of Material Collected:

Plant materials gathered under this Regulation may not be used for non-traditional commercial purposes, such as the sale of plant materials in their original state for commercial purposes. It is permissible, however, to sell traditional items that are made from these materials, such as baskets, jewelry, headware, etc.

Article 10: Violations of this Regulation

The following actions shall be deemed a violation of these regulations:
1. Harvesting or collecting any plant materials from within the boundaries of Mount Rainier National Park without first obtaining a Harvesting Permit from the Natural Resources Department of the Nisqually Indian Tribe.
2. Harvesting or collecting any species of plant that is not specifically authorized for collection on a valid Harvesting Permit.
3. Harvesting or collecting an amount of any species of plant than is greater than the amount that is authorized on the Harvesting Permit.
4. Harvesting or collecting any plant material from an area in the PARK where harvesting has been prohibited, provided that notice is given to the Permit holder.
5. Failure to return the "Reporting" Section of the Harvesting Permit to the Natural Resources Department following gathering activities and within the time specified on the Harvesting Permit.
6. Illegal sale of plant materials gathered under a Harvesting Permit, as defined in Article 9.

Article 11: Jurisdiction

The jurisdiction of the Nisqually Indian Tribe to enforce the provisions of this regulation shall only be limited by the Constitution of the Nisqually Tribe and by federal law.

Article 12: Civil Enforcement

This regulation shall be enforced in the Nisqually Tribal Court through civil rather than criminal procedures. In enforcing these regulations, law enforcement and the court shall use the procedures established in the Environmental Infractions Ordinance, Title 26 of the Nisqually Law and Order Code. The violations listed in Article 9 of this regulation shall be deemed civil infractions and shall be punishable by a maximum fine of $200. No jail time may be imposed.

CERTIFICATION

I certify that the above Regulation implementing the *Memorandum of Understanding Regarding the Gathering of Plant Resources for American Indian Traditional Cultural-Religious Purposes From National Park Lands between Mount Rainier National Park and the Nisqually Indian Tribe,* entered into on November 23, 1998, was presented to the Nisqually Tribal Council at a regular meeting held on the ____ day of June, 1999, at which a quorum was present and voting __ FOR, ___AGAINST, and ___ABSTAINED.

ATTEST:

______________________________	______________________________
STEPHANIE J. SCOTT, CHAIRPERSON NISQUALLY INDIAN TRIBE	NORINE WELLS, SECRETARY NISQUALLY INDIAN TRIBE

Appendix B: Original PEER Plant Gathering Protest and NPS Response

Included in Appendix B are copies of 1) the initial Public Employees for Environmental Responsibility (PEER) letter dated June 11, 2001 regarding Native American Taking of Natural Resources from Park Service lands, including Mount Rainier National Park. Also included is 2) the National Park Service response dated November 29, 2001. Mount Rainier National Park continued to honor terms of the Memorandum of Understanding (Appendix A) with the Nisqually Indian tribe that, in part, stimulated the PEER protest through the five-year MOU period; thereafter initiating joint Nisqually-Mount Rainier plant gathering environmental research under terms of annually renewed research permits through 2015. Additional PEER and NPS letters ensued during this time. The initial correspondences are included here to provide context for the original MOU, the basic character of the PEER complaint, and continuing research that resulted from both.

2001 Public Employees for Environmental Responsibily Letter of Concern

PEER
Public Employees for Environmental Responsibility

2001 S Street, NW • Suite 570 • Washington, D.C. 20009 • 202-265-PEER(7337) • fax: 202-265-4192
e-mail: info@peer.org • website: http://www.peer.org

Copy to Pat Parker

June 22, 2001

Mr. Dennis Galvin
Acting Director
National Park Service
1849 C Street, N.W.
Washington, D.C. 20240

Dear Mr. Director:

Public Employees for Environmental Responsibility (PEER) believes that members of Indian Tribes may take natural resources from parks where Congress or an applicable treaty specifically provides for it. Congress authorizes the activity in a number of parks. The most recent example is at Bandelier National Monument, New Mexico where members of San Ildefonso and Santa Clara Pueblos may collect plant and mineral materials for traditional and cultural uses (P.L 102-246; July 13, 2000).

SUMMARY
As a result of Freedom of Information Act (5 U.S.C. 552) requests to the National Park Service (NPS) on November 9, 2000 and January 21, 2001, PEER confirms that some parks, acting independently, are allowing the take of park resources contrary to provisions of existing NPS law and regulations. The parks have entered into formal agreements (MOUs) with Tribes that authorize the take of natural resources where there are no specific statutes that authorize consumptive use of park resources.

VIOLATION OF THE NATIONAL ENVIRONMENTAL POLICY ACT
In response to our requests, the NPS records prove conclusively the NPS did not conduct any analysis of the impact of the activities authorized by the MOUs under the National Environmental Policy Act (NEPA) (42 U.S.C. *et seq.*). The MOUs that authorize Indian gathering of park natural resources violate the law.

Given that the Act of August 25, 1916 (16 U.S.C. 1 *et seq.*) confers the highest level of protection to the resources of the national park system, PEER expects that the NPS should have given a comprehensive "hard look" at the MOUs. "[T]he "hard look" must be taken before, not after, the environmentally-threatening actions are put into effect." (NPCA v. Babbitt, (9th Cir. 2001)).

The NPS has not prepared an environmental assessment, Finding of No Significant Impact, an environmental impact statement or a record of a decision to categorically

Field Offices: California • Colorado • Florida • Maine • Montana • New Mexico • Refuge Keeper • Tennessee • Texas • Washington exclude from further review any of the MOUs. In short, NPS officials signed all of the agreements without any NEPA compliance.

The MOUs are firm commitments made to Indian Tribes. By signing them without any NEPA review, the NPS failed to take a hard look at the environmental consequences of the action and, therefore, violated NEPA. In a recent analogous decision, the Ninth Circuit Court of Appeals found that the National Marine Fisheries Service (NMFS) made an "irretrievable commitment of resources by entering into a contract with the Makah (Tribe) before they considered its environmental consequences and prepared the EA." (Metcalf v. Daley, 9th Cir. 2000)

VIOLATION OF NPS RREGULATIONS
PEER finds that two particular agreements raise critical questions. One MOU applies to Pipe Spring and Cedar Breaks National Monuments and Zion National Park and was signed by three park superintendents in June 1998. The other MOU applies to Mount Rainier National Park and was signed in November 1998.

The NPS response to our FOIA revealed that the National Parks Conservation Association (NPCA) wrote to the Superintendent of Pipe Springs National Monument on May 23, 2000 to question the Zion, Cedar Breaks and Pipe Springs MOU with the Paiute Tribes.

On July 21, 2000 the park superintendent responded. The response to NPCA confirmed that the MOUs for the three parks effectively suspend provisions of the existing NPS regulations at 36 CFR 2.1(a) that prohibit the "(1) Possessing, destroying, injuring, defacing, removing, digging, or disturbing from its natural state:...
(ii) Plants or the parts or products thereof."

The NPCA letter was searching for a legal basis for the MOUs suspension of 36 CFR 2.1(a)(1)(ii). In response to three direct questions, the park superintendent responded that the MOU authorization to take plants from the three park areas was not based upon a provision of the park's enabling proclamation. Nor was the MOU authorization to take plants based on any treaty right. The superintendent explained that the MOU is not limited to fruits, nuts or berries that the NPS may designate for limited collection under 36 CFR 2.1(c) and therefore was not based on 36 CFR 2.1(c).

The NPS superintendent explained that the MOUs were based instead upon his interpretation of 36 CFR 2.1(d). That regulation states:

> d) This section shall not be construed as authorizing the taking, use, or possession of fish, wildlife or plants for ceremonial or religious purposes, except where specifically authorized by Federal statutory law, treaty rights, or in accordance with 2.2 or 2.3.

36 CFR 2.1(d).

The superintendent claimed that the American Indian Religious Freedom Act (AIRFA) is the Federal statutory law under which the NPS may allow Native Americans to take park natural resources otherwise protected by 36 CFR 2.1(a). This conclusion, which forms the putative authority for the MOU, is contrary to the NPS rulemaking of June 30, 1983. (See 48 FR 30255 and 30263-30264.)

More alarming, if this interpretation were correct, the NPS may enter into MOUs that authorize Native Americans to take wildlife from parks if it were religious conduct. If AIRFA suspends the 2.1(a) protections for plants, it also does so for wildlife, minerals, fossils and cultural resources.

Without his permission, PEER quotes one of the most perceptive employees of the NPS. Superintendent Andy Ringgold of Redwood National Park noted the absence of legal authority and the implications of the MOU for wildlife. In an e-mail of March 31, 1998, Mr. Ringgold said this about the draft MOU for Pipe Spring, Zion and Cedar Breaks:

> As in numerous other attempts I think the agreement is trying to do the right thing but lacks basic legal authority to proceed. Unless there is a reserved treaty right to gather resources in the parks, which doesn't appear to be the case in this situation, Native Americans are governed by the same laws and regulations that apply to the rest of the world when it comes to taking park resources. AIRFA doesn't provide additional rights.... The agreement cites many statutes and EO's but none provides the authority to take park resources.
>
> What's the statutory authority that authorizes Native Americans to take plants and minerals in those parks? In my view, there is no more authority to allow taking of plants or minerals than there is for fauna. Why doesn't the agreement authorize the taking of fauna as well? If asked the question, how would park staff articulate the presence of an authority for one and the absence for the other?

E-mail of March 31, 1998 to George Turnbull, NPS Western Regional Office.

Despite the serious legal questions raised by the MOU, Mr. John Cook, the NPS Regional Director at the time, approved of the MOU "but did not send it to the solicitor for review." Meeting Notes, MOU Meeting, Zion National Park, July 7, 1998.

CONSTRUCTION OF TREATY RIGHTS

On November 23, 1998, the NPS at Mount Rainier National Park entered into an MOU with the Nisqually Tribe that permits Tribal members to collect "limited quantities of plants and plant materials" from within the park. The Mount Rainier MOU is nearly identical to the Zion-Cedar Breaks-Pipe Spring MOU and cites AIRFA among the authorities that suspend the protections at 36 CFR 2.1(a).

3

The Mount Rainier MOU is more troubling than the Pipe Spring MOU because it also cites as an authority the language of the Treaty of Medicine Creek of December 26, 1854. Article III of that treaty provided that the Nisqually Tribe retained the "right...of erecting temporary houses for the purpose of curing, together with the privileges of hunting, gathering roots and berries and pasturing their horses on open and unclaimed lands" that the Tribe ceded to the United States under the treaty. Mount Rainier contains some of the ceded Nisqually lands.

Since the Supreme Court decision in Ward v. Race Horse, 163 U.S. 504 (1896) that affected Yellowstone National Park, many Federal courts and opinions of the Solicitor held that when Congress reserved lands formerly ceded by Tribes as national parks, the lands were no longer "open and unclaimed" and the rights and privileges conferred by treaty ceased.

In November 2000, a Federal court held that when Congress established Glacier National Park and banned the taking of wildlife there, any treaty rights reserved by the Blackfeet Tribe to hunt on lands ceded by the Blackfeet in Glacier were abrogated. This decision applies only to Glacier National Park but it is evidence, along with other decisions, that significant doubt exists about the extent to which treaty rights on lands ceded by Indian Tribes survive the establishment of a national park.

The Mount Rainier MOU reverses a century-old course. The implications are enormous, not just for Mount Rainier but for Olympic National Park and others. Again, PEER borrows the words of an experienced NPS employee. Ranger William Larson, Law Enforcement Specialist for twenty years at Mount Rainier National Park, wrote:

> I know no authorizing authority (for the Special Use Permit for 1999 authorizing Nisqually activities under the MOU) except the Medicine Creek Treaty. If we use this treaty it will be a change in policy that has stood since the park was established. The Medicine Creek Treaty contains the term "open and unclaimed lands" which was popular for treaties in the mid 1800's. The previous thinking was that when the park was established in 1899 it took land within its boundaries out of the open and unclaimed status. This has been the governments (sic) successful argument in several court cases involving Native American killing wildlife in treaty areas that are now National Parks. This change in policy has the potential of effecting (sic) several National Parks and setting new policy for the National Park Service.

Memo from Wm. A. Larson to NPS official John Krambrink, April 14, 1999.

The Nisqually MOU set a dangerous precedent. Yet the NPS did not perform any environmental compliance for the MOU. The record shows some doubt whether the Department of the Interior Field Solicitor ever approved the MOUs reference to the Medicine Creek treaty as an authority.

4

REQUEST

PEER requests that the NPS place a moratorium on MOUs that authorize Native American take of park resources unless they are based on a park-specific statute or a clear treaty right. (Even in the latter cases, the NPS must comply with NEPA BEFORE signing an MOU). The moratorium must endure until the NPS changes its 1983 regulations or Congress gives new statutory direction. To do otherwise is to allow piecemeal decisions on a park-by-park basis that effectively negate rulemaking without complying with the Administrative Procedures Act (5 U.S.C. 551-706) and NEPA.

Please suspend the MOUs that purport to override 36 CFR 2.1(a), such as the MOUs for Zion-Cedar Breaks-Pipe Spring, Mount Rainier, that cite AIRFA or treaties as their authority until the issues raised by NPS employees are resolved and the NPS has complied with NEPA. In addition, some parks may be issuing special use permits for Indian take of park natural resources though the park lacks an MOU. PEER requests that this practice also be halted in conformity with 36 CFR 2.1(a) and NPS Management Policies at 5.3.5.3.1 (2001).

PEER will be happy to provide you with our analysis of why AIRFA does not overrule the protection that 36 CFR 2.1(a) confers on park resources. PEER supports consultation with Indian Tribes. PEER supports allowing the greatest possible access to sacred sites so that Native Americans can engage in religious practices. But, on behalf of many NPS employees, PEER must raise an alarm when, absent specific provision of law such as exists at Bandelier National Monument, or outside of 36 CFR 2.1(c), park managers authorize the consumptive take of any protected natural resources.

Sincerely,

Jeffrey Ruch

cc:
Mr. Michael Soukup, Associate Director, NPS, 1849 C Street, N.W., Washington, D.C. 20240
Mr. Jacob Hoogland, Chief Environmental Compliance, NPS, 1849 C Street, N.W., Washington, D.C. 20240
Field Solicitor Arthur Arguedas, PO Box 1042, Santa Fe, New Mexico 87504
Assistant Regional Solicitor William D. Back, 500 NE Multnomah St. (Suite 607), Portland, Oregon 97232

5

2001 National Park Service PEER Response Letter

United States Department of the Interior

NATIONAL PARK SERVICE
1849 C Street, N.W.
Washington, D.C. 20240

IN REPLY REFER TO:
H32 (0060)

NOV 29 2001

Mr. Jeffrey Ruch
Executive Director
Public Employees for Environmental Responsibility
2001 S Street, NW Suite 570
Washington, D.C. 20009

Dear Mr. Ruch:

This letter responds to your letter of June 22, 2001. You assert that certain Memoranda of Understanding between Native Americans and units of the National Park System violate the National Environmental Policy Act and National Park Service regulations. You request that a moratorium be placed on any new agreements, and that the agreements be suspended and special use permits be halted for use of park resources by Native Americans.

It is our view that the plant resources collected under these documents are carefully monitored to ensure that park resources are not significantly affected. None of these Memoranda of Understanding or special use permits provide for the taking of wildlife which the National Park Service only allows when it is directly authorized by Congress.

The documents to which you refer were developed after extensive consultation with the affected Indian tribes and Native Hawaiians. They represent good faith efforts to improve relations between Native Americans and the National Park Service. To suspend these agreements and permits would not serve our policy goal of providing access by Native Americans to sacred sites and the use of ecologically sustainable cultural practices and traditions. Please see the National Park System Advisory Board Report 2001, *Rethinking the National Parks for the 21st Century*, pages 21-23.

National Park Service Management Policies 2001 at 8.5 indicates that National Park Service policy is evolving with respect to Native American uses. As part of that development, we intend to consider a regulatory change that would clarify appropriate uses of plant resources by Native Americans and specify Service-wide limitations on such uses.

I appreciate your interest in the National Park Service and will keep you informed as discussions about a proposed rule develop.

Sincerely,

Denis P. Galvin
Deputy Director

Appendix C: William F. Tolmie's 1833 Mount Rainier Plant Collections

by

Arnie Peterson and Greg Burtchard

On September 2-3, 1833, William Fraser Tolmie with Indigenous guides Lachalet (Nisqually), Nuckalkut (Puyallup), and others collected 42 plant specimens along Lee Creek northwest of Mt. Pleasant, the Hessong Rock-Mt. Pleasant ridgeline, and the Mt. Pleasant summit –all within the modern boundaries of Mount Rainier National Park. Specimens were packed temporarily on-site and returned to Nisqually House– then a Hudson's Bay Company fur-trading post located on high ground north of the Nisqually River estuary (see Tolmie's journal and diary accounts in Tolmie 1939:11-26, Tolmie 1963, and Meany 1916:6-12). Part, or all, of this collection was then repacked and shipped to William Jackson Hooker, first Director of the Royal Botanical Gardens, Kew. This was Tolmie's only plant-collecting excursion to Mount Rainier; a summary account of which is included in Chapter 2 of this document. Table 2.1 in that chapter lists 25 known species collected, or referenced, by Tolmie and associates during that event.

The plant list and photographs below includes13 species that have survived and remain curated at three botanical facilities: the Royal Botanical Garden, Kew; Harvard University Herbarium, and New York Botanical Garden. Since the excursion to Mount Rainier was made for the expressed purpose of gathering medicinal plants to assist Indigenous people then residing near Nisqually House, we have also listed medicinal properties, if any, of the surviving specimens; as well as medicinal properties for two additional species referenced in Tolmie's journal, but not retained in curation.

We believe that all plants included below are those collected by Tolmie, Lachalet, and Nuckalkut during the 1833 event. Please note that botanical sample sheets shown below and accessible at referenced web-sites may also contain specimens of the same species submitted by several individuals at different locations. Photographs courtesy Royal Botanical Gardens, Kew; Harvard University Herbarium, and New York Botanical Garden.

Kew Royal Botanical Gardens Specimens
Search on: collector, W.F. Tolmie or Tolmie
http://apps.kew.org/herbcat/navigator.do

Arnica latifolia Mountain Arnica ID# K001092157
Sample sheet also contains a specimen collected by Archibald Menzies (labeled NW Coast [possibly during 1792 Vancouver expedition?].

Potential Applications: Taken internally, *Arnica* species cause a rise in body temperature; applied externally, they are antiseptic (Pojar and Mackinnon 2014:297). Mountain arnica stimulates and dilates blood vessels and capillaries enhancing healing processes for bruises, hyperextensions, arthritis, bursitis, and myalgia. Arnica may also assist with poorly healing wounds and sore throat. (Moore 1993:46-51 and Kane 2017:57-60; cf., Kloos 2017:189-10, Foster and Hobbs 2002:136-137)

Sedum spathulifolium Broad-leaved Stonecrop ID# K000739606
Sample sheet contains reference to "Common on dry rocky places of Columbia and Salmon Mtns – leaves obovate-spatulate fleshy – [unreadable] – Aug 4, 1826. 183." Also on sheet is reference near another sample "Mt. Rainier Tolmie." We assume the plant was collected at both places.

Potential Applications: Broad-leaved stonecrop be eaten raw or cooked as trail food. May be used as a styptic poultice or chewed to ease late-stage pregnancy. Crushed leaves may be applied to boils, and other infections, wounds, burns, stings, ring-worm, swollen glands, and hemorrhoids. Tea may be used for sore gums, sore throat, lung ailments, stomachache, diarrhea, and fever. (Deur 2014:214-215, Pojar and Mackinnon 2014:155, Foster and Hobbs 2002:106)

Phyllodoce empetriformis Pink Mountain-heather ID# K000780159
Written on sample sheet: "In tufts at the summit [of Mt. Pleasant]. Flowers purple. Mt. Rainier, 1836, Tolmie" We believe that 1836 refers to the time the specimens were added to the sample sheets.

Potential Applications: Unknown

Gentiana calycosa Mountain Bog Gentian ID# K000872143
Written on Sample Sheet: "Mt. Rainier, Tolmie" [Mt. Rainier]

Potential Applications: Gentian stimulates hydrochloric acid and mucus by the stomach lining useful in restoring digestive process when suppressed by anorexia, orthorexia, or various gastro-intestinal traumas. A medicinal bitter or tonic. (Kane 2017, 148-150; Pojar and Mackinnon 2014:228)

Lupinus latifolius Arctic Lupine ID# K000829642
Written on sample sheet: "On grassy hillocks at the boarder of the snow. Mt. Rainier, W.F. Tolmie 1836" (Presumed to have been attached to sheet by Hooker reflecting the processing date.)

Potential Applications: Arctic lupine can be boiled and drunk as a tea or added to steam for stomach problems. Many lupine species contain toxic alkaloids and are used primarily externally. (Foster and Hobbs 2002:306, Pojar and Mackinnon 2014:194)

Pedicularis ornithorhynchos Bird's-beak Lousewort ID# K000708973 & K000708974
[The herbarium sheet shown is 8974 and 8975 (collected by C.V. Piper). Specimen 8973 is on another sheet.] Written on sample sheet: "Mt. Rainier on the Columbia, ~~Canada~~, Tolmie, Hooker 1837" Note probably added by Hooker from Tolmie notes. "Canada" was struck out as shown. Sheet 8973 reads "N.W. Am. Mt. Rainier"

Potential Applications: Young stems and roots can be eaten raw or boiled. All *Pedicularis* species relax skeletal muscles and are effective in relieving back, neck, and shoulder pain. It serves as a relaxant and sleep aid; especially following severe muscular exertion. (Pojar and Mackinnon 2014:256, Moore 1993:63-68, Kane 2017:224-226, and Kloos 2017:256-258)

Pedicularis racemosa Sickletop Lousewort ID# K000708979
Written on Sample Sheet: "Mt. Rainier, Tolmie"

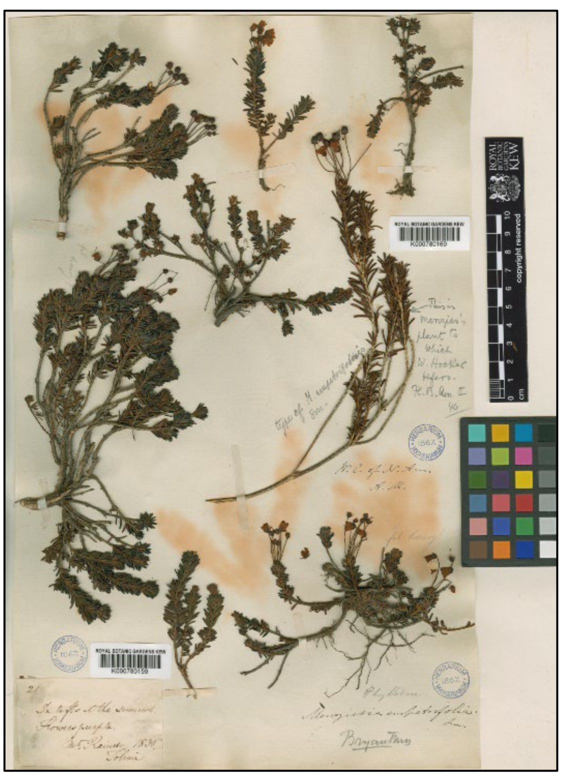
Potential Applications: As above.

Pedicularis contorta Coiled or Curved-beak Lousewort ID# K000708994
Written on Sample Sheet: "Mt. Rainier, Tolmie"

Potential Applications: As above.

Arnica latifolia K001092157

Sedum spathulifolium K000739606



Phyllodoce empetriformis K000780159

Gentiana calycosa K000872143

Lupinus latifolius K000829642

Pedicularis ornithorhynchos
K000708973 & K000708974

Pedicularis racemosa K000708979

Pedicularis contorta K000708994

Harvard University Herbarium Specimen
http://kiki.huh.harvard.edu/databases/specimen_index.html

Haplopappus alpigenus Alpine Goldenweed ID# GH: 00008638
Sample sheet contains a Tolmie note regarding Mt. Rainier, though specimens shown on the web-site do not seem to be his. Specimen may be *H. halli.*

Potential Applications: Unknown

New York Botanical Garden Specimen
http://sweetgum.nybg.org/science/vh/

Penstemon tolmiei Tolmie's Penstemon ID# 1477387
Has a 1838 date on the label. It also bears the note added at a later date "Probably collected on the west side of Mt. Rainier." Specimen may now be known as *P. davidsonii.*

Potential Applications: Astringent properties make them especially useful as a poultice applied to swellings, sores, boils, chapped skin, eczema, and mosquito or tick bites. Plant decoctions were used for stomachaches, colds, rheumatic aches, and ear infections among other applications. (Foster and Hobbs 2002:120, cf., Pojar and Mackinnon 2014:265-267)

Haplopappus alpigenus GH:00008638

Penstemon tolmiei ID#1477387

Other W.F. Tolmie Identified Species with Medicinal Value
(Curation locations for these species could not be found.)

Gaultheria shallon Salal Identified in Tolmie's (1939:11-26) Journal, but not collected.

Potential Applications: Salal is widely distributed in the Pacific Northwest, and was an important food source for aboriginal people—both eaten fresh and dried. Tea made from leaves can be used to soothe stomach, urinary tract, and intestinal inflammation; and to relieve diarrhea. Gargling the tea relieves sore throat and helps to heal mouth sores. Leaf poultice helps to staunch bleeding, and soothes sores, cuts, burns, and insect bite irritation. W.F. Tolmie used a salal poultice to treat a drained "suppurating tumor" on a Nisqually tribal member at Nisqually House in 1833. (Pojar and Mackinon 2014:53; Tolmie 1939:26, Kloos 2017:290; Moore 1993:223; Foster and Hobbs 2002:285-286)

Gnaphalium sp. Cudweed, Pearly Everlasting, Life Everlasting. Sample collected at Mount Rainier by W.F. Tolmie in 1833. Present sample location unknown.

Potential Applications: Used to prevent or relieve chaffing, and to reduce redness and swelling. Tea may have soothing anti-inflammatory and astringent properties, and act as a weak anti-histamine. (Pojar and Mackinon 2014:304;, Moore 1993:200)

References Cited

Duer, Douglas
2014 *Pacific Northwest Foraging.* Timber Press. Portland, Oregon.

Foster, Steven and Christopher Hobbs
2002 *Field Guide to Western Medicinal Plants and Herbs.* Houghton Mifflin Company. Boston and New York.

Kane, Charles W.
2017 *Medicinal Plants of the Western Mountain States.* Lincoln Town Press. Tucson, Arizona.

Kloos, Scott
2017 *Pacific Northwest Medicinal Plants.* Timber Press, Inc. Portland, Oregon.

Meany, Edmond S.
1916 *Mount Rainier, A Record of Exploration.* The MacMillan Company. New York.

Moore, Michael
1993 *Medicinal Plants of the Pacific West.* Museum of New Mexico Press. Santa Fe.

Pojar, Jim, and Andy MacKinnon
2014 *Plants of the Pacific Northwest Coast; Washington, Oregon, British Columbia & Alaska*. Lone Pine Publishing. Vancouver, British Columbia.

Tolmie, William Fraser
1939 *Private Diary of William Fraser Tolmie, Aug, 1833 - Dec. 1833.* Royal British Columbia Museum Archives. Victoria, British Columbia, Canada.

1963 *The Journals of William Fraser Tolmie Physician and Fur Trader*. Mitchell Press Limited. Vancouver, British Columbia.

Appendix D: 1915 Interior Department Memoranda on Hunting and Gathering Treaty Rights at Mount Rainier

The following two United States Interior Department documents are related to treaty rights to hunt, fish and gather plant products within the boundaries of Mount Rainier National Park by members of treaty tribes with ceded lands that included Mount Rainier. These are responses to a park request to clarify these rights in order to determine whether or not annual hunting excursions to Mount Rainier by Yakama tribal members should be prohibited or permitted in accordance to the 1855 Treaty with the Yakama. The first is a September 2, 1915 memorandum to Assistant Secretary of the Interior Bo Sweeny forwarded to Department of the Interior Solicitor for opinion. The second is the Interior Department Solicitor's response. Note, that while directly involving actions of members of the Confederated Tribes and Bands of the Yakama Nation, the 1915 documents are germane to all treaty tribes with ceded lands on Mount Rainier.

1915 DOI Letter Requesting Solicitor's Opinion

DEPARTMENT OF THE INTERIOR

WASHINGTON

September 2, 1915.

Memorandum for the Assistant Secretary:

Supervisor Reaburn of Mt. Rainier Nat'l Park wires under date of September 1, 1915, that:

> "The Yakima Indians under Chief Sluiskin are now on a hunting expedition in the northeast corner of the park. They refuse to obey the ranger's orders claiming the right to hunt and kill as they please, but say they will slaughter only what is needed."

Article 3 of the treaty between the United States and the Yakima Indians, concluded June 9, 1855, ratified by the Senate on March 8, 1859, and proclaimed by the President April 18, 1859 (12 Stat. 953), provides, among other things, that:

> "the exclusive right of taking fish in all the streams, where running through or bordering said reservation, is further secured to said confederated tribes and bands of Indians, as also the right of taking fish at all usual and accustomed places, in common with citizens of the Territory, and of erecting temporary buildings for curing them; together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land."

The only other legislation that I can find bearing on this treaty is an agreement between these Indians dated January 8, 1894, and ratified by the act of Congress approved August 15, 1894 (28 Stat. 320). Subsequently to these agreements and the legislation above-mentioned, certain lands in the State of Washington were set aside as a public park to be known as Mount Rainier National Park, by the act of March 2, 1899 (30 Stat. 993).

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This act - section 2 - provides that the Secretary of the Interior should "provide against the wanton destruction of the fish and game found within said park and against its capture or destruction for the purposes of merchandise and profit", etc.

The regulations for the government of this park prescribed pursuant to the authority contained in said act prohibit the killing of game therein except upon the conditions therein specified.

The right given the Indians under the agreement of June 8, 1855, was to hunt, etc., upon open and unclaimed land.

Since the passage of the act above-mentioned setting the land aside as a national park, I doubt very much whether this paragraph of the treaty is sufficient to support the claim of the Indians of the right to hunt and kill game within the metes and bounds of said park, and before issuing any definite instructions on the subject to Supervisor Reaburn I have to suggest that the matter be referred to the Solicitor of the Department for opinion.

W. B. Acker
Acting Chief Clerk.

RESPECTFULLY referred to the Solicitor for the Interior Department for opinion upon the question presented in the foregoing memorandum.

(Sgd.) BO SWEENEY
Assistant Secretary.

Sept. 2, 1915.

1915 DOI Solicitor's Response

PRESTON C. WEST
SOLICITOR

DEPARTMENT OF THE INTERIOR
OFFICE OF THE SOLICITOR
WASHINGTON

D-39410

September 23, 1915.

12. Mt. Rainier
Opinions

The Secretary of the Interior.

Sir:

My opinion has been requested as to the right of the Yakima Indians to hunt within the boundaries of the Mount Rainier National Park. This opinion has been requested upon the suggestion of the Acting Chief Clerk of the Department.

The land involved is a part of the territory ceded by the Yakima Indians by the treaty negotiated June 9, 1855, ratified by the Senate March 8, 1859, and proclaimed by the President April 18, 1859 (12 Stat., 951). The second paragraph of article 3 of said treaty reads:

> The exclusive right of taking fish in all the streams, where running through or bordering said reservation, is further secured to said confederated tribes and bands of Indians, as also the right of taking fish at all usual and accustomed places, in common with citizens of the Territory, and of erecting temporary buildings for curing them; together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land.

It may be noted, as showing the importance of the question, that this is one of a series of nine treaties negotiated with different tribes of Indians in Washington and Oregon during the year 1855, all being ratified on the same date and proclaimed at various dates in April, 1859, and published in twelve statutes, pages 937-979, each of which treaties contains a provision respecting hunting and fishing by the Indians in language identical with or equivalent to that quoted above from the treaty with the Yakimas.

The agreement referred to by the Acting Chief Clerk, dated January 8, 1894, approved August 15, 1894 (28 Stat., 286, 320), does not affect the matter involved here, as it relates only to land covered by article 10 of said treaty of 1859.

The Mount Rainier National Park was established by the act of March 2, 1899 (30 Stat., 993), and embraces lands within the cession made by the Yakima Indians in the treaty of 1859. The law provides that the park shall be under the exclusive control of the Secretary of the Interior, under such rules and regulations as he may deem necessary or proper for the care and management of the same. It directs specifically that such regulations shall provide for the preservation from injury or spoliation of all timber, mineral deposits, natural curiosities, or wonders within the said park, and continues:

> He shall provide against the wanton destruction of the fish and game found within said park, and against their capture or destruction for the purposes of merchandise or profit. He shall also cause all persons trespassing upon the same after the passage of this Act to be removed therefrom, and generally shall be authorized to take all such measures as shall be necessary to fully carry out the objects and purposes of this act.

The clauses in these various treaties respecting the rights and privileges of the Indians, perhaps more specially as to the right of fishing, have been the subject of litigation at various times, some of which cases will be referred to hereinafter.

That no individual has a personal property right in wild animals, and that the hunting of them is subject to control and regulation of the Government, is not subject to argument. This matter is discussed in Geer v. Connecticut (161 U. S., 519), and the conclusion there reached is stated as follows (pages 527-8):

> Undoubtedly this attribute of government to control the taking of animals ferae naturae, which was thus recognized and enforced by the common law of England, was vested in the colonial governments, where not denied by their charters, or in conflict with grants of the royal prerogative. It is also certain that the power which the colonies thus possessed passed to the States with the separation from the mother country, and remains in them at the present day, in so far as its exercise may be not incompatible with, or restrained by, the rights conveyed to the Federal government by the Constitution.

The act of March 2, 1853 (10 Stat., 172), establishing the Territory of Washington, contains a proviso in the first section as follows:

> That nothing in this act contained shall be construed to affect the authority of the Government of the United States to make any regulation respecting the Indians of said Territory, their lands, property, or other rights, by treaty, law, or otherwise, which it would have been competent to the Government to make if this act had never been passed.

By the enabling act of February 22, 1889 (25 Stat., 676), the people of the proposed States were required to disclaim all right and title to the unappropriated public lands within the boundaries thereof, and to all lands lying within said limits owned or held by any Indian or Indian tribes; and that said Indian lands should remain under the absolute jurisdiction and control of the Congress of the United States. The Congress had full control of this land at the time the National Park was established, and hence no question of State control enters here as was presented in Ward v. Race Horse (163 U. S., 504). That case arose in the State of Wyoming, the act of admission of which contained no exception or reservation in favor of the Indians.

The Acting Chief Clerk expresses a doubt as to whether, since the passage of the act of 1899, the lands embraced within the boundaries of the National Park may be classed as open and unclaimed land within the language of the treaty of 1859. Obviously the phrase "open and unclaimed land" is meant to designate land upon which no party has made settlement or has asserted a claim to under the land laws of the United States. This is supported by reference to another provision in the treaty, guaranteeing to all citizens of the United States the right "to enter upon and occupy as settlers any land not actually occupied and cultivated by said Indians at this time, and not included in the reservation above named."

In considering the provisions of this treaty and of the act of 1899, supra, it is well to refer to certain rules prescribed by the courts for construction of treaties with and laws relating to the Indians. In Choctaw Nation v. United States (119 U. S., 1), the court quotes from Worcester v. Georgia (6 Pet., 515, 582) the following:

> The language used in treaties with the Indians should never be construed to their prejudice. If words be made use of which are susceptible of a more extended meaning than their plain import, as connected with the tenor of the treaty, they should be considered as used only in the latter sense. . . . How the words of the treaty were understood by this unlettered people, rather than their critical meaning, should form the rule of construction.

After observing that the relation of the parties to the treaty there involved was that between a superior and an inferior, the court said: "The parties are not on an equal footing, and that inequality is to be made good by the superior justice which looks only to the substance of the right, without regard to technical rules." In Jones v. Meehan (175 U. S., 1, 11), after pointing out the difference between the contracting parties, it was said:

> The treaty must therefore be construed not according to the technical meaning of its words to learned lawyers, but in the sense in which they would naturally be understood by the Indians.

These cases were referred to in United States v. Winans (198 U. S., 371, 380), and it was said:

> We have said we will construe a treaty with the Indians as "that unlettered people" understood it, and "as justice and reason demand in all cases where power is exerted by the strong over those to whom they owe care and protection," and counterpoise the inequality "by the superior justice which looks only to the substance of the right without regard to technical rules."

These cases referred especially to the rule obtaining in the construction of treaties. A rule to be observed in the Government's dealings generally with the Indians is stated in Choate v. Trapp (224 U. S., 665), which involved the question of taxation of Indian lands. After pointing out that tax exemptions are strictly construed, the court continued (page 675):

> 6. But in the Government's dealings with the Indians the rule is exactly the contrary. The construction, instead of being strict, is liberal; doubtful expressions, instead of being resolved in favor of the United States, are to be resolved in favor of a weak and defenseless people, who are wards of the nation, and dependent wholly upon its protection and good faith. This rule of construction has been recognized, without exception, for more than a hundred years and has been applied in tax cases.

It may be that technically the word "privilege", which is used in the treaty of 1859 in connection with the matter of hunting, may be ascribed a slightly different meaning from the word "right", which is used in connection with fishing. To the Indian mind, however, there was no such difference. They, no doubt, intended to reserve the right to hunt on the open and unclaimed lands as effectually as they

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reserved the right to fish in waters outside the reservation described in the treaty for their use.

Bearing this in mind many of the statements of the court in the Winans case, though it related to fishing, are equally apposite to the present case where hunting is involved. The court said (page 381):

> The right to resort to the fishing places in controversy was a part of larger rights possessed by the Indians, upon the exercise of which there was not a shadow of impediment, and which were not much less necessary to the existence of the Indians than the atmosphere they breathed.
> * * * * * * * * * * * *
> In other words, the treaty was not a grant of rights to the Indians, but a grant of rights from them - a reservation of those not granted.
> * * * * * * * * * * * *
> * * * * * * * * * * * *
> And the right was intended to be continuing against the United States and its grantees as well as against the State and its grantees.

So far as disclosed by the record here, nobody questioned the right of the Indians to hunt on these lands, not settled upon or appropriated by claimants under the general land laws until after the passage of the act of March 2, 1899, supra. The question here presented is not as to the right of Congress to modify or abrogate the treaty, but is as to the extent of the modification affected by the said act of 1889. In Ward v. Race Horse, supra, it was said (page 511):

> That "a treaty may supersede a prior act of Congress, and an act of Congress supersede a prior treaty," is elementary. Fong Yue Ting v. United States, 149 U. S., 698; The Cherokee Tobacco, 11 Wall., 616. In the last case it was held that a law of Congress imposing a tax on tobacco, if in conflict with

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a prior treaty with the Cherokees, was paramount to the treaty. Of course the settled rule undoubtedly is that repeals by implication are not favored, and will not be held to exist if there be any other reasonable construction. Cope v. Cope, 137 U. S., 682, and authorities there cited. But in ascertaining whether both statutes can be maintained it is not to be considered that any possible theory, by which both can be enforced, must be adopted, but only that repeal by implication must be held not to have taken place if there be a reasonable construction, by which both laws can coexist consistently with the intention of Congress.

The language used in the act of 1899 does, on its face, effect a modification of the treaty in that it provides a restriction upon the killing of game within the boundaries of the National Park. The authority of the Secretary in this respect is defined by the provision that he shall prevent the wanton destruction of fish and game and provide against their capture or destruction for the purposes of merchandise or profit. This provision necessarily limits hunting by the Indians to the taking of such game as may be reasonably required for their subsistence. I do not intend to intimate by this that the treaty gave them any greater right. Looking at the provision in the treaty in the light of conditions existing at the time it was negotiated, it will not be presumed that either party thereto had in view the wanton destruction of game or hunting by the Indians for the purposes of merchandise and profit. In this view of it the law of 1899 simply stated specifically what was necessarily implied in the treaty.

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The law, however, did not specifically deprive the Indians of the right to take game for subsistence, nor did it, in my opinion, justify, so far as the Indians are concerned, that provision in the regulations relating to the Mount Rainier National Park, adopted March 30, 1913, which reads (paragraph 4):

> Hunting or killing, wounding or capturing any bird or wild animal on the park lands, except dangerous animals when necessary to prevent them from destroying life or inflicting an injury, is prohibited.

Hunting may not, however, be prosecuted by the Indians in such manner, at such times, and to such extent as they may elect without regulation or supervision. The exercise of the privilege must be in accordance with such regulations as the Secretary may prescribe under that provision of the law of 1899, authorizing him "to take all such measures as shall be necessary to fully carry out the objects and purposes of this act." The National Park was created "for the benefit and enjoyment of the people", and the Indians must exercise their privilege in such manner as not to defeat this expressed purpose. Proper subjects for regulation seem to be the number of Indians who may be permitted to hunt at one time, the kind of instruments that may be used in such hunting, the number of animals which may be taken or killed, etc. In short, the regulations should be so framed

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as to permit the Indians to enjoy "the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle" upon lands ceded by the treaty of 1859 and now incorporated within the boundaries of the Mount Rainier National Park, with such restrictions as may be necessary to prevent injury to the timber, mineral deposits, natural curiosities, or wonders; and also to prevent the killing or taking of animals or birds not properly classed as game, the killing of game beyond their reasonable needs of subsistence for the mere pleasure of killing, or for merchandise and profit.

Respectfully,

Preston C West

Solicitor.

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Appendix E: 36 CFR §2.6 – Gathering of Plants or Plant Parts by Federally Recognized Indian Tribes

The following addition was entered to the Federal Code of Regulations on July 12, 2016 (81 FR 45037). It provides for traditional plant gathering activities on lands administered by the National Park Service by federally recognized tribes traditionally associated with those lands prior to establishment of the park, and subject to an environmental assessment finding of no significant impact in accordance with the National Environmental Policy Act of 1969. The full text of 36 CFR §2.6 follows below.

§ 2.6 Gathering of plants or plant parts by federally recognized Indian tribes.
(a) ***What terms do I need to know?*** The following definitions apply only to this section.
Indian tribe means an American Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges to exist as an Indian tribe under the Federally Recognized Tribe List Act of 1994, 25 U.S.C. 479a.
Plants or plant parts means vascular plants or parts of vascular plants. No other types of plants may be gathered or removed under this section.
Traditional association means a longstanding relationship of historical or cultural significance between an Indian tribe and a park area predating the establishment of the park area.
Traditional gathering means the method of gathering plants or plant parts by hand or hand tools only. Traditional gathering does not include the use of tools or machinery powered by electricity, fossil fuels, or any other source of power except human power.
Traditional purpose means a customary activity or practice that is rooted in the history of an Indian tribe and is important to the continuation of that tribe's distinct culture.
Tribal official means an elected or duly appointed official of the federally recognized government of an Indian tribe authorized to act on behalf of the tribe with respect to the subject matter of this regulation.
(b) ***How may the Superintendent authorize traditional gathering and removal?*** After receiving a request from an Indian tribe to gather plants or plant parts within a park area, the Superintendent may enter into an agreement with the tribe to authorize the traditional gathering and removal of plants or plant parts for traditional purposes. The agreement will describe the terms and conditions under which the Superintendent may issue a gathering permit to the tribe under § 1.6 of this chapter. The permit will designate the enrolled tribal members who are authorized to gather and remove plants or plant parts within the park area.
(c) ***How must a tribe request to enter into an agreement?*** (1) A tribal official must submit to the Superintendent a written request to enter into an agreement under this section that contains the following:
(i) A description of the Indian tribe's traditional association to the park area;
(ii) A description of the traditional purposes to which the traditional gathering activities will relate; and
(iii) A description of the traditional gathering and removal activities that the tribe is interested in conducting, including a list of the plants or plant parts that tribal members wish to gather and the methods by which those plants or plant parts will be gathered.

(2) Within 90 days after receiving a request that contains the information required by paragraph (c)(1) of this section, the Superintendent will initiate consultation with the requesting tribe in order to develop an agreement. If a Superintendent fails to initiate consultation within 90 days after receiving such a request, then the tribe may submit the request to the Regional Director.
The Superintendent will also consult with any other tribe that has gathering rights in that park area under a treaty or federal statute or is party to a valid plant-gathering agreement with the NPS for that park area.
(d) ***What are the requirements for entering into agreements?*** Before entering into an agreement to allow gathering and removal, the Superintendent must:
(1) Determine, based on available information, including information provided by the tribe itself, that the tribe has a traditional association with the park area and is proposing to gather and remove plants or plant parts within the park area for a traditional purpose; and
(2) Comply with all applicable federal laws, including the National Environmental Policy Act of 1969, the National Historic Preservation Act, and the Endangered Species Act. The compliance for the National Environmental Policy Act of 1969 must consist of an environmental assessment and must conclude with a finding of no significant impact, which must also document the determinations required by paragraph (d)(1) of this section. The Superintendent may not enter into an agreement that will have a significant adverse impact on park area resources or values.
(e) ***When must the Superintendent deny a tribe's request to enter into a gathering agreement?*** The Superintendent must deny a tribe's request to enter into a gathering agreement if any of the requirements of paragraph (d) of this section are not satisfied.
(f) ***What must agreements contain and how will they be implemented?*** (1) An agreement to gather and remove plants or plant parts must contain the following:
(i) The name of the Indian tribe authorized to gather and remove plants and plant parts;
(ii) The basis for the tribe's eligibility under paragraphs (c)(1)(i) and (ii) of this section to enter into the agreement;
(iii) A description of the system to be used to administer traditional gathering and removal, including a clear means of identifying the enrolled tribal members who, under the permit, are designated by the Indian tribe to gather and remove;
(iv) A means for the tribal government to keep the NPS regularly informed of which enrolled tribal members are designated by the tribe to gather and remove;
(v) A description of the specific plants or plant parts that may be gathered and removed. The gathering agreement may not authorize the gathering of any species listed as threatened or endangered under the Endangered Species Act;
(vi) Specification of the size and quantity of the plants or plant parts that may be gathered and removed;
(vii) Identification of the times and locations at which the plants or plant parts may be gathered and removed;
(viii) A statement that plants or plant parts may be gathered only by traditional gathering methods, *i.e.,* only by hand or hand tools;
(ix) A statement that the sale or commercial use of natural products (including plants or plant parts gathered under the agreement) is prohibited in the park area under § 2.1(c)(3)(v);
(x) Protocols for monitoring traditional gathering and removal activities and thresholds above which NPS and tribal management intervention will occur;
(xi) A requirement that the NPS and the tribe engage in periodic reviews of the status of traditional gathering activities under the agreement through consultation;
(xii) Operating protocols and additional remedies for non-compliance with the terms of the agreement beyond those provided in this section, including mitigation, restoration, and remediation;

(xiii) A requirement that a permit issued under the agreement identify the tribal members who are designated by the tribe to gather plants or plant parts under the permit;
(xiv) A list of key officials; and
(xv) Any additional terms or conditions that the parties may agree upon.
(2) Agreements will be implemented through a permit issued in accordance with § 1.6 of this chapter. Activities allowed by a permit must fall within the scope of activities agreed upon in the agreement.
(g) ***What concurrence must the Superintendent obtain?*** Before executing any gathering agreement, the Superintendent must obtain the written concurrence of the Regional Director.
(h) ***When may the Superintendent close areas to gathering and removal?*** (1) Notwithstanding the terms of any agreement or permit executed under this section, the Superintendent may close park areas, or portions thereof, to the traditional gathering and removal of plants or plant products for any of the following reasons:
(i) Maintenance of public health and safety;
(ii) Protection of environmental or scenic values;
(iii) Protection of natural or cultural resources;
(iv) Aid to scientific research;
(v) Implementation of management plans; or
(vi) Avoidance of conflict among visitor use activities.
(2) Closed areas may not be reopened to traditional gathering and removal until the reasons for the closure have been resolved.
(3) Except in emergency situations, the Superintendent will provide public notice of any closure under this section in accordance with § 1.7 of this chapter. The Superintendent will also provide written notice of the closure directly to any tribe that has an agreement to gather and remove plants or plant parts from the closed area.
(i) ***When may the Superintendent suspend or terminate an agreement or permit?***
(1) The Superintendent may suspend or terminate a gathering agreement or implementing permit if the tribe or a tribal member violates any term or condition of the agreement or the permit.
(2) The Superintendent may suspend or terminate a gathering agreement or implementing permit if unanticipated or significant adverse impacts to park area resources or values occur.
(3) If a Superintendent suspends or terminates a gathering agreement or implementing permit, then the Superintendent must prepare a written determination justifying the action and must provide a copy of the determination to the tribe.
(4) Before terminating a gathering agreement or implementing permit, the Superintendent must obtain the written concurrence of the Regional Director.
(j) ***When is gathering prohibited?*** Gathering, possession, or removal from a park area of plants or plant parts (including for traditional purposes) is prohibited except where specifically authorized by:
(1) Federal statutory law;
(2) Treaty rights;
(3) Other regulations of this chapter; or
(4) An agreement and permit issued under this section.
(k) ***How may a tribe appeal a Superintendent's decision not to enter into a gathering agreement under this rule?*** If a Superintendent denies a tribe's request to enter into a gathering agreement, then the Superintendent will provide the tribe with a written decision setting forth the reasons for the denial. Within 60 days after receiving the Superintendent's written decision, the tribe may appeal, in writing, the Superintendent's decision to the Regional Director. The appeal should set forth the substantive factual or legal bases for the tribe's disagreement with the Superintendent's decision and any other information the tribe wishes the Regional Director to consider. Within 45 days after receiving the tribe's written appeal, the Regional Director will issue and send to the tribe

a written decision that affirms, reverses, or modifies the Superintendent's decision. The Regional Director's appeal decision will constitute the final agency action on the matter. Appeals under this section constitute an administrative review and are not conducted as an adjudicative proceeding.
(l) ***Have the information collection requirements been approved?*** The Office of Management and Budget has reviewed and approved the information collection requirements in this section and assigned OMB Control No. 1024-0271. We will use this information to determine whether a traditional association and purpose can be documented in order to authorize traditional gathering. We may not conduct or sponsor and you are not required to respond to, a collection of information unless it displays a currently valid OMB control number. You may send comments on any aspect of this information collection to the Information Collection Clearance Officer, National Park Service, 12201 Sunrise Valley Drive (Mail Stop 242), Reston, VA 20192.
[81 FR 45037, July 12, 2016]