

Collaborative Resource Stewardship Plan Nuwuvi (Southern Paiute), the Spring Mountains National Recreation Area and the Desert National Wildlife Refuge Complex

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3



Contents

9	Chapter 1. Introduction				
11	Chapter 2. Nuwuvi Past, Present and Future				
	Ancestral Territory				
12	Language				
13	Origin Story				
13	Interconnection with the Land				
14	Contact Period				
	Nuwuvi Today				
19	Chapter 3. Nuwuvi Ecological Knowledge and Understanding				
19	Environmental Ethic				
21	Mountains				
25	Water				
33	Plants				
48	Other Landscape Features				
50	Chapter 4. Perceptions of Pinyon-Juniper Ecosystem Management				
52	Mistletoe Parasitism				
53	Pinyon-Juniper Encroachment				
54	Fire Management				
56	Synthesis and Implications				
60	Chapter 5. Perceptions of Hydrological Management and				
	Restoration				
63	Springs, Seeps, Streams and Ponds				
65	Water Catchments				
66	Population Growth and Recreation				
67	Non-Native Species and Climate Change				
68	A Note on the Term "Management"				
68	Hydrological Restoration				
71	Chapter 6. A Model for Collaborative Resource Stewardship				
78	Individual/Family				
79	Specialist Groups				
80	Events				
85	Chapter 7. Proposed Collaborative Resource Stewardship Activities				
85	Prioritized Stewardship Interests				
88	Proposed Resource Stewardship Activities				

Contents

92	Appendix A: Project Methodology
95	Appendix B: Ethnographic Research Methodologies
107	Appendix C: Case Studies of Collaborative Stewardship/ Management Projects
121	Appendix D: Select Pinyon-Juniper Ecosystem and Management Resources
126	Appendix E: Select Water and Hydrological Management Resources
131	References



5

List of Acronyms

DNWR: Desert National Wildlife Refuge DNWRC: Desert National Wildlife Refuge Complex NWG: Nuwuvi Working Group PSU: Portland State University SMNRA: Spring Mountains National Recreation Area TMI: The Mountain Institute USFS: United States Forest Service USFWS: United States Fish and Wildlife Service TEK: Traditional Ecological Knowledge LEK: Local Ecological Knowledge

List of Tables and Figures

34	Table 1: Select Nuwuvi Plant Names and Uses
51	Table 2: Summary of Nuwuvi (Southern Paiute) and Federal Agency Perceptions of Pinyon-Juniper Management by Category/Theme
61	Table 3: Summary of Nuwuvi (Southern Paiute) and Federal Agency Perceptions of Hydrological Management and Restoration by Category/ Theme
12	Figure 1: Nuwuvi (Southern Paiute) Ancestral Territory and Current Reservations
15	Figure 2: Nuwuvi (Southern Paiute) Ancestral Territory, Federal Agencies and Current Reservations
16	Figure 3: Nuwuvi (Southern Paiute) Ancestral Territory, Desert National Wildlife Refuge Complex, Spring Mountains National Recreation Area and Current Reservations
73	Figure 4. Pinyon-Juniper Ecosystems, Nuwuvi (Southern Paiute) Ancestral Territory, Current Reservations, Spring Mountains National Recreation Area, Desert National Wildlife Refuge Complex and Other Federal and Private Lands
74	Figure 5. Watershed and Springs, Nuwuvi (Southern Paiute) Ancestral Territory, Current Reservations, Spring Mountains National Recreation Area, Desert National Wildlife Refuge Complex and Other Federal and Private Lands
75	Figure 6. Pinyon-Juniper Ecosystems, Nuwuvi (Southern Paiute) Ancestral Territory, Current Reservations, Spring Mountains National Recreation Area, Desert National Wildlife Refuge and Other Federal and Private Lands
76	Figure 7. Watershed and Springs, Nuwuvi (Southern Paiute) Ancestral Territory, Current Reservations, Spring Mountains National Recreation Area, Desert National Wildlife Refuge Complex and Other Federal and Private Lands
77	Figure 8. Collaborative Stewardship Framework
82	Figure 9. Gathering For Our Mountains Event Logo
83	Figure 10. Sample Collaborative Stewardship Event Fliers

Glossary

- 1. animals: pisavav
- 2. arrowhead: weenup
- 3. Autumn: uvan
- 4. basket: nuhup
- 5. brush shelter: noveep
- 6. cave: tugun
- 7. dunes: *tu-uv*
- 8. echoes: ahnowv
- 9. fire: naeteep or kuna

10. grinding stone-hole in boulder near food supply: *pawhaddonumb*

11. grinding stone- elongated stone used as pestle: *pawhawcoo*

12. grinding stone- portable flat stone: matas

13. grinding stone- flat round edged stone used as pestle: *mo-ohz*

- 14. home: kanee
- 15. meadow: yu-nuip
- 16. moon: meyothogoputs
- 17. petroglyph: *tutugove po-ohp*
- 18. pine nut harvest: tuva sawaga
- 19. pine nut: teuv
- 20. pottery (pot): pabun
- 21. rain: oowaduh
- 22. rock: tumb
- 23. sky: togoo omb
- 24. snow: nuvav

8

25. Spring (season): taman

- 26. spring (water source): pas
- 27. story: tooveenup
- 28. Summer: tawts
- 29. Sun: tavaputs
- 30. star: pootseev
- 31. thunderstorm: tasanewud
- 32. trails (human): nuwu-vots
- 33. trail (animal): tuvong
- 34. water : *pa*
- 35. wind: nugad
- 36. Winter: to-om

Nuwuvi words listed here and used throughout this document are derived the Pahrump and Las Vegas dialects sourced from Leroy Howell, Pahrump Paiute Tribe, March/April 2011 and April 2012.



Chapter 1. Introduction

Nuwuvi (Southern Paiute) embody a distinct cultural affiliation to many traditional homeland areas in the southern Great Basin and northern Mojave Deserts. A large portion of this territory is now considered public lands managed by the U.S. Forest Service, Fish and Wildlife Service, National Park Service, Bureau of Land Management and other federal and state agencies. These land managers are in a unique position to foster a reunion of the indigenous peoples within their ancestral territory, which was severed during the contact period with non-Indians.

Collaborative resource stewardship provides opportunities to facilitate consultation and rapport building. Activities such as pinyon-juniper management through pine nut harvests and spring restoration are key components for creating positive relationships. Federal agencies and Nuwuvi Nations can work together to explore mutual interests related to integrated natural and cultural resource management for the benefit of the land, native people and the general public.

Resource Stewardship can be defined as collaborative engagements between federal agencies and Nuwuvi Nations that hybridize indigenous/western science-informed outcomes. Although management and stewardship may appear to be similar terms, *management* in this plan refers to the direct physical or spiritual management of a single entity (i.e., federal agency or American Indian Nation(s)). The term can be highly politicized when used to describe collaborative resource management. Conversely, *stewardship*, a more neutral term, is utilized to refer to multiple entities with different ways of knowing and understanding the land and how it functions working together for the benefit of the land and all peoples connected to it, including its Nuwuvi relatives, federal land managers and visitors to the area.

It is important to note that this collaborative resource stewardship plan is not intended to be a universal document for all agencies; rather, it serves as a model for federal agencies in southern Nevada to adapt their individual working relationships with culturally affiliated Native American Nations. It can be used as a foundation to gain an understanding and further insight into Nuwuvi relationships with their ancestral territory and begin the examination of the similarities and differences between an indigenous way of knowing and western science. The plan also introduces various Nuwuvi/federal agency collaborative resource stewardship opportunities. Collectively, this plan was born out of a desire and need to do something more meaningful and systematic than simply 'checking the box' or 'written correspondence' as a basis for consultation. Lastly, the plan ensures current resource management efforts take Nuwuvi perpectives into account for creating hybrid indigenous/western science outcomes. It is rooted in rapport and consistency and aims to be resilient with the likelihood of changes in federal agency personal and Tribal Government representatives.

The plan begins by introducing *Nuwuvi past, present and future* (see Chapter 2) and presenting information collected from systematic ethnographic research on *Nuwuvi ecological knowledge and understanding about the land, mountains, water, plants, other landscape features and the interconnections among them* (see Chapter 3). *Nuwuvi and federal agency perceptions of pinyon-juniper and hydrological management and restoration* are then shared (see Chapters 4 and 5). A model for collaborative resource stewardship in the Spring Mountains National Recreation Area and Desert National Wildlife Refuge Complex is then presented (see Chapter 6). The final chapter provides suggested collaborative resource stewardship activities (see Chapter 7). The Plan concludes with Appendices that illustrate the *project methodology* and provide *case studies of collaborative stewardship* and *select pinyon-juniper ecosystem* and *hydrological resources* (see Appendices A-E).

The authors hope that this foundational plan begins an era of increased interaction and blending of collective wisdom in the best interest of the land and all those who love it.



Chapter 2. Nuwuvi Past, Present and Future

Ancestral Territory

Nuwuvi (Southern Paiute) or 'the people' are Numic speakers who have called the southern Great Basin and northern Mojave Deserts home for thousands of years. Their oral history explains that they were created at *Nuvagantu* (the Spring Mountains landscape, Nevada) at the beginning of time when the world was new and were subsequently placed throughout the ancestral homeland and charged with the responsibility of caring for the land and its resources (Figure 1).

They call themselves *Nuwuvi, Nuhwu* or *Nungwu*, which translates to 'the people.' In English, they are known as the Southern Paiute Nation. This name came from other non-native peoples; however, they have adopted it contemporarily as their American identity. The ancestral territory spans four states (Nevada, Utah, Arizona, and California) with a current population of approximately 3,000 people. Numbers have diminished significantly due to disease episodes and resource exploitation from general encroachment by settlers into their homelands. Previously, Nuwuvi occupied many areas throughout these four states; presently, members are affiliated with seven federally and non-federally recognized American Indian Nations who live on various reservations, rural communities and in nearby cities. Within the ancestral territory are a variety of public and private lands. On public lands, the U.S. Government is the land manager who has issued federal mandates emphasizing the importance of consulting with the Nations on a government-to-government basis. In these areas, Nuwuvi have recognized the importance of working collaboratively with federal agencies to responsibly manage both cultural and natural resources in culturally appropriate ways.

Language

Nuwuvi speak a Numic language that is not written and is learned by listening and speaking. Other tribes, such as the Shoshone, Hopi, Ute, and Comanche also speak Numic languages. Although under the same group, individual variations or dialects exist within the Nuwuvi language. These differences include pronunciation and borrowing or adapting terms from neighboring languages. In some instances, words may be completely different from dialect to dialect. The words selected for this document are generally derived from the Las Vegas, Moapa, and Pahrump Paiute dialects although others are provided. They are presented in italics and spelled phonetically.



Figure 1. Nuwuvi (Southern Paiute) Ancestral Territory and Current Reservations

Adapted from Kelley and Fowler 1986: BARA 2005

Origin Story

Nuwuvi oral history explains that they have been in the southern Great Basin and northern Mojave Deserts since the beginning of time when the world was new. They are linked to each other and their ancestral territory through a common language, ancestral ties, songs, stories and many other deep-rooted traditions. The ancestral territory is connected to how humans (Nuwuvi) were placed in their traditional homelands at the beginning of time. The winter story, which is summarized here, describes how Ocean Woman made humans (Nuwuvi). She placed Nuwuvi inside a special basket for their journey to the Spring Mountains Landscape. In order to complete the journey, Ocean Woman instructed Coyote to take the sealed basket to Mount Charleston, but not to look inside. An inquisitive being, Coyote's curiosity got the best of him and he peeked inside the basket; when doing so, many Nuwuvi jumped out and scattered across the landscape. He quickly closed the basket and continued on until he once again checked inside. Others then came out, until the basket was empty. The places where the basket traveled coincide with the Nuwuvi ancestral homeland. Once there, the Creator said that if Nuwuvi live in partnership with the land by taking care of the resources and treating them with dignity, the people would never be alone. The land would take care of them. This precious gift was intended to be forever cherished and never to be owned. Although thousands of years have passed since Nuwuvi were created, the concept of ownership of the land and all its resources is still foreign and not easily understood or contextualized in Nuwuvi culture.

Interconnection with the Land

Nuwuvi consider the land as a living being that requires continuous interaction and presence to remain healthy. It is not and cannot be divided from them; rather they remain united as one family. The Creator made it this way. Nuwuvi are charged with the responsibility of caring for the land for the future generations, just as the land has cared for them. This entails both physical and spiritual management techniques and interactions. When they were placed on this land, the Creator gave them the unique treasures and resources that are abundant in these homelands. The messages were taught to Nuwuvi by various spiritual beings that provided them with knowledge and wisdom to care for the resources so that they would continue to flourish together for future generations. As an example, the following Welcome Statement developed by the Nuwuvi Working Group illustrates this relationship:

> Welcome to our sacred land, *Nuvagantu*. It is a place that is alive and has power. The land has feelings to greet you, eyes to see you, and ears to hear you. It talks from every place in your sight. All of the plants, animals, rocks, water, snow, and air in this landscape are living and need to be in balance to remain healthy. To sustain this balance, we treat all beings with the utmost respect, as we have since the beginning of time. We are inseparable from these mountains, which are powerful, yet delicate. Our language and songs resonate through the springs, trees, rocks, and animals. We harvest resources here and renew our cultural and familial ties.

Nuwuvi (Southern Paiute) continue to care for this land as we have for thousands of years, long before it became a National Recreation Area. We along with the U.S. Forest Service actively strive to keep the land in balance in culturally appropriate ways. Although you may not see us, you will surely hear our voices and feel our presence. Take a moment to get acquainted with this special place and allow it to know you. Use your senses and open your heart. This is a landscape where your spirit can be replenished and you can learn valuable lessons. Please walk softly on these grounds as we do and it will continue to thrive for generations.

As children, Nuwuvi are taught that the land defines their culture and reaffirms their past, present and future destiny. It speaks loudly about who they were and continue to be, long after they go on the spiritual journey to the afterlife. Without their presence and active involvement, the land misses them and suffers from loneliness, depression and neglect.

Nuwuvi can hear the land crying for help and nobody wants to hear its voice. Nuwuvi know they cannot do it alone. It is imperative federal agencies and visitors to these areas understand the importance of Nuwuvi perspectives, and help protect and preserve what the Creator has collectively given Nuwuvi to make the world whole and keep the land in balance.

Contact Period

During the contact period, Nuwuvi were forced to adapt to changing circumstances and began adopting other ways of life. These included ranching, expanded farming, railroad, mining, military service and more. Many Nuwuvi remained in their traditional areas while others moved to cities or other areas in search of employment. They helped in the development of the surrounding areas, providing labor and crucial knowledge of the land. In many cases, Nuwuvi taught the settlers how to live in this environment based on their extensive knowledge. It is in this era that they received English names.

During this era, the federal government relocated Nuwuvi to reservations without consideration of traditional life-ways. Some were allotted lands within the traditional areas. Others were denied *formal* recognition by the government, as is the case of the Pahrump Paiute Tribe, which continues to this day. Some Nuwuvi resisted going to reservations and retreated to different parts of the ancestral territory. While deciding where to locate the reservations, the United States Government began identifying potential areas that were thought to be



unproductive and undesirable land to other settlers. Eventually, settlers began to gradually encroach upon much of the ancestral territory and the U.S federal agencies annexed various portions as well (Figure 2). The land was consequently affected by the introduction of non-native plants and animals through ranching and the depletion of resources through mining. Exploitation of native plants, animals and claiming ownership over water resources became common. Eventually, slices of Nuwuvi territory were impacted by the arrival of the military and large-scale landscape modifications attracting workers and their families, such as the Hoover Dam, Lake Mead and early railroad systems.

The most far-reaching change that the contact period brought to the indigenous people of the Great Basin is the disconnection from their land. It was a time of great hardship and many challenges, where Nuwuvi saw many people die from unfortunate circumstances beyond their control or comprehension.



Figure 2. Nuwuvi (Southern Paiute) Ancestral Territory, Federal Agencies and Current Reservations

Adapted from Kelly and Fowler 1986; BARA 2005

Nuwuvi were also repeatedly introduced or exposed to various forms of Christianity, the most common being Mormonism. Some converted voluntarily and others were enticed into these faiths, although others resisted. Many intermixed pre-contact spiritual perspectives with elements from the new traditions. Today, it is not uncommon for some Nuwuvi to practice aspects of both; however, it is important to note that some have never been converted or been exposed to Christianity.

Starting in the mid-1800s, the Nuwuvi ancestral territory was reduced significantly due to encroachment and disease episodes. In 1872, the Moapa Paiute of southern Nevada were relocated to lands east of the Sheep Mountains near the Virgin River (federal recognition 1875; territory expanded 1980). This area was originally intended for all southern Nevada Paiutes and encompassed a larger portion that was ultimately reduced significantly by the United

These lands were later expanded approximately 19 acres downtown and 4,000 acres between the Spring and Sheep Mountains (federal recognition 1970; territory expanded 1983). The Las Vegas Paiutes were originally given 10 acres of land near downtown Las Vegas in 1911, by Euro-American settler Helen J. Stewart. These lands were later expanded to nearly 19 acres and eventually beyond downtown Las Vegas to another area of approximately 4,000 acres located between the Spring and Sheep Mountains (federal recognition 1970; territory expanded 1983). The five Nuwuvi bands in Utah were all allotted land during this era. In the 1950s, the federal government *terminated* all but one of the bands. This occurred through Congressional action that attempted to assimilate Indian tribes throughout the United States

Figure 3. Nuwuvi (Southern Paiute) ancestral territory, current reservations, the Spring Mountains National Recreation Area, Desert National Wildlife Refuge Complex and other federal lands.



Ash Meadows, Pahranagat, and Moapa Valley are National Wildlife Refuges. The Shivwits Paiute are part of the Paiute Indian Tribe of Utah. The Kaibab Band of Paiute, Chemehuevi Tribe, Colorado River Indian Tribes are not on the map.

into mainstream lifestyles. Recognizing the importance of maintaining their tribal identity, these five nations were later reinstated in 1980 under the umbrella of the Paiute Indian Tribe of Utah. The Kaibab Paiute of Arizona share their lands with Pipe Springs National Monument and a nearby Mormon community (federal recognition 1913). For the Chemehuevi Tribe, many individuals were relocated to the Colorado River Indian Tribes reservation in 1865 (which represents Chemehuevi, Hopi, Navajo and Mohave peoples); Some Chemehuevi retained their distinct identity and were associated with the Chemehuevi Indian Tribe in 1907, which was later terminated. Although a portion of their land was covered by water with the construction of a dam in Arizona and California in the 1970s, some Chemehuevi families returned to their homelands with the reestablishment of the Chemehuevi Tribe reservation in California near Lake Havasu (Spoon and Arnold 2012; Pritzker 2000; Spoon et al. 2011, 2012).

Nuwuvi Today

Today, each federally recognized Nation has developed native owned business enterprises that provide goods and services to tribal members and surrounding communities. Examples include: casinos, golf courses, gas stations, various stores, museums, cultural centers, smoke shops and more. All of these businesses support tribal infrastructure and provide resources for social, cultural and environmental programs.

Nuwuvi interactions with and perceptions of non-Indian settlers shaped how many people

view them today. The myth that they were wandering hunter-gatherers of the desert without any defined territory, life-way, or complex culture and belief system, began in this era. The geological surveys of George M. Wheeler (1869-71) and the ethnographic assessments of John W. Powell (1871-73) served as an introduction to identifying Nuwuvi culture. Early cultural anthropologists Alfred Kroeber, Edward Sapir, Julian Stewart, and Isabel Kelly also added to outside perceptions of the culture, further compounding their perceived anthropological image. Nuwuvi acknowledge that some of this information is useful; however some of this research has been detrimental. Many early



anthropologists did not conduct extensive nor systematic fieldwork and only relied upon a limited number of informants. As the discipline evolved, methods improved and studies became more complex and useful.

Even today, some archaeologists still theorize that Nuwuvi are newcomers to the area and that other indigenous peoples existed within their homeland before their arrival. This theory known as the Numic Spread argues that the migration of Numic people followed the distribution of the pinyon tree as a food source to the ancestral lands as early as 300-500 years ago. These assertions are based on academic speculation and not necessarily supported by contemporary anthropologists. Expectedly, Nuwuvi strongly disagree with this conjecture that contradicts their worldviews described in the traditional Creation Story and encoded in

their ecological knowledge and understanding. This continuous conflict requires Nuwuvi to repeatedly refute these assertions and unnecessarily prove who they are and what they know. These unfounded hypotheses impede the assertion of Nuwuvi cultural affiliation to southern Nevada public lands. They also silence the Nuwuvi ability to tell their story and demonstrate their way of knowing. Nuwuvi believe that those who were here before them are their direct ancestors and speak of their blood running through Nuwuvi veins thus allowing them to share a common culture. Fortunately, many more progressive anthropologists and other individuals recognize this dilemma and have experienced and recognized the value in collaborating with Nuwuvi to accurately tell their story with others.

Unfortunately, it is common for the public and even for some federal agency staff to be influenced by a romanticized image of Nuwuvi that neither accounts for continuous change or their constant presence on these lands. Nuwuvi culture has undergone countless changes since the beginning of time; however, it remains place-based, which forms the basis of their perspective. While Nuwuvi did not start to change when non-natives came to the United States, they did experience impacts at a severely rapid pace due to outside influences. Many outsiders think of the culture as unchanging or stuck in the past. Some even think that they no longer inhabit their lands or have disappeared entirely.

As experienced through years of direct involvement with the land, Nuwuvi remain consistent in their views; their traditional knowledge reaffirms they are still here, and that they have never left their homelands. As with any culture, it requires an understanding of their past, present and future to truly appreciate the complexities of their views.



Chapter 3. Nuwuvi Ecological Knowledge and Understanding

The following ethnographic information was sourced from structured and semi-structured interviews with 28 Nuwuvi consultants. Graduate Researchers from the Anthropology Department at Portland State University conducted the research in two research phases (January-March 2012 and August-October 2012). Additional information was also added from previous research (see Spoon et al 2011, 2012a, 2012b, 2012c; Spoon and Arnold 2012). The ethnographic research primarily focused on the biota and function of pinyon-juniper ecosystems and hydrological resources; however, where appropriate, other information is shared to provide context (see Appendices A and B).

Environmental Ethic

To define Nuwuvi ecological knowledge and understanding, the authors borrow from Berkes' (2008:7) definition of traditional ecological knowledge, as 'a cumulative body of knowledge, practice and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationships of living beings (including humans) with one another and with their environments.' This information is incrementally learned over time and responds to lessons learned from crises and mistakes.

Before contact with non-native peoples, Nuwuvi were more than merely hunters and gatherers wandering throughout the desert, as often portrayed in the literature. The Creator engaged them in a sophisticated way of life that allowed them to receive songs and stories and provided them with needed foods, medicines and other resources. This included interacting with numerous animals such as Mule Deer, Mountain Sheep, Tortoise and Jackrabbit to name a few, while also gathering countless other resources. They farmed various crops—squash, corn, beans and melons among others and harvested hundreds of medicinal plants for healing. There are areas Nuwuvi return to cyclically each year for many of these resources. They manage them using the traditional values of interaction and respect so that they continue to provide what they need. Many of these traditions carry on today and are interspersed with other strategies to thrive. Much of the value system that reinforces respect and maintains balance remains consistent, even when practices adapt and change.

From a Nuwuvi perspective, the land needs to be properly managed to remain healthy. Accordingly, the Creator charged Nuwuvi to assume this responsibility, which entails both physical and spiritual management protocols. Without Nuwuvi presence and active and sustained involvement, the land suffers sickness from loneliness, depression and neglect. Physical management includes the select harvest of non-timber forest products, incorporating seasonal considerations, temporal taboos on hunting particular wildlife, spring and water catchment maintenance, patch burning, pruning, whipping (knocking down old pine cones, branches and needles) and more. For example, in pinyon-juniper habitats where pine nuts are harvested in autumn according to certain cultural indicators including the Milky Way and particular plants being in bloom, systematic patch burning is used to reduce fuel loads and clear old vegetation from the forest floor, thus restoring or creating new crops. Nuwuvi describe the importance of limbing the lower branches of trees to ensure that fire burns through the forest and not up tree crowns. Old cones are then knocked off the trees (whipped) and hemiparasites (parasites that are also photosynthetic typically on juniper trees) are removed and burned. Spiritual management embodies specialized songs and prayers in the Nuwuvi language that feed the land. Nuwuvi therefore consider spiritual interaction as an essential component of physical management (Spoon and Arnold 2012).

Upon entering the mountains or before leaving for a journey certain practices are observed, which have many similarities, but may vary from person-to-person or from tribe-to-tribe. The Creator, the keeper of the mountain along with other key spirits, is greeted through communication and special interaction. The purpose of the journey is relayed, with assurance given that their presence will be respectful and harmonious. Safety may be requested as well as protection over the individual or areas, so that the mountain does not take them away and they become lost. When specific things are sought or if there are plants to harvest, permission and guidance must first be requested. Concurrently, offerings are left as gifts to demonstrate appreciation, respect and humility.

Well, I would say that the Indian people, learned from the land itself. That the land can communicate if you're in tune with it and if you're sensitive to it. If you see it as always in harmony and you're part of that harmony, so it in turn will reciprocate and it will show you, you know, how to behave toward it, to make it good and keep it in balance.

-Native Elder, Colorado River Indian Tribes

First of all, before you do anything to go there, you have to say your prayers. What I was told when I was little, no matter where you're at, the first thing that you do is offer a prayer even if you're going there to go look. Before you go, give something like dirt, whatever you had, candy, rock, anything. Pray to it, tell them why you're going there, that way they'll know. You know somebody will be looking at you when you go there; you ain't the only one who stares. Somebody else is there, may even be there waiting for you.

-Native Elder, Paiute Indian Tribe of Utah

I think it [knowledge of how to interact with the land] came from...the animals that were protecting us. Because I believe that we all spoke in some fashion to each other. The sheep, snakes, birds, humans, rabbits, all those, we all spoke together. They would tell us a lot of the stories about how you would take care of this and I believe that that's where it started. It didn't start from mankind itself. It started way before then, when we first started coming out of the ground. That's why I believe that those things started happening.

-Native Elder, Moapa Band of Paiute Indians



Mountains

Mountains have been on this earth since the beginning of time when the world was new. They are important forces in sustaining resources and world balance. The mountains have spirits who watch over the landscape. They attract rain and snowfall and purify the water for the land, plants, animals and humans. Water from the mountains is revered for its purity, although Nuwuvi believe all water is related and can be affected by inappropriate actions or activities elsewhere. Mountain ranges are interconnected with one another. When pollution or other human interactions disrespect a mountain range, it will in turn react and affect others in different forms.

Mountains specifically in southern Nevada are also significant to humans because they have provided a more moderate climate during the year in comparison to what is found in the valley. These ecosystems provide Nuwuvi with many important plants, animals, minerals and other resources used for food, medicine, utilitarian and spiritual purposes. Before contact with early settlers, mountains were spiritual places and the source of special foods and medicines gathered only during particular times of the year or in special locations. After encroachment by settlers who took over springs and other precious resources in the lower elevations, Nuwuvi families were forced into other areas and eventually onto reservations or isolated communities. Children were sent to boarding schools, mountains became refuges or hiding spots for those who resisted or were fearful of the impending changes. Today, mountain areas remain important to Nuwuvi as places for spiritual connection, ceremonial activities and locations for harvesting special resources, cultural revitalization and respite. I think that it wasn't until the white man or the government came in and started collecting all the Indians, collecting ... not all the Indians, collecting all the young Indian kids to send them away to boarding school, that a lot of people, because of that, to get away from that, they had no place to go. So they moved up into their sacred lands, which is a no-no. You know Indians don't live on sacred land. When they had that to be afraid of, when you're being intimidated and stuff like that, there was only one place to go and that was back to their sacred land. That's why a lot of Indians today, their families lived in the mountains. Before they all lived in the valleys...(Our stories) were built in that mountains (Mt. Charleston landscape). When they came down they got threatened and stuff, they had no alternative but to start migrating or moving back into that mountain.

-Native Elder, Colorado River Indian Tribes

The purpose of singing was...a song to the mountains, a song for the spirits, you know, because we believe those spirits are everywhere. And when you go out in the mountains, you don't just go out there, you have to feed the mountains, let the mountains know what you're doing out there. You know, 'cause that's what I did when we went out into these mountains here in Nevada. Those spirits out there don't know me so I had to make sure that I was going to be safe, so anytime I was going to eat or had food to offer, I would offer it to the mountains, 'cause that's what I was taught as a young person.

-Native Elder, Kaibab Band of Paiute Indians

I have this horrifying thought that once the mountains are gone, the earth will probably perish, as we know it.

-Native Elder, Colorado River Indian Tribes

Nuvagantu or the Spring Mountains Landscape

Nuvagantu (where snow sits) or the Spring Mountains landscape is one of the most important mountain landscapes to Nuwuvi—a site of creation. To some, the Spring Mountains are a forbidden area that was only visited by special spiritual people. Some individuals have visited the Spring Mountains a handful of times physically, but are quick to mention they have travelled to its peaks often through the songs or stories in a spiritual journey. Natural resources including pine nuts from the Spring Mountains landscape have a reputation of being more desirable. Water located in the range is considered a unique feature and special gift of this environment. The resources in the Spring Mountains landscape are generally considered healthy, although there is concern about the number of private residences and the increase in visitors who do not know proper cultural protocols associated with interacting with the mountain.

And those mountains, they attract that rain, which is... I'm glad to see the rain there in that mountain, because that's our sacred mountain. You know, keeping it green, keeping it nice like that...you look at those mountains from down below...you don't see the beauty of it until you get up into it. It just looks like old, dry, desert mountains. But it holds a secret. It holds a secret. It contains a lot of life. And to me it's amazing because that dry looking mountain...if anybody was to hear our story, how it's a sacred mountain to us, and how our people were brought there, they would think, oh my gosh, they were brought into that desert in those dried out old mountains, and if you don't know the people, and never been into those mountains, that's what you would think. But it's really a green, beautiful place...a sacred place to us.

-Native Elder, Kaibab Band of Paiute Indians

Like I say, the Natives from here, the Paiutes...in the summer time, they'd be up in Mt. Charleston because the water used to run freely up there. And then in the winter time, they'd come down to the valley because they used to have...they had these—like the aquifer went all the way through these areas, and the people knew where they were...right where the animals went...that's how the Paiute people survive is by watching the animals...what they did and what they ate. They knew what to eat and what not to eat, because they—the animals were still around. So that's how they learned a lot of this stuff. So they knew where the water was. That's how they recognize where to go.

-Native Elder, Las Vegas Paiute Tribe

The Sheep Mountains Landscape

The Sheep Mountains landscape is an important place in the Nuwuvi world that provides a reservoir of resources throughout the seasonal cycle. It has a complex trail system that connects Nuwuvi throughout this world and into their afterlife. Nuwuvi speak of the area when the world was new and the animals could talk. Wolf and his brother Coyote lived and watched over these areas. They were told to talk to each other from their own mountains across the valley while watching out for one another because of their strong family connections. The nearby mountains watched and listened to the messages spreading their words in special stories, songs and placing them in landscapes



found here for Nuwuvi to manage and use. These important spirits continue to watch over the area and travel freely while never forgetting their relatives and relationship with the land, a legacy still understood and observed by Nuwuvi.

In more recent times, the mountains became surrounded with residential development and within close proximity to military training activities that present a challenge for accessibility. However, with an emphasis placed on preserving the resources, coupled with the remoteness of the area, there is far less visitation today than found in other nearby areas, creating an ideal refugia for select species.

... a little bit, not a real lot because it's kind of like sealed off. You can't go there too much because of the military. Yeah, we went up there I think in the late 60s I think, somewhere around then. We actually just went up to visit with the mountain sheep, 'cause there are mountain sheep there. So we went up to visit with them and I say visit with those because I believe that animals, plants, birds, fish, all those things, the ground, the Earth itself....they're all my relatives.

-Native Elder, Moapa Band of Paiute Indians

I know the Sheep Mountains. That's where the Southern Paiutes, they went to collect their pine nuts back in there. And there's an area where they have a big pitAnd it's still there and that's where they used to bring all their produce and their animals that they used for the winter, coming winter and they would roast all their meats and all their pine nuts and medicinal plants. And they would do it all together.

-Native Elder, Colorado River Indian Tribes

Interconnections within and among Mountain Landscapes

Everything in the Nuwuvi world is interconnected, and when one component becomes unhealthy or out of balance, it ultimately affects other elements of the system. Elements, weather, plants, animals, rocks and other landscape features all affect one another. Nuwuvi consider the activities of humans, such as interacting with the land, telling of stories or singing of songs in this system. When these forces are healthy and engage in meaningful interactions with one another, the land is considered healthy and in balance.

The land, it's features and life forms are connected in many different ways. Water connects the landscape both above and belowground through its waterways and aquifers. It is the lifeblood of the surrounding land. All life requires water, and relies on the springs dotting the landscape where people, birds, animals and the land come to survive. Spiritual beings travel through watercourses that are connected hundreds of miles away.

The animals that travel between them also connect and interact with the springs, and other interrelated mountain ranges. Birds, deer, mountain lions, mountains sheep, and other fauna make the journey across low-lying valleys to adjacent ranges to keep balance in the area.

Physical and spiritual trails crisscrossing the landscape can still be found or are used throughout the mountains and deserts. The unbroken patina covering the rocks and special offerings left along the trail by Nuwuvi ancestors identify old trails. As Nuwuvi used certain trails leading to springs, resource sites or to other destinations, it was customary to leave offerings and sing songs along the landscape, which are embedded in special seasonal stories. There are Nuwuvi trails connecting certain places such as those from the Moapa area to Pahranagat Valley and onwards to the Sheep Range. From there, connections exist from the Sheep Range that lead to the Spring Mountains and finally to Pahrump and Ash Meadows. One particular trail in the Spring Mountains is meant for people who are sick or need help. To use this trail, the sick person or a medicine person makes a spiritual journey building up strength and power as they go. By the time they arrive at the destination, they have accumulated enough power to heal or overcome the sickness. There is also a trail colloquially called the Holy Trail running from the Spring Mountains to the Pintwater Range further to the north. The trail follows the path of Wolf who left after Coyote had an argument with him and became upset with each other. Other stories connect the Sheep and Spring Mountains by the path Fox used to create springs while another is a trail Bear journeyed on between the two ranges.

I think that's our basis of belief as Native people. That's where everything has a purpose and has a role and connection is, you know, with the elements, weather patterns, with the snowfall, the

rainfall, all of that, you know. There's that connection of its importance to the land and water resources.

-Native Representative, Kaibab Band of Paiute Indians

We have a trail from here that goes to Corn Creek, that continues on over from Corn Creek to Indian Springs and over below Willow Springs and over to Wheeler Springs down into Pahrump.... It used to be the path our people took. And then from Indian Springs there was another trail into Pahranagat.

-Native Elder, Moapa Band of Paiute Indians

Everything that we have within (our) cultural landscape affects the springs. Not just on the ground, I mean things in the sky...the songs that pass through the area...songscapes, storyscapes that are all around that describe those things that are there also, and as part of our, our tribute, I guess it is, and out of respect for those other resources. So all that, they're very important, but it's also something that...with those feelings it's something that kind of evokes a great deal of respect form everybody, the way that you interact with any of those different types of resources.

-Native Elder, Pahrump Paiute Tribe



Water

Water is the lifeblood of the earth and all living things. It shapes the land and feeds the plants, animals, humans and the spiritual beings that watch over the area. Water is a living entity, sentient, similar to humans. Water commands a great deal of respect, and mistreating or offending it can make it disappear, or result in serious repercussions.

Although water is vital resource to sustain life, it is important not to misuse or upset the beings who watch over it. Wasteful behaviors can cause negative impacts and a serious imbalance in the world. Water is viewed as a precious natural resource given as a gift to sustain plants, animals and humans. It therefore must be carefully managed.

Today, water plays an equally important role in contemporary Nuwuvi economies and activities, which incorporate agriculture, tourism and recreation, requiring access to this important resource by always incorporating the notion of respect.

My grandma, used to say we drink from this earth and this water, and they always thanked thankful for what they got. The water especially, and this earth. If we didn't have it we wouldn't be alive.

-Native Elder, Las Vegas Paiute Tribe

The Power of Water

Water is alive and has great power. Nuwuvi are told by the Creator to manage water sources to help keep the land in balance. The water is treated with reverence, so that it will thrive. It speaks to Nuwuvi as they speak to it. Water must always be approached very carefully and respectfully. It is connected above and below the ground and travels from one area to another. Nuwuvi speak about the importance of listening and understanding the messages of the water to remain strong. When it is treated properly, it will reveal itself and provide good things. When it is upset, it can cause great harm to people or bring undesirable changes to the world. When it has been disrespected, it retreats underground and travels to other places where it can be safe.



Water is very precious to the people...you know, as we grew up... Paiute people didn't waste it. They used it in the right way. They used it as medicine too. I mean, blessing. Water blessing and all that. Yeah, my grandfather used to bless us sometimes, you know. We had bad dreams...get his feathers out, get the cedar, the smoke. Pray in every different direction, put water, put it on us...water is very sacred. That's what I'm saying. That's how they used it too, for a blessing.

-Native Elder, Las Vegas Paiute Tribe

I know there's ceremonies that you sing and you offer the ground some water...some water so that you're giving it a blessing and you're making the land holy, and you know, the traditional people, they tend to carry water like that. They use it specifically as a blessing.

-Native Elder, Colorado River Indian Tribes

You can't do things that are offensive to the water...they say to not be nasty or things bad thoughts around water, or else it would go away...throwing debris and stuff in there, you're not supposed to do that. You're supposed to go up to it very carefully, and you are not supposed to startle it, you're not supposed to throw rocks in it, because that disturbs it and makes it upset. You're supposed to gently awaken it. I mean, even when talking and singing and choosing words that starts out very mellow. So it's more soothing. And as it awakens, then now you can start singing or talking a little more loudly.

-Native Elder, Pahrump Paiute Tribe

Humans and Water

Water has always been one of the most vital resources for Nuwuvi. It is considered extremely important to Nuwuvi due to its scarcity in these arid landscapes. Many Nuwuvi express frustration with people who take water for granted because of modern engineering that makes water readily accessible.

.... we're high desert people. And not having the streams and the lakes and all of those things in place, we viewed water as a gift from the Creator. And when the Creator gave us water, he didn't say that this was for you, you know, as a human being. He said that this water must be shared by all beings. Not only the humans, but the animals and the elements of the earth.

-Native Representative, Kaibab Band of Paiute Indians

Knowing that the water has such power. Knowing that it carries such a strong spirit...whenever I have like turmoil or there's huge stresses...whether it involves my children, life, work, family, community, and there's a real big stress that I have to deal with...I go to the water. And I will—I tell the children "I have to go to the water," and I travel to the Colorado River. And I take my offerings and I sit there and I pray and I talk to that water for strength to come back and having to face whatever the issue or the stress may be, or to deal with that stress.

-Tribal Representative, Kaibab Band of Paiute Indians

Nuwuvi restricted human settlement from water sources. The reason for this restriction is to ensure that animals had full access to the water without having to worry about human presence within the immediate vicinity. This provision coincides with Nuwuvi perceptions of what is needed to sustain life and the integrity of the landscape.

...they never camped right on them (springs) or really close to them, because you can contaminate it doing it that way. But you know, away from it, but you can come over and get your water, and you know, make your offerings and your prayers before you got your water. Talking to the water. And you know, there are spirits in the water too.

-Native Elder, Kaibab Band of Paiute Indians

Animals and Water

Water is equally important to animals as it is to humans. The Creator put water on the earth for animal as well as human use. For this reason, humans must share this important resource with the animals. Animals know where water sources are located and what times of year they are available. Nuwuvi rely on animals to communicate where water sources are and whether or not it is safe to drink.

Some animals are seen as being harmful to water sources, springs in particular. This is especially true of wild horses and cattle, which tend to trample springs as they drink, thus depleting the flow.



When the water is gone and there's no more water that's available for them to drink in the evening, then they have to go five, six miles, ..., to go find the next waterhole, because we live in the desert, and our desert here is really arid, and so the animals depend on water wherever they can get it I know turtles do that, I know coyotes do that, and I know deer do that.

-Native Elder, Colorado River Indian Tribes

I know that when water dies, all the vegetation dies with it, and it's a sad, sad thing when water is taken away, because vegetation, animals, and the other flying birds ... can't live without water. They need to have water. Otherwise they're forced to migrate to a new home, and they don't do that. Turtles don't do that. They don't migrate.

-Native Elder, Colorado River Indian Tribes

Stories and Songs

Stories and songs are important in maintaining balance and a strong relationship with the water. Many culturally important stories refer to water. Most fitting is the Nuwuvi Creation Story, which describes a time when the earth was covered in water and the animals could talk and interact with the environment. Some stories have corresponding songs that describe the origin of specific water sources or other resources located near water sources. These stories and songs are an integral component for describing and understanding storyscapes and songscapes. Thus, Nuwuvi culture, and specifically ecological knowledge, continues as it is embedded in songs and stories and shared with future generations.

Water, like I say, from in the beginning of our Creation Stories, water played an important part. And it's sad I can't tell the Creation Story the way it is, because of the season—it's not the right time. But like I say, it's always been important to the Native Americans. We have a lot of stories on it.

-Native Elder, Moapa Band of Paiute Indians

There are songs like that. Bringing people together near water. They do sing songs about bringing people together when they haven't met for a long time and they would sing songs and it would be

by water, because these people, they're not gonna meet out in the desert somewhere. They're gonna meet by water sources, cause that's where they get their water.

-Native Elder, Las Vegas Paiute Tribe

Changes Over Time

Nuwuvi share how they have witnessed massive changes to their water resources in these areas throughout their lifetimes. Many of these changes have resulted from growth in Las Vegas, which at one point contained several artesian springs. Numerous Nuwuvi shared that the landscape is "drying up," a change they attribute to more people disrespecting the water by relying on the underground aquifers and thinking of it as an unlimited resource. Water must be now brought in from rural areas that contain upset water spirits who will create a disturbance and cultural and ecological imbalance in Nuwuvi homelands.

Nuwuvi also recognize that degradation is occurring in water quality, especially in the Colorado River, Muddy River, Pahranagat Valley, Ash Meadows and other large bodies of water within the region. This change is attributed primarily to increased recreation using boats and watercraft that is considered an unnatural activity that negatively affects the balance of these resources. Other contributing factors including agriculture, ranching, mining, power plants, factories and government-sponsored activities are believed to cause detrimental cultural and physical effects on the environment and the water.

A lot of the elders could stand up and say, 'I remember this,' like my dad said, 'the water was clear—we could see right down to the bottom. Not like the way it is now, where—it's beautiful and everything, but it just—it has too much toxins in it now. It's not for drinking like when we were children.'

-Native Representative, Colorado River Indian Tribes

Everything is, is really drying up. I've seen the desert—from the lack of water—die. You know, we don't have the Joshuas, you know, looking at one year, two years ago; looking at the Joshua...they're all drying up and dying from lack of water. We don't have the vegetation out there any more from the lack of water. We don't have used to have.

-Native Elder, Las Vegas Paiute Tribe

It's so crazy to me, you know, the way we have our rains today...I remember growing up, we had spring rains...rains would be so nice, and now we're having rains in the fall. Yeah, things are not balanced anymore, and there are plants that are growing at different times of year than they used to.

-Native Elder, Kaibab Band of Paiute Indians

Springs, Seeps, Streams and Ponds

Springs are an extremely important water source for Nuwuvi, helping to sustain people while traveling and camping. The water available at low volume seeps would be maximized by digging a hole around the damp part of ground and letting it fill up with water. Springs were often spoken of as being the point of origin where water comes above ground. Springs are

most pure at this point, with layers of geology acting as natural purifiers for the water. Once spring water is exposed, potential contaminants can be introduced from trash, chemicals or unnatural sources. Some springs are ephemeral coming to life at different times while others are available year round.

Like other types of water, the relationship between humans and springs is delicate, and must be managed to alleviate disrespect or mistreatment. When water is upset, it can lessen in volume or withdraw completely.

Mainly they (springs) come out of mountains and they come out of certain hills and they are like a fountain and they seep into the ground, much to the delight of animals and birds...they know where all the water springs are, and in my culture, we believe that it we don't treat these springs right then they get mad and they'll disappear.

-Native Elder, Colorado River Indian Tribes

There are things that were taught that you shouldn't be doing at the springs. Because you can actually stop the flow of it, they say the flow of the springs.

-Native Elder, Moapa Band of Paiute Indians

... oftentimes the people would see a seep or whatever, they would dig a hole and everything and whatever thing that could hold it, you know...they'd put a little hole there... they always found a way to keep the water there.

-Native Elder, Las Vegas Paiute Tribe

Springs are strategically placed and named by the Creator or other deities. Nuwuvi have a unique understanding about the location of springs that are described in songs and stories.

Water from springs can possess different cultural abilities depending on location and resources nearby. Some locations are known for their spiritual power, and people often travel long distances to retrieve water from those specific sources. This water is sought after for specific ceremonies or for other purposes. Nuwuvi believe each spring has a unique character or personality that makes it difficult to generalize about springs and the restoration necessary.

....well, the way the water was named from the, from the Coyote, ...so he's the one that named all the springs...every one of them springs got a name to it.

-Native Elder, Pahrump Paiute Tribe

When you left the valley, you sang this song for a good trail, and when you got there there'd be water. And when you got there, you'd sing this other song giving thanks that there was water up there, you'd have a rest and have some of that water, and then sing another song that you're gonna take off and go to the next spring.

-Native Elder, Chemehuevi Indian Tribe

Culturally, when we talk about the world when it was new...the Creator had decided where certain springs were to be. We have songs that talk about the placement of those springs. There's

certain animals that are responsible for making those springs as well. They then select where those springs would be.

-Native Elder, Pahrump Paiute Tribe

Nuwuvi were involved in complex farming, which produced crops from springs. These crops included squash, corn, beans and melons, typically planted by families during seasonal rotations. Other native foods and medicines were managed and harvested throughout the seasons by families who would return at a later point in time to harvest the crops.

Where the water comes up out of the ground. And I guess, it just comes up! It comes running, and it's green and there's trees, there's willow trees and arrowweeds, and you just throw your seeds in the ground and let that crop grow and go do something else and you come back and everything is grown.

-Native Elder, Chemehuevi Indian Tribe

Fences and artificial barriers that surround springs today are of concern to many Nuwuvi. On one hand, they protect the springs from non-native animals, such as horses, burros and cattle; on the other hand they may prevent other animals to access the springs. These barriers disrupt the natural flow of water making it more difficult for humans to visit and manage springs. Prayers and songs may also have trouble transcending barriers that are intended to protect the water source. Since barriers were never placed around springs in the past, Nuwuvi believe the water spirits are troubled causing new management issues to surface.

The downside,, is that it's artificial...the songs and the prayers and things that we do...even though the chain link is open, sometimes things still can't get through the chain link. It's like an obstacle or a little barrier. It becomes a filter of sorts.

-Native Elder, Pahrump Paiute Tribe



It is very important that stream water continues to flow. If water is disrespected or tampered with, it may reverse flow direction or stop flowing all together.

Some people say if you bother with the water it'll go down...that Pahrump ranch used to have a lot of water a long time ago. It had big huge ponds. We used to go swimming when I was a little girl. But when they bother with it, trying to think if they're gonna find more water with a bulldozer dozing it, and the water went ... and now there's no water.

-Native Elder, Pahrump Paiute Tribe

A stream, it runs constantly until it dries up. Wherever it moved, because underneath the water moves here and there. It don't stay in one area. Sometimes it runs to a certain area and then it's being directed some other way, and then it goes to a different direction.

-Native Elder, Las Vegas Paiute Tribe

Many activities are currently affecting streams and ponds in these areas, including recreational endeavors. All terrain vehicles (ATVs) and equestrian and mountain bike trails are threats to water health. ATVs release oil onto the land and water and some riders leave other traces, such as trash behind.

... Cause they don't care—they make their own roads and obviously they leave trash out there and you can see parts laying out there and you can see where they've spilled oil, because you know, they've punched a hole in something.

-Native Elder, Pahrump Paiute Tribe



Water Catchments

Pohs or water catchments, commonly known as *tinajas*, play an important part in ensuring adequate water for animals and humans in the southern Great Basin and northern Mojave Deserts. *Pohs* are depressions formed in bedrock by rainfall, wind, seepage, or other flowing water. These depressions fill up during rainfall. They are managed by Nuwuvi as an ephemeral source of water during these periods.

After rains, you can tell where those...little pohs that may be there, and a lot of times it's because of sediments in there need to be cleaned out. There's a way to do all that, so you have to feed the pohs too...as those things were cleaned out, you have to give it some water, so you may have to bring in water...bring in water to the area to introduce it, but ... it's almost like a magnet, and so the other water will recognize it, the rain will recognize it. And other water, if it's even from flash floods, will recognize it, andso that way, the animals will know where it's at.

-Native Elder, Pahrump Paiute Tribe

They usually had them by areas where they probably had like a rock shelter...near a rock shelter. But they had like covers on them, I guess. You know, rain would collect and then they would cover it up and they would use it later. To keep it from evaporating faster, because it's covered, you know. But it's not completely—you know, if the rain hit it, it would fall back in. There was an opening to let it fall in. but it wasn't wide open, like you would see some areas where the water collected, it would just evaporate really fast. But it lasted a while, I guess. They were there, on top of a ridge. People would clean them out to catch water...

-Native Elder, Las Vegas Paiute Tribe

Subterranean Hydrological Resources

Various types of water features are interconnected, such as springs, streams and ponds, all originating from underground aquifers and snow melt. Many negative human impacts to hydrological resources occur underground. Sometimes water that typically flows aboveground changes to flow underground if something is done to make it go away. Subterranean waterways are considered important pathways for supernatural beings to keep the water alive.

There's an abundance of water, but it's underground. And like I said, that's how the Paiute people survived here. Cause, you know, they knew where the water was.

-Native Elder, Las Vegas Paiute Tribe

Culturally there are certain beings...supernatural beings...from other people's standards. But they're normal to us...that live in the water, travel in the water. And they can go from one area to another area...one spring to another spring through that. So we know that there's those pathways, and so we have stories about underground water systems that relate to, and typically correspond to different springs and different activities that happen in those springs.

-Native Elder, Pahrump Paiute Tribe



Plants

Plants are vital sources of food and medicine used for sustenance. They are sentient beings that communicate and interact with humans. Many plants like to be harvested, and will go away if they are no longer used or cared for. Plants growing on their own are thought to be stronger because of the difficulty of standing on their own. Similarly, plants growing on mountaintops and other extreme locations are thought to have greater power. If the right message or feeling is not received from the plant, it should not be gathered, even though there may be an abundance of that species available. The wrong harvester can get sick or encounter bad experiences if they ignore the wisdom of the plant. Certain plants also need to be growing alongside or surrounded by other plants to function correctly as medicine. This is a specialized knowledge that not everyone has.

Latin Name	Common Name	Nuwuvi Name	Use
Artemisia sp.	Sage	Sa-wa-ve	 Leaves: Purification, tea, humidification, and dye. Stalk: Scratching stick Bark: Clothing, twined rope, bags and garments
Calochortus nuttallii	Sego Lily	Sigʻo	 Leaves: Food Roots: Food Indicator for water
Castilleja sp.	Indian Paintbrush	Inip-ma-tho-rup	1. Leaves: Tea
Cercocarpus sp.	Mountain Mahogany	Tu-nam-ba	1. Branches: Digging sticks, arrows, frames for baskets, fuel, twine, rope and mats
Ephedra viridis	Indian Tea	Tu-tupe	 Needles: Tea Roots: Gum Whole: Tattoos (charred)
Ericameria nauseosa	Rabbitbrush	Skump	 Flowers: Indicator of Pine Nut Harvest Season Stalk: Shelters, Dolls (bun- dled to make body) Root: Gum
Gutierrezia sp.	Matchweed		1. Whole: Firestarter
Juniperus osteosperma	Utah Juniper	Wa' ap	 Bark: utensils, necklaces, bow staves, clothing, shelters, fuel, adornment, smoking buckskin, storage for baskets awls Trunk and Branches: Fuel
Larrea tridentata	Creosote	Ya-tumb	 Sap: Adhesive, preservative Whole, Branches: fuel, summer shades, digging sticks, lotion
Lycium andersonii	Wolf Berry	Pa'up	1. Berries: Food
Nicotiana attenuata	Indian Tobacco	Saxwaxwapi	 Leaves: Offerings (dried, smoked) Managed by patch burning
Oryzopsis hymenoides	Indian Ricegrass	Wai	1. Stalk: Food
Pinus monophylla	Singleleaf Pinion	Тиvар	 Pine Nuts: Food (roast, grind to flower) Sap: seal water jugs, gum, ceremonial use Branches: shelters, and fuel.
Proboscidea parviflora	Devil's Claw	Munee- kasetaw	 Stalk: Basket designs, Seeds: Food Indicator of Nuwuvi Gardening

Table 1. Select Nuwuvi Plant Names and Uses

Latin Name	Common Name	Nuwuvi Name	Use
Prosopis glandulosa	Mesquite	O'pimb	 Pods: Food (roast, grind to flower), flavor drinks, fuel Branches with Sap: Awl for basketry Trunk and Branches: Fuel, shade
Purshia glandulosa	Buckbrush	Hunupi	 Bark: Clothing, rope, sandals, mats, fuel, dye Branches: Mats, baskets
Quercus sp.	Oak	Kwiav	 Branches: Cane and Cradle Trunk, Branches: Whip Trees in Pine Nut Harvest and Pinion- Juniper Management, fuel, spears, canes Acorns: Food (mush) Associated Lichen: paint
Ribes cereum	Gooseberry	Pohgombi	1. Berries: Food 2. Stems: Arrows, Spears
Salix sp.	Willow	Kanav	 Branches: Baskets, water jugs, cradleboards, bows, arrows Trunk, Branches: Houses and Shelters
Stanleya pinnata	Princess' Plume (Indian Spinach)	Tu mar	1. Leaves: Food
Vitis arizonica	Wild Grape	Nuwu-eeyav	 Berries: Food Whole: Summer shade Indicator for water
Yucca baccata	Banana Yucca	U'ivi	 Roots: Food (roasted), sham- poo, basket designs Leaves: Sandals, matches
	Cottonwood		 Trunk: Building Whole: Shade Indicator of Water

But normally it's the plant that will say, okay, ya know, you can use me. And that takes a long, long time to understand. The way it moves, if it's warm, if it gets an okay, ya know. And some places, ya know, you don't feel nothing from it. So I leave it alone. You never know what happened there, or you never know what's gonna... when you pick it up, your gonna pick up with you.

-Native Elder, Kaibab Band of Paiute Indians

Well if we use that, non-natives say, well there's millions of 'em out there. And that's, what they said is true, but to me there's only one. If I want to use medicine I have to pray to find out which one that one's going to help me. Because those others can hurt you and I've seen it hurt people. So you have to pray for that one.

-Native Elder, Moapa Band of Paiute Indians

Plants are sources of food, medicine and materials for construction. Certain plants are strongly associated with water, and found around seeps, springs, streams, rivers or ponds. Plants can be important indicators of water health, and are strongly affected by the presence or absence of clean water, prayers, songs and cultural interaction. The foliage found around springs is a sign that water is present.

You can tell by some of the plants that are there, and ... sometimes the ground is damp. Native Americans know the plants, and so they'll know where the water is...some will dig it by hand...just going like that. And they'll see it gets damp, ... as it gets down, and the water seeps through.

-Native Elder, Moapa Band of Paiute Indians

Pinyon Pine (Pinus monophylla and P. edulis)

The pinyon pine, which produces an edible pine nut, is a significant food of nutritional and symbolic importance for Nuwuvi. It provides a utilitarian pine pitch used for many different purposes. Nuwuvi stories explain how Wolf and Coyote brought the pine nut from the north and scattered the seeds throughout Nuwuvi territory. These stories account for the variation in size of pinyon pines and pine nuts in different locations.

In the fall during pine nut season, pinyon pines are scouted and monitored in advance using knowledge about crop size and locations that is freely shared within informal networks of friends and families. In other cases, people will exchange information with knowledgeable individuals to inquire

about the condition of pine nut crops in other areas. Natural indicators show Nuwuvi the location of a bearing trees and inform the harvester of the anticipated harvest time for the pine nuts. Rabbitbrush, with its spray of yellow flowers, indicates pine nut readiness with its blooms. The Milky Way, which is an important feature described in Nuwuvi winter stories, serves as both an indicator of the fall season and signals the harvesting time for pine nuts. The Pinyon Jay's distinctive piercing calls and interaction with Nuwuvi help locate productive stands. If harvesters miss these important cues, the animals will have the advantage of collecting all of the pine nuts, making timing vital for a successful harvest.
Formerly, Nuwuvi pine nut harvests were large community events, with multiple family groups joining together for weeks at a time. In one elder's childhood, picking 300 to 400 pounds of pine nuts was not uncommon. Special pine nut songs are sung and stories shared

to honor the harvest and request abundant crops in the future. It is not uncommon to observe some camping out for several days whereas others just go for the day. Depending on location, strict protocols are followed to ensure that the cultural stewards of an area are aware of a family's harvest. Permission is requested from the local Nuwuvi group and when granted, picking occurs within the periphery of the resident group's primary picking area. In most cases, permission is granted as long as pine nuts are abundant.



Nuwuvi know pine nuts must be shared, otherwise the thunder and lightening might reprimand an individual and the crops will relocate to other areas. In the past, this and other beliefs about sharing and reciprocity allowed Nuwuvi to survive local fluctuations in food availability. Great care is taken to remove only what is needed and enough is always left for the animals, including birds, deer and ground squirrels who sing their special songs, to make it through the winter and allow the crops to return. While several animals store pine nuts in large caches, these areas should not disturbed or mistreated allowing proper respect to be



given to the land and animals. In all cases, no harm should be brought upon the trees and mountains; otherwise what is harvested can make someome sick or cause the pine nuts to find another area to live.

Children are often sent up into the trees to shake down cones and dislodge pine nuts. Pine nut poles are also used and were either found on location from previous harvests or prepared in advance from different areas. Desired species include: oaks, willows, ash and alders. Sometimes poles are used fresh, while in other instances, they are dried so they are lighter and easier to use. In all cases, flexible longer branches are preferred. For shorter branches, several can be lashed together to create a single long pole. A hook can also be attached or created by bending and tying a fresh branch as it dries. These poles allow the picker to gently jostle stubborn cones off of the tree, and a hook provides even more efficient cone removal. When the harvest is completed, pine nut poles are typically left standing in the trees or stored at home.

Green cones collected earlier in the harvest season are roasted to both burn off the sticky pitch and to steam the cones. This method allows the nuts to remain in the cone when knocked down and cooked, causing the pinecone to expand making extraction easier. Some families prefer this method because the pine nuts have a different taste. One method used incorporates a nest-shaped structure out of sagebrush branches, placing the green cones inside, while igniting the branches. The smoldering embers are then covered with earth to further steam the cones. After steaming the cones for several hours to a day, the cones are unearthed and the pine nuts are extracted. Other methods include salvaging old chicken wire from dumpsites and placing it beneath the green cones before cooking. After the roasting is complete, the cones could be easily lifted out of the pit using the wire screen beneath.

Brown cone harvests occur when the pine nuts are fully ripe, and the cones expand to release the nuts. Sunny days are good days for picking, because fresh pine nuts are released at these

times. Some prefer brown cone harvesting because the pine nuts come out easier and they do not have to contend with the sticky pitch that covers green cones. Some prefer picking pine nuts off the ground at the base of the trees while others leaves these nuts for the animals. Still others shake the trees or use pine nut poles to whip additional cones and nuts out of the trees and onto large tarps. Once removed from the tree, cones still containing pine nuts are tapped with a smaller stick to dislodge the remaining nuts. During this process, pine nuts are gauged to be edible. The experienced picker can easily discern by monitoring the weight, level of dryness and color of the pine nut shell. Some individuals have further guidelines, such as only picking certain sizes or only those with goldcolored shells.

There are a wide variety of opinions relating to how much one should harvest and the method they should use. Some avoid taking everything from a given tree to ensure there's enough food for the animals. Others only visit a few trees, but take everything from selected trees. Nuwuvi consider the nuts found on the ground as offerings for the animals that are unable



to get the food from the trees. Nuwuvi feel that their impact on a few trees is miniscule compared to the large tracts of pinyon pines that remain untouched.

Still others rely on their instincts that tell them when they have picked enough. In former times, when traveling on foot or horseback, trees were accessed far and wide. Since the construction of roads and the advent of the automobile, the trees within 100 yards of the roads receive the highest harvesting impacts, while less accessible trees remain un-harvested. Some harvesters switch locations over a period of years to adjust their pattern, while others return to the same stand of trees year after year. Those individuals who rotate where they pick believe they allow the trees to rejuvenate and new trees to sprout and grow.

Many Nuwuvi speak about diminishing pine nut production in their lifetimes. Some attribute this to air pollution and nuclear testing, while others cite damaging commercial picking practices and fire fuel load reduction techniques that are inconsistent with Nuwuvi protocols. As with many of the resources managed traditionally, there is a general belief that

interaction, communication, relationship and continued harvesting must continue in order for the resources to exist and continue producing. Reduced interactions between Nuwuvi and pinyon-juniper woodlands demonstrate the cultural perception of diminishing pine nut crops and decreased ecosystem health.

Beyond pine nut harvesting, other traditional management activities occur. Dead branches are selectively removed from the trees or the ground to allow the tree to breathe while exercising great care in preserving plant and animal habitats. Other vegetation is strategically pruned and returned to the land, thus creating mulch and stimulating new growth. This pruning occurs either through snapping reachable branches by hand or through whipping the trees with pine nut poles. Whipping breaks off dead, brittle branches, needles and old pinecones from the tree, thereby exfoliating the tree and freeing up space for new growth in the form of branches, needles and cones. Nuwuvi also share common feelings about the importance of interacting with the plants who like and need to be managed so that they know they have not been forgotten. Great care is taken during these activities to avoid damaging live limbs unintentionally. Dead material is either pushed to the side or used as fuel wood for food preparation or plant restoration.



I know that we have the story of how the pine nuts came to the Spring Mountains, which was told to me by one of my relatives on my dad's side of the family. She told a story of the bighorn sheep coming from Canada, on down. He [brought] the pine nuts on the way down. The little mouse and the mountain wanted it, so he challenged him to a game. So he had to ante the pine nuts and the end of the story is that the little mouse won, so that's why the pine nuts are plentiful in the Spring Mountain area, especially Charleston and Lee Canyon area. It's where we go.

-Native Elder, Moapa Band of Paiute Indians

That's part of our stories of how the Coyote when it brought the pine nuts to Arizona. He had the responsibility to be with the wolf and go back in there and plant the pine nuts in this area. But he went and got mischievous chasing girls, and he told Wolf, you know, that I'm going to go over here for awhile, I'll catch up with you later. And Wolf went ahead and he planted all the pine nuts and the Nevada area, and Coyote got sidetracked. So when he found out that all the other plants had been planted...instead of going where he was supposed to go he planted them here and not Arizona, so they say that's why the pine nut is small here in Arizona, 'cause the Creator punished Coyote for being mischievous.

-Native Elder, Colorado River Indian Tribes

So when you pick them and they're, the tree's thankful. The mountain's thankful, because they're seeing Indian people up there doing what they used to do. They're probably crying out for us.

-Native Elder, Moapa Band of Paiute Indians

They used to go ahead and go through the pine nut area for your picking, they'd go ahead and same time they were picking they'd go ahead and something they used to call pruning. They wouldn't break the limbs like they do nowadays...where they cut the trees down to get pine nuts and they'd break the limbs off to get the pine nuts. That was against the rules. 'Cause the only limbs they could use is the ones that was already dried up and everything, ... break them off and use them for fire starters.

-Native Elder, Paiute Indian Tribe of Utah

Juniper/Cedar (Juniperus osteosperma and J. utahensis)

The cedar or juniper tree, like most if not all plants, has both utilitarian and spiritual significance to Nuwuvi. Management through harvesting occurs with the picking of small amounts of foliage as a form of pruning. While it is permissible to cut branches of the cedar, the roots are avoided. The cedar springs are also harvested for smudge creating smoke to cover up a hunter's scent.



The berries (botanically known as cones) of the cedar have multiple uses. In the past, some individual trees were renowned among individuals and family groups for their special berries. The location of these trees is passed along within families, although some stands have gone away. The dry berries that litter the ground were used as adornment and other things. The drying process requires roasting the berries before they can be used.

The bark is used for sandals, fire starter, clothes, shelter and other implements. If harvested sustainably, cedar bark will continue to regenerate itself. Nuwuvi conduct cedar cleaning or shaking in the summer season. This is a beautiful act to witness and a testament to the life-force within the tree.

And if you're very fortunate, you can see the life of that cedar tree. You can see it shake itself. It's very awesome to see that and not very many people get to see that....I bet in the old days our ancestors, I bet they really got scared of it when they seen it do that, 'cause it's like a white puff that comes out of it....Seeing its spirit come out and moving. But they tell you nowadays, it's pollinating itself.

-Native Elder, Kaibab Band of Paiute Indians

Oak (Quercus gambelii and Q. turbinella)

Oak trees, both Gambel's Oak and Scrub Oak, are used for several purposes. Nuwuvi prepare the acorns for food and other items. At one time, dolls were made using parts of the acorns. Acorns serve as an important food for deer and other animals. The solid wood of the oak is used for stout canes, cradles, axe handles and pine nut whipping poles. Oak trees are considered able to take care of themselves; however, when harvested for fire wood, it is important not to cut the tree down all the way, otherwise it will not re-grow.

We used it right away, because it was still wet....my dad used to, he put it through wagon spokes, cut it down, make it curve like a cane and he'd try to tie it up here so it will stay when it dries. Older people use it for canes.

-Native Elder, Pahrump Paiute Tribe

Willow (Salix spp.)

Willow is an important plant to Nuwuvi because it has multiple uses. Historically, the plant was burned to the ground, stimulating the plant to produce straighter shoots, necessary for obtaining unbroken lengths of bark or "skin" used in basketry. Patch burning involved setting fires in the summertime under damp conditions, singing a song of celebration during the burn, and managing the blaze to make sure it does not get out of hand. Small stands or individual trees can be cut to the ground at the end of the growing season and ashes poured on top of the stumps to similarly achieve vigorous new growth the following spring.

Old, brittle limbs are broken off and moved out of the way so that the dried branches are further broken down when walked upon. Care is taken to not unnecessarily damage live shoots. Live shoots are collected using pruning shears, knives or digging sticks. They are generally gathered in the spring, and in some areas only in February and March when it is easier to remove the bark. Selection of material occurs in a staggered manner to minimize the impacts of harvesting by only taking as much as can be readily used. Nuwuvi weavers are also guided to certain willows, with a design in mind for a specific basket to be created. While gathering shoots, it is important to pull back the bark to make sure to avoid individuals that show spotting on the inside. After harvesting is complete, processing the bark can be a laborius and repetitive daylong affair, thus resulting in a limited harvest.

Cuttings of willow are sometimes taken from live plants and replanted in wet soil either to expand existing patches or to create new ones that are either more accessible or near a gatherer's area. Nuwuvi believe that current willow gathering areas are related to those used by their ancestors using similar harvesting techniques. If Indian people cease to gather, willow patches will become overgrown and unhealthy creating hindrances to accessibility and an imbalance in the ecosystem.

Various species of willow are strongly associated with water. Culturally, willows are perhaps most important in the construction of baskets, cradleboards and other items. Longer shoots are desired in basket making, and they are more readily available in the springtime. In some years, willow branches will be brittle due to the absence of rain, making them less desirable. Before harvesting branches, it is important to ask the plant and the land for permission to take the branch. Harvesters explain to the resource the purpose of their gathering while leaving an offering to encourage its return.

After branches are harvested, the preparation process begins. Stalks are spilt and the plant material is coiled up for future use. When dried, water is used to make the material pliable for making baskets. Some types of willow baskets were used as water jugs to transport. These particular baskets were tightly woven and sealed with pine pitch and placed in wet sand to make them stable and watertight.

About maybe six years ago...when this old lady was alive, she was talking to us and she said, do it, do it like this, she said. So we did what she told us to do, how to start the fire ... 'cause she would do that to that. You either cut it or burn it so that next year it will grow back good, straight.

-Native Elder, Kaibab Band of Paiute Indians

I know that when my aunt...did her baskets...she'd say when I'd went to this area to pick my willow, one certain tree will call me, and she'd go right to that one...then she would pick it and she'd say the design is in the willow that I pick. I don't know what I'm going to do with it yet, but when I start doing it, she says, then it evolves like that and she'd know it came from the tree.

-Native Elder, Colorado River Indian Tribes

You can't just cut that branch off—you gotta tell that tree...you gotta talk to it. You gotta tell that tree—that tree is a living thing...it's got these branches like it's arms. And it's alive, and you're gonna take a branch, but you don't mean it no harm, you're not gonna kill it. And you're gonna tell that tree what you're gonna use his arms—his limbs for. That's a living thing.

-Native Elder, Chemehuevi Indian Tribe

There's songs that Indian people sing when they're gathering willows, willows run near the water... and there's many songs, many different kinds of gathering songs. Plant gathering songs, willow gathering songs that talk about the water flowing by. Yeah, there are songs for everything.

-Native Elder, Kaibab Band of Paiute Indians

Skunkbush Sumac (Rhus trilobata)

Skunkbush sumac, locally termed squaw bush, also provides important basketry material. Although not botanically related to true willows (*Salix* spp.), it is sometimes referred to as 'willow' due to similarities in their use in basketry. Fire was used to manage this shrub, although this apparently no longer occurs. Burning produces longer, straighter branches that create elongated fibers necessary for basket weaving. Similar to the treatment of the true willow, skunkbush sumac is sometimes cut down to the root crown and covered in ash to stimulate vigorous spring growth. Sumac has been transplanted on at least two reservations and other areas for continued use.

And there's two kinds of willows that you can use, squaw bush [Rhus trilobata] or this coyote willow [Salix spp.].

-Native Elder, Kaibab Band of Paiute Indians

Service Berry (Amelanchier utahensis)

Service Berry, a member of the rose family, produces edible fruits, as do many other members of this family. These fruits are made into jam, or eaten on their own as a dessert. Nuwuvi continue to manage and transplant service berries to have better access to the fruit. Walking sticks and arrows can be made from serviceberry branches when straightened and/or fire-hardened.

They bend it down, then they cut it with a knife and it'll grow back if you cut it at an angle, then bend it get that knife like this and split down, cut it... just go ahead and, if it's flexible it'll bend, cut a certain way like if you went ahead and twist it like this, if it's bent ... just cut it like this, it's going to pop off or break.

-Native Elder, Paiute Indian Tribe of Utah

Cliffrose/Bitterbrush (Purshia stansburiana, P. tridentate and other spp.)

Cliffrose and bitterbrush, also termed buckbrush in some communities, are large shrubs with fibrous bark. Smoke from the bark is used for dying buckskin and is used similarly to juniper (cedar) bark for other purposes, although it is reputably less itchy. This quality allows it be utilized for baby diapers and for constructing "grass skirts" for the Mountain Sheep Dance, where skin irritation is a concern. The bark also serves as a fine fire starter and is

twisted into cordage to make traditional ornaments. The importance of speaking in Nuwuvi to the plant before and during harvesting activities is considered essential. If the correct words are not used in the proper order, the harvested resources will not work. Permission is requested from the plant with the reassurance that enough bark will be left as winter and early spring fodder for deer and other animals. The bark is harvested within a certain proximity to the central heartwood, and in some cases the outer weathered bark is removed before harvesting the fresher bark underneath. The repetition of use and communication with the plant will allow the harvester to



develop a sense for when they are getting too close to the inner plant tissue. Concurrently, certain insects help stimulate the plant to occasionally produce white, fluffy galls, which one grandmother jokingly calls "Indian earplugs" to her grandchildren.

And they say that first layer, because I guess it's more out to the elements, you would pull that up and then get that second layer, 'cause it's on the inside.

-Native Elder, Las Vegas Paiute Tribe

So when we go up there and gather that we make sure we talk up there in the mountains to the Creator, to the trees, to the spirits. You know, asking permission to take some of that bark and telling it why we're taking it and the we only take just enough off from that one tree, then move on to the next one, 'cause the animals eat that bark, the deer eat that bark, so you don't want to kill that tree. You want it to continue to grow so it'll feed the animals.

-Native Elder, Kaibab Band of Paiute Indians

Mountain Mahogany (Cercocarpus ledifolius)

Mountain mahogany is a small tree or shrub with dense, strong wood. The thin diameter branches are pruned off and used as arrows that will not break while other branches are used for digging sticks. The plant must be spoken to during harvesting, and after the juice is extracted, the root must be replaced in the ground. The plant will take care of itself or can be cut down to the roots and covered in ash until the spring, when it reemerges with fresh new growth. Individuals that are left standing through the winter provide critical habitat for deer.

... they used to cut them down clear down to the root....And they burnt, poured ash on the top of it and they know that during the winter when it's got moist ... it'll grow back up.

-Native Elder, Paiute Indian Tribe of Utah

Currants/Gooseberries (Ribes spp.)

Currants and other *Ribes spp.* grow as shrubs and produce edible fruits ranging in palatability. Some are transplanted by Nuwuvi in other areas to make pies and other foods.

They used to make pie...currants...it's in the mountains...it's like a big bush and it stands up really high too, but it has little berries...they ate that for making pie and stuff.

-Native Elder, Paiute Indian Tribe of Utah

Wood's Rose (Rosa woodsii)

Roses are found at various locations in the Sheep and Spring mountains, and often near springs and other water sources, in dense impenetrable thickets. Nuwuvi have differing perspectives about clearing, cutting, or pruning rose thickets to allow better access to water supplies by humans and wildlife.

It's one of those ones that grows a bunch of thick and you can't, you know if you got in there you wouldn't know how to get out.

-Native Elder, Paiute Indian Tribe of Utah

Rabbitbrush (Chrysothamnus spp. and Ericameria spp.)

Rabbitbrush is a large grouping of two related genera that contain many species and subspecies that are found in the Spring and Sheep Mountains. Nuwuvi have names for many if not all of these different species. Perhaps a more notable function of rabbitbrush is as an indicator of seasonal gathering rounds, utilitarian objects or other important uses. When the plants flowers turn a brilliant yellow, it coincides with the Milky Way appearing overhead, which indicates that the fall season has arrived with the pine nut crop. Although several different species may act as seasonal indicators, *Ericameria naceosa* is considered culturally important.



Yeah, that's for your calendar for your pine nuts. When these turn yellow up on top and when they're little yellow ones they're barely starting, the pine nuts are green. So you look for those when they turn brighter....if they get too brown colored the pine nuts are already gone.

-Native Elder, Paiute Indian Tribe of Utah

Sagebrush (Artemisia spp.)

Sagebrush is as important as it is ubiquitous in the Great Basin. The predictable presence of sagebrush lends to its use as a common, dependable fuel wood. It is used in food preparation, roasting pits, campfires and other applications. Collection of branches occurs by hand, pruning the branches by simply snapping off dead and dry limbs. Green branches are harvested similarly and used in various ceremonial activities. Following deer hunts, the meat is hung in strips over sagebrush to help it dry with adequate ventilation.

When I was growing up we...we had to gather sagebrush. That goes with the pine nuts too. She used to make a dig, like a bird nest, and we have to harvest, get the sage before we go to pick pine nuts, and look like a bird nest. It was huge, huge like this. When we come up before lunch, we, that thing was ready to put that to fire, ...bring the pine nuts in, dump it on...like a nest.

-Native Elder, Pahrump Paiute Tribe

Indian Tea (Ephedra nevadensis and E. viridis)

Indian Tea, commonly referred to as Mormon Tea, consists of two predominant forms within the classification systems of interview participants. There is a "gray one" (*E. nevadensis*) and a "green one" (*E. viridis*), the latter associated with pinyon-juniper woodlands. Indian Tea is not harvested when producing male and female reproductive cones (resembling and colloquially termed flowers); although harvesting variations exist among Nuwuvi relating to gathering techniques and the implements that are used for harvesting.

Based on ancestral ecological knowledge and understanding, Nuwuvi recognize the importance of allocating plant nutrients to the reproductive structures rather than the stems. Some harvesters break the tips of the stems off with their bare hands, while others believe that cutting the stems straight across is healthier for the plant and allows it to grow back better. Dead and decaying matter under the plant is cleaned up in order to help the plant grow and to allow rain to penetrated the soil. While others believe that by removing this natural mulch, the soil is exposed and moisture is lost. For best results, Nuwuvi commonly use a balance between the two approaches.

When it's flowering you don't pick it...because the tea's not good. All of the nutrients of the leaves and stuff are all going to the flower You pick it when they're through flowering, still lush and green.

-Native Elder, Las Vegas Paiute Tribe

Tobacco (Nicotiana spp.)

Wild tobacco is an important plant used culturally for many activities. The flower color varies by species. Ecologically, this plant springs up on its own in recently burned areas, and according to some, in sandy and rocky soils with lots of solar exposure. These observations combined with the plant's tendency to come up with predictability for years in the same location, allows it to grow with little Nuwuvi interaction thus confirming the strong spiritual nature of the plant. Most Nuwuvi commonly believe that the plant may have been intentionally planted, or the seeds spread as harvested material when moved and processed in different areas.

I harvest Indian tobacco, I even grow some in my garden...my soil out here is more clay and where I got my seed from was in a more sandy spot. Took a plant like that, it was ready to drop it's seeds,

so I took the plant, you know, cut it down here...brought it home, and was drying the leaves out and then a whole bunch of the seeds came out...I didn't want to just throw them away so I threw them in my garden and they came up.

-Native Elder, Kaibab Band of Paiute Indians

Watercress (Nasturtium officinale)

Watercress is an edible green found in springs, rivers, ponds and other aquatic environments. Nuwuvi harvest this plant for food and continue to manage it at the source. It can either be cooked to subdue the flavor or eaten fresh if collected properly. In some locations, Nuwuvi recognize a distinctive taste, which may be attributed to a change in springs becoming less pure from environmental impacts. In the nearby mountains, Nuwuvi brought watercress to some water sources for proper management. Before transplanting watercress, special



prayers are said at the onset of the harvest. Then, clumps of the whole plant are taken out of the water and transported in a bucket or other container to the new location and simply placed in the water. As long as the water is cool and the current is not too swift, the plants can survive in their new home. Further cultural interaction in management is important to help the plant to become more productive.

Yeah, they used that as a lettuce with their foods and stuff....[Ash Meadows] was the only area where that grew. So a lot of them would pick

it and carry it off to their own water supply, stream or whatever and plant it then, and ... which it would grow there.

-Native Elder, Colorado River Indian Tribes

We used to go up to the pond too, 'cause some of that water would just be diverted into the pond and we could go up there and just drink right out of the pipe there. And there's that watercress there, and sometimes you'd chew on that stuff there and you know ...

-Native Elder, Kaibab Band of Paiute Indians

Yucca (Yucca bacata and other Yucca spp.)

Yucca species, including the banana yucca, which grows near pinyon-juniper ecosystems, are utilized for both their above- and below-ground parts. Nuwuvi use different aspects of the plant depending on what is needed. Some only harvest above ground parts, since taking the taproot ends the plant's life. Leaves are harvested to chew on, but the most delectable portion of the plant is the middle stalk where the new leaves are produced. Using a stick or other implement, the middle portion of the plant can be severed from the surrounding leaves and root. The stalk can be cooked and eaten, if prepared properly. As long as the root is undisturbed in the ground, the plant continues to live and produce. In cases where the root is harvested, it is important to use all parts of the plant, and in all cases of harvesting, to only take what one needs at that time. In some areas with higher concentrations of yucca, harvesting can be viewed as thinning out the population. Nuwuvi share concerns about the illegal collection of these plants with the hopes of preserving the ecological and spiritual balance for continued cultural practices.

Utah Agave (Agave utahensis)

Agave produce clonal pups alongside the parent plant that is genetically identical to the parent. These juveniles are generally left to mature and only the mature central plant is harvested. As a precautionary measure during harvests and especially with plants that are repeatedly harvested in a rotation over the years, some harvesters clip off the sharp points of the agave leaves to avoid injury. The plants continue to be important indicators for various cultural activities and can retreat to higher elevations if the land is not in balance.

And it should only be done by a man....born in the month of June. You do that when you...gather that....That's what I was taught....There's a reason why...

-Native Elder, Kaibab Band of Paiute Indians

Cacti

Various species of cacti are known as an alternative source of hydration when water is not available. Nuwuvi speak about cacti as resilient plants that retain large amounts of water, despite growing in areas with limited available moisture.

... cactuses ... you know when it rains in the desert ... they will absorb the water and pull it in and they will store it for themselves until they're ready to... because our rainfalls are so far in-between, so... they need that water to survive.



-Native Elder, Colorado River Indian Tribes

Grasses

Grasses, including Great Basin Wild Rye (*Leymus cinerus*) and Indian Rice Grass (*Achnatherum hymenoides*), serve several uses. Gathering of wild grass seeds is an important practice to Nuwuvi. Depending on the species, grass must be kept at a certain height and straight across in order to maximize later re-growth. Tightly woven baskets were used to collect the seed heads, as the gatherers moved through the fields. Some replanting occurred unintentionally, as some seeds inevitably missed the basket or fell through the fibers. The action of people walking around would effectively push the seeds into the soil, thus replanting them; others used digging sticks to plant seeds.

You had to collect a whole bunch. My aunt used to talk about that. She said you have the basket and you'd hit it on there. You had to get a lot of it....

-Native Elder, Moapa Band of Paiute Indians

Yeah, like they do hay, you know when they cut it so far so down so it can grow again? That's how ... we did our horses like that. That was out in the wild. We didn't come into town buy hay and stuff. That was just there.

-Native Elder, Paiute Indian Tribe of Utah

Other Landscape Features

Caves

Caves have many purposes possessing important attributes for Nuwuvi. They are used for shelter, storage and in many other ways. Some caves are seen as portals to other worlds and should not be entered. Nuwuvi abide by strict cultural protocols before entering. Sometimes a cave will let you know that you should not enter. Each cave has a distinct personality that can be positive or negative in nature. Spiritual beings live in caves and might play tricks on you, bring harm or make you have bad dreams. Sometimes people are led deep into caves and never find their way out. Other caves posssess special songs that must be approached in culturally appropriate ways.

Every time you go to a cave, introduce yourself ... and have some kind of token that you could give it as a gift so that cave won't hurt you. Once you venture into there ..., without appropriate acknowledgement, then that cave will do something to you.

-Native Elder, Colorado River Indian Tribes

Canyons

Canyons, similar to other places in mountain landscapes, are inhabited by spiritual beings. Respect is given and communication should occur before entering. Some canyons are so powerful that they both give powerful gifts and take them with the same intensity. These powerful canyons are not intended for recreation. Other canyons have special properties, including acoustics or have special rocks with special tonal qualities. Features such as these are used for specific interactions with mountain spirits.

Canyons ... have a lot of hiding places and are largely inaccessible, allowing Southern Paiutes to

perform rituals in isolation. Part of the ritual is the journey itself. In canyons and other montane areas, you have to take four days to get there and stop four times in order to arrive at the ritual location in a purified state.

-Native Elder, Kaibab Band of Paiute Indians

Mountain Peaks

Mountain peaks are considered powerful places that are meant only for certain spiritual beings and people with the proper knowledge to approach. As some of the most out-of-the way places on the planet, the seclusion of peaks offer time for reflection, spiritual connection due to their proximity to the sky and the spiritual beings who watch over the landscape to keep it in balance.



You know the higher up you are, the closer you are to the Creator.

-Native Elder, Kaibab Band of Paiute Indians

One day I'm going to go to the peak, this one up here at Snow Mountain.

-Native Elder, Las Vegas Paiute Tribe

Rocks and Artifacts

To Nuwuvi, landscape features, including culturally unique rocks, minerals and artifacts, have a life of their own. Sometimes special objects will make themselves visible to the passerby; while other times they will hide even if someone is looking right at them. Objects can also carry energy from the people that came before. This energy can be good or bad, but many Nuwuvi avoid picking them up or disturbing them to avert negative consequences. Many of these things are known by Nuwuvi, but are not shared to protect the unsuspecting from harm.

I don't pick rocks up. I don't pick anything up, because I don't know who left that there. It could be a bad person or a good person, but I don't want to take that chance.

-Native Elder, Moapa Band of Paiute Indians

Rock Writing (Petroglyphs and Pictographs)

Nuwuvi are expert knowledge holders about rock writing and appreciate when their interpretations are respected and considered on par with those of academic and agency specialists. From a Nuwuvi perspective, rock writing, also known as petroglyphs and pictographs, contain important cultural information. Some Nuwuvi state that the origins of the writings were from their ancestors while others believe spiritual beings called *tutugove* or "little people," who have watched over the area since the world was new, are responsible for their presence. Nuwuvi share how the rock writings are alive and can also change over time, as the "little people" alter their messages.



[Rock writing] will talk to you. They will talk. To me, everything talks to you. Because everything has power, everything has some reason for being there. And they tell you that themselves.

-Native Elder, Moapa Band of Paiute Indians



Chapter 4. Perceptions of Pinyon-Juniper Ecosystem Management

The following chapter presents Nuwuvi and federal agency perceptions of pinyon-juniper management and restoration. They are sourced from ethnographic interviews conducted by PSU Graduate Researchers with 28 Nuwuvi knowledge holders and six federal agency representatives in January-March 2012 and August-October 2012 (see Appendices A and B). In addition, information was collected during the Nuwuvi Knowledge-to-Action planning meetings facilitated by the Project Directors in August 2011 and 2012 and December 2012 and previous research (Spoon et al 2011, 2012a, 2012b, 2012c; Spoon and Arnold 2012).

Table 2. Summary of Nuwuvi (Southern Paiute) and Federal Agency Perceptions of Pinyon-Juniper Management by Category/Theme

Management Category/Theme	Nuwuvi	Federal Agency (USFS/USFWS)	Similarities	Differences
Mistletoe Parasitism	 Natural part of the environment Important for thinning overcrowded trees Can become out of balance When out of balance should be removed and burned to prevent spreading 	 Natural part of the environment Play important ecological roles Barometer of ecological health Not currently a problem 	 Natural part of the environment Plays important eco- logical roles Can become out of balance 	 Deciding when it is out of balance Methods of control
Pinyon-Juniper (PJ) Encroachment	 Range has stayed the same or decreased Reduced range from development, disease, and commercial pine nut pickers Tree health and pine nut crops declining from pollution, reduced Nuwuvi interactions, and commercial pickers 	USFWS • PJ encroachment theory backed by ranchers • PJ loss backed by scientists USFS • Scientific studies back PJ encroachment theory Both • No local concern of PJ expansion • Sage grouse not locally present to fuel debate • Chaining and land clear- ing has not occurred at large scales in the DNWR or the SMNRA • Goal is a mix of plant com- munities and seral stages	 PJ encroachment theory backed by some ranchers and scientists No local need for large-scale PJ removal Importance of bal- anced and diverse plant communities 	 Opinions about PJ encroachment theory Explanations for shift in PJ abundance and/or range Importance of Nuwuvi interaction Opinions of commercial pine nut picking impacts
Fire Management	 Any destruction of PJ is negative Concern about creation of fire breaks and methods of fuel load reduction Removal of lower tree limbs eases access and may increase pine nut size Nuwuvi reduce fuel load with cooking fires Lightning fires need different treatments than human-made fires Certain plants benefit from fire Catastrophic fires are negative Negative ecological impact of fire retardant 	USFWS • High elevation fires are left to burn • Fire is good for certain ecosystems • Invasive grasses increase flammability USFS • Mandated to protect urban interface • Fire useful for creating mixed seral stages • Prescribed burns have happened in the past • PJ tends to have danger- ous crown fires and needs to be mechanically managed	 Fire can be good for forest health Catastrophic fires are generally bad 	 Beliefs about when (if ever) tree damage or cutting is permissible Methods of fuel reduction and thinning Treatment of humancaused vs. lightening-induced fires Use of fire-retardant

Mistletoe Parasitism

Nuwuvi

Mistletoe (Arceuthobium spp. and Phoradendron spp.) parasitizes a variety of trees, with a few species occurring in pinyonjuniper communities. Nuwuvi view these species as a natural part of the environment, playing an important role in the thinning of overcrowded trees. In some Nuwuvi communities, mistletoe is knocked out of trees when it becomes out of balance and is concurrently burned in fires in order to stop it from spreading. Even if it is actively removed from trees, respect is still necessary during the process. Nuwuvi interact with the host trees explaining the intended purpose of their management activity. Some Nuwuvi living near mesquite habitats where mistletoe is common consider its moderate presence to be a positive indicator of the health of the local environment and it is therefore not disturbed. This practice is connected to the revered status of the mesquite tree and the necessity of maintaining animal habitats and balance in the world according to Nuwuvi culture.



Some of them [pinyons and junipers] were starting to die because they had those mistletoes that would explode and jump from tree to tree. And that was killing them.....They used to knock it, they used to take it down...they probably either burned them or just left it. But maybe they did burn it, because how it explodes....

-Native Elder, Paiute Indian Tribe of Utah

Federal Agency

U.S. Fish and Wildlife Service (USFWS) consultants expressed that mistletoe parasitism is not currently a problem, and that it has a role to play as a native species in the ecosystem. Other species of mistletoe are known to play important ecological roles, such as a species parasitizing mesquite trees (*Phoradendron californicum*), which is known to serve as a vital moisture source for Phainopepla birds. One USFWS consultant suggested that the amount of mistletoe on a tree can act as a barometer of overall tree health.

The important consideration with this and other forest health concerns was whether or not the mistletoe population and tree morbidity or mortality were reaching epidemic, rather than endemic proportions. Mistletoe was seen as a slow killer of trees, and did not currently receive high management priority. This is especially the case in pinyon-juniper ecosystems, where its removal was not considered cost prohibitive.

Pinyon-Juniper Encroachment

Nuwuvi

Pinyon-juniper encroachment or expansion is the idea that pinyon-juniper woodlands are expanding into adjoining ecosystems, especially sagebrush steppe, and outcompeting other plant communities. This subject is political, with different interest groups and resource users wanting more or less of particular ecosystems (see Appendix D for resources related to this debate). Often in rural areas, it is cattle ranchers that prefer shrub and grassland ecosystems as forage for their cattle, while Nuwuvi are concerned about the availability of pine nuts, and the balance of available plants. Historic activities such as mining, fuel wood extraction, chaining for rangeland expansion, and catastrophic fires, blur the boundaries between precontact lines for different ecosystems. What some people call encroachment, others consider a slow successional re-establishment of pinyon-juniper woodlands.

In contrast to other perceptions, Nuwuvi stated that there are less trees because of private and public land development, irresponsible and damaging commercial pine nut pickers, and disease, limiting Nuwuvi interaction. Concerns were voiced over the general health of existing trees as well, with many individuals having viewed stunted and sick trees. They noted a general decline in pine nut crops overtime and point to pollution, damaging commercial harvesting practices and a lack of interaction and management with Native peoples as explanations for this trend.

Except for cutting them for woods, that bothers me, the only thing. You know, nowadays they trim it, like just nothing, it's nothing to them. Like I told them one time, I said I don't care, I can speak English now, I said I don't like it to be trimmed and I said the older trees get more pine nuts on it because it's aged trees, but the young ones, you know little ones, they don't, they just growing up like a teenager. Some of them have small but it's a little ... many years on it but still got little pine nuts on it.



-Native Elder, Pahrump Paiute Tribe

At one time they had chained all that down, again for the cattle and to revegetate it with those grasses, and now it's all grown back...they're probably about 20-30 years old or more.

-Native Elder, Kaibab Band of Paiute Indians

If it is expanding, it may be a good thing. It may be that the pine trees may say, you know, we can't live here anymore, we have to move...and maybe it's because these pine trees have been abused so much, they can't get anything more out of the ground. So they have to move.

-Native Elder, Moapa Band of Paiute Indians

Federal Agency

USFWS consultants did not show strong concerns concerning the expansion of pinyonjuniper ecosystems into surrounding landscapes. Indeed, large-scale pinyon-juniper woodland removal activities that have occurred in other parts of Nevada, such as chaining and intentional burning, have not transpired on the Refuge.

Equally, USFS consultants expressed similar views about pinyon-juniper encroachment that it does not appear to be a large concern. Part of this may be due to the absence of the endangered Sage Grouse. The Sage Grouse has been a large part of the discussion in other parts of Nevada, where the effects of fire and encroachment are thought by some to be major threats to its survival. One predominant counter-argument against the encroachment theory holds many "new" establishing pinyon-juniper stands are simply a recovery of the historic distribution of the ecosystem prior to the impacts of early Euro-American land clearing and timber harvesting activities or the more recent chaining to create grazing land.

Fire Management

Nuwuvi

Any activities that damage or destroy pinyon and cedar trees were considered negative. Some Nuwuvi reported seeing trees uprooted during the development of campgrounds. Others were concerned about trees destroyed by hot shot crews during forest fires, or by fuel load reduction techniques that included the inconsistent sawing off of the lower limbs of pinyon pines to avoid fire ladders. Those concerned with this management activity were alarmed about both the aesthetics and the potential of disrespecting the trees by opening a wound where fungal or insect attack could occur. Others agreed the attempted pruning was satisfactory and the agencies were doing a good job. Some observed that trees with no lower limbs produced bigger pine nuts in the upper portions of the tree in subsequent years. The space created by removing the lower limbs made it easier for some to access the trees during harvesting or management activities.

Most Nuwuvi did not believe that fire was used in the past as a large-scale management tool. Female elders from Kaibab performed traditional burns in both the recent and more distant past to maintain stands of willow for basketry material. On the Pahrump side of the Spring Mountains, fire was routinely used to clear encroaching undesired overgrowth. Natural lightening strikes were respected and considered important to the natural management of the resources. Fire was generally considered positive, especially as a cleansing process that rids the environment of old, sometimes-diseased material, thus making way for fresh, healthy new growth.

The impact of wood collection by Nuwuvi today is significantly less than it was in the past when fire was used daily for heating, cooking and other purposes. The collecting and burning of fuel wood and the by-products of traditional management and harvesting activities did and continues to systematically reduce fuel loads. Another issue is the recovery of vegetation after forest fires. To Nuwuvi, fires caused by accidents or through deliberate action affect the landscape differently than those set off naturally by lightning. Areas where lighting struck or ignited a fire are treated with reverence and require a different treatment than those areas burned by human-made fires.

Nuwuvi use a variety of plants for many different reasons including ceremonial purposes. Some culturally important plants have become threatened or endangered. Unfortunately, the need for traditional practitioners to continue their activities is often in conflict or inhibited by the Endangered Species Act. Culturally, it is essential for traditional religious practioners to have healthy plants that retain their power so it can exist in perpetuity. The importance and necessity of informing traditional gatherers and religious practioners about Agency sensitivities and limitations is a critical component to working together to sustainably manage threatned and endangered plant populations.

I think that they try to over-manage sometimes. 'Cause they'll cut down a whole section instead of taking two, three out of the spot to clean it, to allow the other plants to grow. When you cut those sections up and just knock down trees just to be knocking down trees that's not good and I don't like the way it looks. It doesn't look right. It looks like somebody just went and abused the area. And it's like sometimes it's like well, you know when people destroy something and they kind of like hide that they destroyed something. That's what that reminds me of.

-Native Elder, Moapa Band of Paiute Indians

Federal Agency

At the DNWR, most lightning fires at higher elevations were left to burn due to several factors. Among these, firefighter safety was paramount—the limited personnel and rugged nature of the refuge made reaching the site of a fire extremely difficult. In some cases, the natural return of fire to certain fire-adapted ecosystems was viewed as a healthy or at least a natural process. Unfortunately, the arrival of non-native grasses, such as red brome, provided fuel for the fire to keep burning. Equally, there were concerns that a recently burned landscape may allow invasive plants to more-easily move into an ecosystem. In some cases, fire-retardant was dropped to suppress fires. The higher-elevation Ponderosa Pine community was considered to burn more frequently than the lower-elevation pinyon-juniper woodlands.

On the SMNRA, the USFS not only manages fire in the context of forest health, but also in a way that protects private houses and land holdings adjacent to public lands. Maintaining a certain flame length within the urban interface area takes precedence over all other fire management goals. Typically, natural fires in wilderness areas were left to burn as long as there is no imminent danger to human life or property, or natural or cultural resources. Due to the large number and intensity of nationwide fires of 2012, there was an agency-wide suppression of all fire.

Some consultants viewed fire as a natural way to return a forest to an earlier seral stage in its natural progression. Since the agency was charged with maintaining a certain percentage of each seral stage, fire could be a useful tool to achieve these goals. Certain animals prefer earlier seral stages, where different growing conditions, food sources, or levels of sunlight are available than in older stands. When canopy cover is greater than 50%, understory vegetation recedes, triggering increased erosion and competition between trees. Currently at the SMNRA prescribed burns in Ponderosa Pine forests are planned, although burns in pinyon-juniper woodlands have also occurred in the past. Ponderosa pine forests are fire-adapted, and actually need fire to occur in order for the cones to release their seeds. Pinyon-juniper woodlands also experience natural fires, which typically travel through the

tree crowns. The USFS avoids crown fires due to the difficulty of their control. In order to reduce the chance of crown fires, mechanical methods of fuel reduction including chipping, masticating, and pile burning are used.

It's about managing in terms of the overall ecosystem health, recognizing that there's going to be a mosaic, that it shouldn't be a monoculture. That you're going to have a great diversity of habitat and substrates as well as species. Recognizing the fact of course that humans are a part of that system. And though some people would love to see preservation, which doesn't include human beings. For the most part a lot of our land, especially our public lands, have been influenced in some way by a human presence for a very long time. And just recognizing the fact that trying to ... that humans are always going to be a part of that ecosystem. And then how do you manage for the health in that regard.

-U.S.Forest Service Consultant, SMNRA

Synthesis and Implications

In many cases there was a mutual concern surrounding select issues related to pinyon-juniper ecosystems. Some recommendations revolve around future projects. Other recommendations stem from negative experiences observed by Nuwuvi in the past, or from other collaborative resource management projects domestically and abroad. There was inevitably some differences in perspectives that arose due to differences in worldview, culture, personal experience, age group, training, agency mandate, and so on. These should not be viewed as barriers to successful management, but as valuable and distinct sources of information that together can provide a more comprehensive understanding of the land. Indeed, there are many similarities between Nuwuvi ecological knowledge and the use of an ecological lens in Agency land management practices. By building on these common perspectives of interconnection and acknowledging the differences, cross-cultural exchange and enhanced communication can create a new paradigm shift of Nuwuvi/federal agency understandings.

They have a lot of knowledge of the land. We don't know everything about it. And it goes beyond the very cerebral data collection. There's the spiritual side to land management and the history behind it and a lot of times we don't focus on that. We focus on the hard science part of it. So to get that other aspect in is great.... I think it's beneficial to try to look at things from as many angles as possible to try to come up with the best solutions to any problems that may arise.

-USFS Consultant, SMNRA

Science is a tool to measure stuff. Culture is a tool to maintain what you have. That's what I believe.

-Native Elder, Moapa Band of Paiute Indians

Management Concerns

Collectively, the USFS and Nuwuvi representatives expressed concern over the impact of off-road vehicles in the Spring Mountains. Consultants shared concerns over the visual pollution from vehicle tracks and constructed obstacles and ramps, the denuding and

compaction of soil and the killing of plants and the destruction of soil crusts. Expectedly, there was agreement in concerns relating to littering and careless disposal of cigarettes in fire-prone areas. Several consultants mentioned garbage often associated with ATV trails and munitions debris left over from target shooting.

One noteable distinction between the Spring Mountains and the Sheep Mountains is the existence of private land holdings adjacent to Forest Service land. Most native consultants expressed distaste at the existence of these private, often lavish dwellings. One primary reason for this discord is the sacredness attributed to the Spring Mountains as the place of Nuwuvi Creation where those dwellings should not exist.



Other reasons included visual impact on the mountain experience in addition to the strain that developments put on water resources, leaving less for the plants and animals inhabiting the mountain. Even with these complaints, some individuals understood the appeal of living in such a beautiful location, and one consultant even previously owned several homes in the Lee Canyon area.

Native consultants generally approved of the development of a

new visitor's center planned at a previously disturbed site, but expressed dismay with newly developed campgrounds resulting in pinyon and juniper groves being destroyed. In response to private holdings and developments, USFS consultants expressed challenges in managing the urban interface and protecting homes from wildfires.

Collaborative Stewardship into the Future

Most Nuwuvi consultants expressed the need and desire for expanded opportunities to harvest and co-manage resources at the species, community and landscape level. Nuwuvi consistently emphasized their conections with plant and animal life, water and landscape features such as cultural sites, artifacts, rocks, caves and mountain peaks. A primary interest in opportunities related to the collecting of pine nuts and management of pinyonjuniper ecosystems was continually shared. The focus on pine nuts lies in the importance of maintaining them as a staple in the traditional Nuwuvi diet, and their important role in the transmission of traditional cultural knowledge and strengthening their connection with the land. Another reason for the focus on pine nuts was its relatively depoliticized status in comparison with medicinal plants and other culturally sensitive resources that some tribal members are much more resistant to sharing detailed information with non-native people.

Nuwuvi expressed interest in working with the agencies at both the SMNRA and the DNWR to create special management areas maintained by Nuwuvi. The idea would be

used to meet tribal priorities of continuing traditional practices and interacting with the land while concurrently meeting agency goals of managing ecosystem health. Similar projects in other U.S. protected areas could be replicated whereby a Memorandum of Understanding (MOU) could be considered on a multi-year, or perpetual basis, if agreed upon by all parties, although it is not necessarily needed to engage in these activities. Agreed-upon practices, including those within this report, are presented as suggestions for consideration that could be systematically implemented over an agreed upon period of time (see Chapters 6 and 7).

When considering some activities, it is important to note that some Nuwuvi do not want to have their activities monitored or limited to select management areas. Certain families have been harvesting pine nuts and other crops while managing the landscape for generations. Nuwuvi wish to continue using the same locations in the same way that they have always done.

Agency monitoring may be perceived as an element of control and having certain associated power dynamics. In order to alleviate or minimize negative feelings carried over from previous eras of negative government-Native American intervention, these matters should be handled cautiously.

Certain rituals, ceremonies, and prayers are considered private matters and can only occur when Nuwuvi are not influenced or interrupted by the presence or perceived control of other individuals. When monitoring occurs, it should not be judgemental, but used as a collaborative process of co-learning. Efforts should be used to engage and integrate Nuwuvi representatives into the process by being inclusive and sharing scientific methods, while concurrently teaching agency personnel about Nuwuvi perceptions of tree and ecosystem health.



During the research and interview process, several impediments were identified that may hinder participation in traditional harvesting and other forms of interaction with the Sheep and Spring Mountains. For many Nuwuvi, there was a general confusion regarding the legality of harvesting traditional resources. In regards to pine nuts, many do not know whether picking is allowed or if there are different limits for individuals and families or if regulations vary between federal agencies.

Both historic and current military activities on part of the DNWR appear to ward off many individuals because of fear of reprisal. To encourage fuller tribal participation that develops relationships and work towards co-stewardship of resources, federal land managers should make efforts to share their respective policies consistently in a concise, accessible format. For the DNWR, where special use permits are required, information about obtaining harvesting permits would be considered useful.

Timing of events and interactions must be given serious consideration. Many Nuwuvi work demanding jobs and/or are involved in tribal functions and related activities. Tribal members living on distant reservations, or those who have moved to metropolitan areas may not have the time or resources to make the journey to southern Nevada. Planning such events or meetings can become increasingly difficult as more individuals, tribes, and agencies become involved—each having its own internal schedule of activities.

When developing harvesting or management activities, consideration must align with certain cultural protocols including: seasonal, ceremonial and cultural perceptions. Specific natural or cultural cycles, such as the maturation of pine nuts or the culturally appropriate time for sharing knowledge or stories, must be taken into account to insure success. Consistent communication and the scheduleing of regular events and meetings will provide continued opportunities for enhanced participation. As capacity and relationships grow, participation can be expected to increase resulting in meaningful and long-term relationships and Agency support (see Chapters 6 and 7).



Chapter 5. Perceptions of Hydrological Management and Restoration

The following chapter presents Nuwuvi and federal agency perceptions of hydrological management and restoration. They are sourced from ethnographic interviews conducted by PSU Graduate Researchers with 28 Nuwuvi knowledge holders and six federal agency representatives in January-March 2012 and August-October 2012 (see Appendices A and B). Similar to Chapter 4, information was also collected during Nuwuvi Knowledge-to-Action planning meetings facilitated by the Project Directors in August 2011 and 2012 and December 2012 and previous research (Spoon et al 2011, 2012a, 2012b, 2012c; Spoon and Arnold 2012).

Table 3. Summary of Nuwuvi (Southern Paiute) and Federal Agency Perceptions of Hydrological Management and Restoration by Category/Theme

Management or Restoration Category/Theme	Nuwuvi	Federal Agency (USFS/USFWS)	Similarities	Differences
Management (General)	 Taking care of the water is an important human responsibility 	 Management strategies are guided by agency plans and missions 	• N/A	<u>Nuwuvi</u> • The word "management" is often associated with Euro- American control of resources
Restoration (General)	 It is possible for water health to be restored Opinions vary on the timeline for restoration 	 Restoring water sources to historic conditions Monitoring and surveying com- mon methods used in prepara- tion for restoration projects Extended timeline is necessary Disturbance sometimes encour- aged 	 Restoration can have a positive effect on the land Humans can facilitate restoration 	<u>Nuwuvi</u> • Before a disturbance, humans need to explain to water why it is being altered
Springs	 Springs need human interaction to remain healthy Indictors of healthy water: green vegetation, wildlife in the area, strong water flow 	Popular recreation sitesMonitoring of water flow	 Management/stewardship involves cleaning debris from springs Consistent water flow a sign of spring health 	<u>Nuwuvi</u> • Humans must recognize springs as living things in order to show respect
Streams and Ponds	 It is important for stream flow to continue If water is disrespected, it may stop flowing or the flow may reverse 	• Popular sites for recreation	 An important and striking part of the landscape 	<u>Nuwuvi</u> • Flowing water susceptible to change if disrespected
Water Catchments/ Guzzlers	 Sediment should be cleared out Rock "lids" sometimes used to stunt evaporation 	 Guzzlers an important part of wildlife management in both areas <u>USFWS</u> Especially important for the preservation of desert bighorn sheep, consistent with the agency mission 	 Animals need reliable water sources in order to survive 	Nuwuvi • Humans have responsibility to clean out pohs (water catchments)
Recreation	 ATV use, horses, and other recreational activities nega- tively impact springs 	 ATV use, horses, and other recreational activities negatively impact springs <u>USFS</u> Recreation is an essential activ- ity in SMNRA 	 Camps should be located away from water sources so that ani- mals can utilize the resource Recreational activities can have negative impacts on the land Hiking is the most desirable/ least ecologically impactful form of recreation 	Agencies • Providing recreational oppor- tunities is an important goal in these areas
Climate Change	 Climate change has altered seasonal weather patterns in the region 	 Increased summer temperatures and decreased snowfall have the potential to change ecologi- cal conditions in both areas 	 Climate change poses a threat to water resources in the region 	• N/A
Population Growth	 Urban population growth means that more people are using regional resources Houses in SMNRA use too many resources 	 Population growth affects the ecology through increased recreation and tourism 	 Population growth has affected the land and will continue to affect it into the future More education is needed to prevent further damage to the land and its resources 	• N/A
Non-Native Species	 Non-Native species such as Salt Cedar draw up large amounts of groundwater, negatively impacting native plant species such as Cottonwoods 	 Invasive plants drawing up water Non-Native animal species trampling springs 	 Non-Native plant species can negatively impact native species 	• N/A

Table 3. Summary of Nuwuvi (Southern Paiute) and Federal Agency Perceptions of Hydrological Management and Restoration by Category/Theme

Management or Restoration Category/Theme	Nuwuvi	Federal Agency (USFS/USFWS)	Similarities	Differences
Flowing Water	 Historical impacts on flow- ing water have negatively impacted the resource Restoring water flow, avoiding stagnation, removing trash from water source all impor- tant parts of restoration Springs may be able to restore themselves, but human management activities prompt restoration 	 Historic impacts such as piping are often targeted for removal 	 Historic modifications are often seen as detrimental to water health 	Nuwuvi • Respect for the water source is a vital component to restoration
Subterranean	 Subterranean water is espe- cially vulnerable to impacts from nuclear and chemical pollution 	 Lowering water tables are a concern 	 Regional groundwater development projects are a potential problem 	• N/A
Exclusion	 May be detrimental to animal life and prevents human stew- ardship of water sources Helps protect water from de- struction by horses and ATVs 	 A common approach to ecological restoration Excludes sources of disturbance (horses, vehicles, etc.) 	 Exclusions can be an effective method against damage 	Nuwuvi • Reservations are restricted access to water sources

Springs, Seeps, Streams and Ponds

Nuwuvi

According to Nuwuvi participants, springs require appropriate human interaction to remain healthy. As such, these interactions must respect the water and recognize it as a living sentient being. Participants often referred to traditional management activities as "taking care" of the springs rather than "spring management." This relationship must continue for springs to remain healthy. Springs that contain potable water were seen as being healthy, keeping the world in balance. Other indicators of healthy hydrological resources include an abundance of green vegetation and wildlife activity in the area.



Most importantly, participants saw strong water flow as a key aspect of healthy spring function making it more culturally appealing. Springs that become stagnant were considered unhealthy. If water is stagnant, or if water flow becomes blocked, it is difficult for humans and animals to utilize the resource. Consequently, one important aspect of taking care of the springs involves stimulating and maintaining the flow of the spring. Debris including dead plants must be cleaned out from around the source of the spring. The removal of excess vegetation is essential to making sure that springs maintain an adequate flow. Lush plant life was considered an indicator of spring health. Additionally, some consultants mentioned plants and their roots being beneficial to soil, water and overall ecosystem health.

It's the job of the people to take care of the water, you know. ... they're very important, because if we don't do that, they're gonna go away, that's what I've always been told—if you don't take care of the water and if you don't take care of the plants then they're going to go away, and you'll no longer have the knowledge of them. And so it's important to manage them

-Native Elder, Kaibab Band of Paiute Indians

For me, for springs to be healthy, people need to pray for it...showing how careful they're trying to preserve it so that it too will live, you know, when our grandchildren grow up. And to have Indian people visit it, to have Indian people pick up its trash that other people leave behind, and to take care of the vegetation that's crowding it, and to make sure that appropriate animals are there to take, you know—watch over it.

-Native Elder, Colorado River Indian Tribes

You know, always—because we believe that everything has life...has a spirit. And so in order for that spirit to be healthy, you take care of it, you nourish it, you do all the things that you need to do to make that spirit healthy and strong. And so that's how we would view the water. Always taking care of it, always keeping it clean.

-Native Representative, Kaibab Band of Paiute Indians

Federal Agency

Spring features are the most abundant water sources in both the Spring and Sheep Mountain ranges. Historically, they have been important in the development of Las Vegas and surrounding settlements. It was a common practice to use pipes and other improvements to support activities such as farming and ranching. Most of the current springs in the DNWR are the result of these human activities. In the present day, springs continue to be important features for recreation in SMNRA and DNWR, though many springs are relatively inaccessible to casual visitors.

One of the most important aspects of managing springs in these two areas is monitoring. Springs are monitored, either by contractors, other federal and state agencies, volunteers or other partners, or the land management agency itself to record spring characteristics such as



water flow, pollutants and diversions in order to identify long-term trends.

The current management on here basically is now providing a water source for the residents on the mountain. And basically, at the time, first we came in, historically of course...from what I understand, when they first came in there, they were developing Las Vegas itself. A lot of timber came off the mountain to develop Las Vegas. Water was needed for that, and so they did tap into some of the springs...Clark Canyon, I know they had a spring up there that they used the water for the old mill there, in addition to some of the springs on the West

side. So water was key, actually in the settlement of Las Vegas valley. Not only here, but up on the mountain. And with that, it's still key. You know, they've had...when they came down here, the reason why Las Vegas settled was because of Las Vegas Springs. There was a water source. And up in the mountain there they had more water. And they had a timber base, because that's where they provide a lot of timber for when it got developed.

-Agency Consultant, U.S. Forest Service

Streams are popular sites for recreationists in these areas. Corn Creek, for instance, is by far the most visited site in DNWR due to its level of accessibility as compared to the rest of the refuge. It is a popular site for walking and birding, among other activities. In the Spring Mountains, sites such as Deer Creek and Cold Creek provide spaces for hiking, horseback riding, and other day-use activities.

Humans seek out water. So it's an end point in recreation sometimes. You know, we're going to hike to see so-and-so spring, we're gonna go hike to see Mary Jane Falls.

-Agency Consultant, U.S. Forest Service

In the backcountry, there are very few roads, so you have to have the proper vehicle, which is a large reason why people only go this far. Because they can come [to Corn Creek] in a car on the gravel road, but beyond here, the roads are pretty rugged.

-Agency Consultant, U.S. Fish and Wildlife Service

Water Catchments or Guzzlers

Nuwuvi

Over time, wind, rainfall or other waterflow present challenges for catchments or *pohs* to become filled with sediment. Humans have the important responsibility of clearing out this sediment to help maximize the capacity of the catchment. Some *pohs* are positioned along trails and within close proximity to rock shelters or other important features. Culturally, individuals are responsible for interacting with *pohs* and removing sediment or debris as they travelled along such trails. In addition to cleaning out the *pohs*, rock "lids" were sometimes placed over the catchments to stunt evaporation and prevent sediment build up. Often these lids were designed to allow small animals to access the water while blocking out most of the sunlight. It was shared that introducing some water during the cleaning cycle attracts more water to that location.

Federal Agency

The construction and maintenance of guzzlers are important aspects of wildlife management in these areas. They provide animals with dependable sources of water along migration routes, ensuring that populations will survive through harsh summers. Guzzlers also aid hunters in locating game. Guzzlers are especially vital to the mission of DNWR, which is centered around the preservation of the desert bighorn sheep. Consultants from both agencies indicated that not many new guzzlers are being constructed in SMNRA and DNWR.

They vary in size and appearance, but the main concept of them is they build a storage tank. On top they put a—it's called a metal apron...collects any precipitation and then funnels it down under it. So the apron is like the cover—it holds it over the storage so it won't evaporate as much. It's rainwater or snow, and depending on what species you're aiming for will help determine what type of guzzler to put in, and the access might be different for different species, or you know, the fencing you put around it...you can put fencing around it to exclude some species if you want, or not...it varies.

-Agency Consultant, U.S. Fish and Wildlife Service

Population Growth and Recreation

Federal Agency

Historically, the city of Las Vegas depended on groundwater during its construction and growth, and the tapping of groundwater continues to be a pressing political issue as water levels in large water bodies such as the Colorado River and Lake Mead decline. Both agencies saw the preservation of groundwater levels as being extremely important for maintaining ecosystem health now and in the future.

There have been attempts—and not by us—to look at the aquifers that lie under the refuge for potential extrapolation of the resource, which we, of course, would not permit. And you know, we're always concerned about the water and how long it's going to be here.



-Agency Consultant, U.S. Fish and Wildlife Service

In that context, really talking about managing groundwater, because the springs that appear at the surface are all dependent on the groundwater. And there's a lot of pressure to develop the groundwater in the sense of pumping, you know, for Las Vegas water supply. And if you don't do that, if you're not very careful about how you do that, you could impact springs. You could lower water levels and impact springs...essentially dry them up...it's very much keeping springs sustained while managing groundwater

development. It's also restoring and enhancing the habitat in the springs and the streams that come from the springs.

-Agency Consultant, U.S. Fish and Wildlife Service

Recreation has a huge impact on the way water sources are managed in both areas, but particularly in SMNRA, which is a popular site for hikers, campers, horseback riders and a multitude of other recreation activities. Vehicular recreation with all terrain vehicles (ATVs) is especially detrimental to water sources, as these vehicles can cause soil erosion around water sources and scare off wildlife.

A big one is roads...trying to keep people on designated routes so they're not driving all willynilly everywhere. So you don't have willy-nilly roads driving through water sources or sensitive plant species or sensitive wildlife species habitat areas, nesting areas, or stuff like that...or ATVers and dirtbikes, since they're smaller, they can go anywhere they want to. So working with them, education, letting them know why these areas are important other than just because we're curious and wanted to go trailblazing. You've got to take a step back and realize that you're not the only species using these areas.

-Agency Consultant, U.S. Forest Service

Non-Native Species and Climate Change

Federal Agency

Agency representatives discussed impacts associated with invasive plant species such as tamerisk, which can draw large amounts of water, making them detrimental to native plant species such as cottonwood and willow. Even more often discussed were impacts from non-native animal species, especially horses and burros, which creation significant adverse effects to the resources. These animals often are responsible for eating large amounts of riparian vegetation and trampling springs in such a way as to reduce water flow and damage important resources.

From a natural resource management perspective, [horses] do a lot of harm to the Spring

Mountains when they exceed their appropriate management levels— AML--and we have AMLs and they've exceeded them. And they're having a lot of impact. We have horses up in upper Lee Canyon...they're degrading a lot of our sensitive butterfly habitat. So there's that too. They're going up there because it's cooler...there are springs up there. I'm just thinking if we're looking at springs, they're just trampled in there, because they've gotten through the fence. I have Willow Creek—we have an exclusion fence to protect the riparian habitat from



both ATVs—vehicular and horses. And last summer a horse got through a couple of times. There wasn't a clean break, so we don't really know how. But just completely ate down everything. We have like horse cages that we monitor and we put a cage our so nothing can eat the grass. And so you go out and measure the grass—how tall it is versus the grass outside of the cage, like where it could eat it. It's just nuts.

-Agency Consultant, U.S. Forest Service

Impacts from climate change, including increasing summer temperatures and decreased snowfall, have the potential to drastically alter these ecosystems. Many explained that they expect that these problems could become more pronounced in coming years, which would drastically impact water resources in SMNRA and DNWR.

How are the springs functioning? Are we seeing evidence of them drying up? Do we need to restore? Is encroachment by upland species drawing down the water table that's actually gonna be—it's drying up the springs? Pinyon-Juniper encroachment is quite a big thing in the whole Great Basin here. And with that, they do draw up water...Management is basically the maintenance of keeping the hydrological regime, or the flow, or the springs, whatever you want to use—continues. At least to maintain it, if not to improve it.

-Agency Consultant, U.S. Forest Service

67

I think the aquifer itself is fairly insulated, and is going to attenuate a lot of the climate change signal. It's going to take a long time to see it in the aquifer...water levels potentially declining. Certainly the major impact down there...a couple of major impacts. One would be more rain and less snow in the winter, and maybe that would be more susceptible to loss from evaporation or transferration and not captured or not recharging the aquifer.

-Agency Consultant, U.S. Fish and Wildlife Service

A Note on "Water Management"

Nuwuvi

Many Nuwuvi interpret the word "management" to refer to Euro-American methods of controlling resources, unlike Nuwuvi "interaction" that works in a culturally compatible, adaptive manner. They often associated the word with proposed pipeline projects such as the Southern Nevada Water Authority pipeline project from Ely, Nevada or the Lake Powell Pipeline Project in Utah. Activities along the Colorado River, such as the building of dams (especially the Hoover, Parker and Davis Dams), that control water flow and may divert water to cities such as Los Angeles, California and Phoenix, Arizona. Participants often defined management as a way of making sure there are enough resources for the future, using the framework of Western science. It does not consider Nuwuvi perspectives that help keep the world in balance.

You know what? I will tell you the truth. Water management to me, as a Paiute, living here on the Kaibab Indian Reservation...it really means the white man's control of the water, and them overseeing the water, them controlling the water. And you as a Paiute, you having any say... water management, that's—you're really cut out of the picture. That excludes you from the whole picture. Whereas, if you were to say preserving the water resources or documenting the water resources for the importance of your people, you know, that's a whole different approach. But water management, I think, to me is really losing that source completely, and it being overtaken by another—like you say Fish and Wildlife or National Park Service, or—whatever the entity may be, it's really losing all rights and power over the water.

-Native Representative, Kaibab Band of Paiute Indians

People are controlling the use of the water..., I think it does need to be managed, but for the right reasons, - You can't be greedy with it, that's for sure.

-Native Elder, Chemehuevi Indian Tribe

Hydrological Restoration

Nuwuvi

Many agreed that it is possible for water health to be restored. A variety of opinions were shared about restoration techniques and the timeframe for such processes to be completed.

Restoring water flow, avoiding stagnation, and removing trash and other contaminants from water sources were listed as some of the most important goals of restoration.

Others explained that springs (and the earth itself) have the ability to restore themselves if they are given an opportunity to do so. Generally, people explained that in order for this to be possible, humans must prompt restoration by performing management activities on the source (clearing out debris, trash and excess vegetation) and then limiting access to the water

source. This allows the water time and space to recover. The legitimacy of western scientific restoration techniques must be combined with other methods, including singing, praying and interacting with the water and the land. Restoration activities should also incorporate talking to the water source, sharing intentions and explaining why it is being altered.

Several activities conducted by the USFS and USFWS were viewed as negatively impacting water sources



in the Spring and Sheep Mountains: piping, the digging out of springs and other attempts to maximize water flow, pollution sourced from vehicles, and trash from recreationists. Historically, activities such as mining and ranching played a major role in impacting water sources and Nuwuvi relationships with these particular resources.

Nuwuvi believe these areas should have more public education about culturally appropriate interaction with the land. This would include suggestions for respecting the water, such as refraining from littering or polluting the source. More awareness can lead to proper treatment of the land and prevent further damage to water sources in these areas.

Atomic Testing and military activities at the Nevada National Security Site (formally the Nevada Test Site) and the Nevada Test and Training Range are perceived as affecting water sources in these areas. Most agreed that this contamination and disturbance has caused imbalance and would be extremely difficult if not impossible to reverse.

I think things have the ability to restore itself, but it has to be given that chance. I think...and even an old, stagnant, clogged up spring, once you clean all that stuff out, and just clean it up really good and just let it continue to flow and keep cleaning it, keep cleaning it... I think it can be restored. Taking care of it, offering prayers and giving offerings there at the springs, you know, talking to the spirits that live in that water and telling it why you're there to clean it and why you're even messing around with that water...and just letting it know that you're trying to restore the balance. You know, I think today a lot of things are off balance.

-Native Elder, Kaibab Band of Paiute Indians

Federal Agency

Consultants from both agencies described restoration as one of the most common hydrological management techniques in these areas. Impacts from historic activities such as mining and ranching, as well as present-day recreational activities, have rendered hydrological restoration projects a necessity in these ecosystems.

Agency consultants described several motivations for restoring flowing water sources. Monitoring and surveying are two important tools for determining whether or not water sources are in need of restoration. Comparing water sources is another way of determining the relative health of a given source.

Several large-scale restoration projects have taken place in SMNRA and DNWR, including the restoration of Corn Creek, which included re-channelization and re-vegetation activities.

A lot of our water source restoration has to do with disturbance—how much disturbance is associated with it. Are we seeing a lot of human impact? Are we seeing a lot of ungulates? And so we'd recognize that and say, ok, we need to keep those out.

-Agency Consultant, U.S. Forest Service

Early settlers, who used available water sources to irrigate fields, shepherd livestock and provide water for activities such as mining, drastically altering many springs and streams. Some federal restoration projects attempt to reverse these impacts by removing unnatural obstructions focusing on restoring water flow to its original state.

Maybe it was channelized years ago to go to a field to irrigate a field. Restoring that stream and that spring stream to its natural channel...historic channel, and then trying to plant some of the riparian species that are associated with it.

-Agency Consultant, U.S. Fish and Wildlife Service

Clearing excess vegetation, particularly non-native species, is one important restoration technique enacted by federal agencies for water sources in these areas. Additionally, revegetating the area with native species reduces erosion and restores wildlife habitat. One consultant spoke specifically about taking the non-equilibrium approach to hydrological management and restoration, which encourages some amount of disturbance to the ecosystem.

We're trying to restore it to basically a balanced—basically ecological system. Where basically it will maintain itself. In some areas, it's been degraded. In some areas, maybe it's crossed the threshold. We have seen in some of our springs, and everything, if you protect it too much, basically certain species are going to take over and it's going to become more of a monoculture, and that may be more detrimental. The idea is to have a broad ecological mix of species in there so that it can function naturally. Natural users for springs are like deer, elk, I guess. So you may have some disturbance, but disturbance does help with the vegetation. But if you close something off too much, it almost—we've seen a couple of springs where it just becomes one species of vegetation.

-Agency Consultant, U.S. Forest Service



Chapter 6. A Model for Collaborative Resource Stewardship

Collaborative resource stewardship can take different forms depending on the resource, scale and funding opportunities. The following model focuses specifically on pinyon-juniper ecosystems (Figure 4) and hydrological resources (Figure 5); however, the examples are analogous to similar practices in other habitats.

A grid system is proposed to monitor collaborative resource stewardship activities. Resource stewardship by individual and family, specialist groups and events (see below) can be monitored in select areas within the grid and areas untreated can serve as the control (Figures 6 and 7). This system will be especially useful in the monitoring of pinyon-juniper ecosystems, considering the erratic nature of pinecone production. It is also helpful when tracking spring and *poh* stewardship and restoration within a particular watershed. Gridded areas could also serve as proposed stewardship areas for particular Nuwuvi Nations or groups of Nations. Training in GIS is recommended for Nuwuvi to further assist in mapping resources and collaborative stewardship activities (see Chapter 7).

It can't be done without us. Tribes need to be actively and intimately involved from the very beginning. ... we were here in the beginning. We were the ones that showed people how to interact with it, how to use it. ... I think that the tribal people rely upon a lot of the information that was given to us. I mean, it's thousands of years old. From the beginning of time, we've interacted with the resources out there. And so for people to understand...they would have to include us.

-Native Elder, Pahrump Paiute Tribe

I think it would be a really good learning experience...especially if you brought cultural people in there to help them. You know, to understand how you're supposed to talk to these different places and how there are spirits that live in these spring waters and creeks and rivers and things like that. Because a young person going out there without that knowledge would be just like anybody else going out there. But to teach them as they're working out there about the spirits that live in the water, about giving offerings at these springs, about keeping them clean, would be really great.

-Native Elder, Kaibab Band of Paiute Indians


Figure 4. Pinyon-Juniper Ecosystems, Nuwuvi (Southern Paiute) Ancestral Territory, Current Reservations, Spring Mountains National Recreation Area, Desert National Wildlife Refuge Complex and Other Federal and Private Lands



Pinyon-Juniper ecosystem distribution sourced from USDA Forest Service-Forest Inventory and Analysis (FIA) and Remote Sensing Application Center (RSAC), 2011. Last accessed 2/2/13. Ash Meadows, Pahranagat, and Moapa Valley are National Wildlife Refuges. The Shivwits Paiute are part of the Paiute Indian Tribe of Utah. The Kaibab Band of Paiute, Chemehuevi Tribe, Colorado River Indian Tribes are not on the map. Figure 5. Watersheds and Springs, Nuwuvi (Southern Paiute) Ancestral Territory, Current Reservations, Spring Mountains National Recreation Area, Desert National Wildlife Refuge Complex and Other Federal and Private Lands



Watershed and spring data sourced from Source: United States Geological Survey, Conservation Biology Institute, National Oceanic and Atmospheric Association and Environmental Protected Agency, 2012. Many springs are human modified. Last accessed 2/2/13. Ash Meadows, Pahranagat, and Moapa Valley are National Wildlife Refuges. The Shivwits Paiute are part of the Paiute Indian Tribe of Utah. The Kaibab Band of Paiute, Chemehuevi Tribe, Colorado River Indian Tribes are not on the map. Figure 6. Pinyon-Juniper Ecosystems, Nuwuvi (Southern Paiute) Ancestral Territory, Current Reservations, Spring Mountains National Recreation Area, Desert National Wildlife Refuge Complex and Other Federal and Private Lands



Pinyon-Juniper ecosystem distribution sourced from USDA Forest Service-Forest Inventory and Analysis (FIA) and Remote Sensing Application Center (RSAC), 2011. Last accessed 2/2/13. Grid scale should be enlarged for use in ecosystem monitoring; it is used here only as a proposed technique. Ash Meadows, Pahranagat, and Moapa Valley are National Wildlife Refuges. The Shivwits Paiute are part of the Paiute Indian Tribe of Utah. The Kaibab Band of Paiute, Chemehuevi Tribe, Colorado River Indian Tribes are not on the map. Figure 7. Watershed and Springs, Nuwuvi (Southern Paiute) Ancestral Territory, Current Reservations, Spring Mountains National Recreation Area, Desert National Wildlife Refuge Complex and Other Federal and Private Lands



Watershed and spring data sourced from Source: United States Geological Survey, Conservation Biology Institute, National Oceanic and Atmospheric Association and Environmental Protected Agency, 2012. Many springs are human modified. Last accessed 2/2/13. Grid scale should be enlarged for use in ecosystem monitoring; it is used here only as a proposed technique. Ash Meadows, Pahranagat, and Moapa Valley are National Wildlife Refuges. The Shivwits Paiute are part of the Paiute Indian Tribe of Utah. The Kaibab Band of Paiute, Chemehuevi Tribe, Colorado River Indian Tribes are not on the map. For SMNRA and DNWRC, three configurations for collaborative resource stewardship are proposed:

- 1. Individual/Family
- 2. Specialist Group
- 3. Event

Figure 8. Collaborative Stewardship Framework



Individual/Family

An *individual* or *family* configuration includes Nuwuvi who physically or spiritually manage resources on an informal basis. This occurs throughout the year in different locations depending on season and the needs of individuals, families and the land. Collaborative stewardship can occur in this framework through open and frequent communication between federal agency managers and Nuwuvi Nations. Using a consultation framework that updates tribes on the condition of culturally important resources (such as pinyon pine and springs), individuals and families can make more informed decisions on when and at what scale to conduct their management. Reciprocally, Nuwuvi Nations need to create a mechanism to have individuals and families who are conducting physical and spiritual management evaluate these resources and report their activities and observations to the tribe and concurrently to the federal agency. It is advised that each Nation develop a clearinghouse of information such as identifying a Working Group member or intern, for these individuals and families who would in turn report their findings to the federal agency.

Individuals can also serve as points of contact for specific resource stewardship activities that cannot accommodate a larger group, but would benefit by the input of a few knowledgeable Nuwuvi individuals. This framework is also useful when a project requires Nuwuvi input to be provided within a short timeframe.





Specialist Groups

Specialist groups include key knowledge holders who have specialized information about specific natural and cultural resources. They can include elders with a lifetime of experience interacting with the land and others who frequently practice certain resource management activities or are designated by their respective Nation. Specialist groups can serve as managers and monitors who evaluate resources. These individuals are especially useful in collaborative resource stewardship activities with federal agencies. They can meet to conduct a reconnaissance for a larger event (see below) and work with federal agency representatives to reach mutually agreed upon outcomes for future planning meetings and on field visits. Examples of specialist groups include the Nuwuvi Working Group and various types of resource users (e.g., pine nut harvesters, basket makers, cultural demonstrators or traditional practioners). They can also encompass groups of expert knowledge holders brought together for a specific purpose, such as sharing information useful in interpretive planning or resource stewardship.



Events

Events are powerful opportunities to communicate information from generation-togeneration and to benefit the land in a larger scale. They are also useful forums to build rapport between indigenous peoples and federal agencies, especially with individuals who typically do not participate in specialist groups. Events can also serve the dual purpose of an annual meeting to provide mutual updates and a resource stewardship activity. They require more logistical planning than specialist group activities; however, they can have significant positive impacts on ecosystem health and can create knowledge transmission opportunities, if planned appropriately.

It is recommended to conduct large inter-generational resource stewardship events with youth to provide them with lived experience on their ancestral lands and to exchange knowledge with federal land managers, as future tribal leaders. Events can have multiple components, such as stewardship activities (e.g., pine nut harvesting or spring restoration) cultural demonstrations for all ages, hikes, driving tours, storytelling (depending on season), songs, traditional dances or other appropriate cultural activities.

In event planning, one individual from each Nation should serve as the point of contact for their tribe, such as a Nuwuvi Working Group member. The designated representative can then report the Nation's participation to the federal agency or other points of contact.

The *Gathering for Our Mountains* events serve as examples of this framework. These events were conducted in June and October 2012 and offered two nights of camping in the SMNRA. In both events, more than 100 individuals attended from Nuwuvi Nations, federal agencies and The Mountain Institute/Portland State University. A logo was created by project participants and used to "brand" the event on reusable water bottles and t-shirts (Figure 9) and group photos were sent to participants as keepsakes.

Each event included cultural practitioners to demonstrate various Nuwuvi skills and knowledge, such as gourd, bow and arrow making, and flint-napping, as well as the identification, harvest and use of certain plants. They included hikes and driving tours led by SMNRA and DNWRC representatives, promoting relations, sharing useful information and acquainting tribal representatives with agency responsibilities and undertakings. The fall event included pinyon-juniper management and pine nut harvest in the DNWR. During the evening, harvested pine nuts were roasted and shared by all, accompanied by singing, dancing and storytelling.

In the future, events similar to this *Gathering* could be held in conjunction with pinyonjuniper ecosystem management or spring restoration (see Chapter 7). These events could serve as opportunities for youth to have memorable experiences on the land and to learn aspects about future careers in environmental science and management. This involvement could take the form of a summer youth camp or specific outings planned during the school year. Non-Indian volunteers could participate with Nuwuvi individuals in collaborative stewardship activities; however care should be taken to make sure that Nuwuvi culture is not misunderstood or misused. These engagements will require careful planning and candid discussions. Nuwuvi, federal agency and The Mountain Institute/Portland State university participants at the Gathering for Our Mountains Events. These events included pine nut harvesting, cultural demonstrations, singing, dancing, hikes and driving tours. June and October 2012.



Figure 9. Gathering For Our Mountains Event Logo



THE MOUNTAIN INSTITUTE & PORTLAND STATE UNIVERSITY









Gathering for Our Mountains II

What to know....

- This gathering is being organized by The Mountain Institute and Portland State University to reunite multiple generations of Southern Paiute tribal members to the Spring and Sheep Mountains.
- We will be camping for 2 nights (October 5 and 6) at the Foxtail Group Picnic Area in the Spring Mountains National Recreation Area. The Campground has bathrooms and running water. Participants are also invited to attend for the day.
- We have mileage reimbursements available for 3 tribal vans or SUVs from each tribe.
- We have limited camping equipment available (4 person tents, sleeping bags, and sleeping pads).
- Each family/group is responsible for bringing and cooking their own food. We will provide dinner on Saturday night, breakfast on Sunday morning and water throughout the event.
- ♦ Activities on October 6 and 7 include pine nut harvesting and cultural demonstrations. Please bring appropriate footwear and clothing. Dress in layers. It will be cold at night.
- Please arrive by 3 pm on October 5. The event ends at 4 pm on October 7.

Please let your contact know the following:

- Number In Group
- ♦ Camping Equipment (Yes/No)
- Planned Transportation to the Event (car, tribal van, etc.)
- ♦ Special Needs



Chapter 7. Proposed Collaborative Resource Stewardship Activities

Prioritized Stewardship Interests

The following represent actionable resource stewardship interests and activities prioritized by Nuwuvi Working Group, Forest Service and Fish and Wildlife representatives in December 2012:

Nuwuvi Working Group

- Hold an annual meeting.
- Continue to conduct annual or seasonal gatherings (events).
- Work with agencies to identify culturally important species and sites (e.g., plants, animals, geology, archaeology, etc.) and to monitor and take care of them.
- Conduct pine nut harvests and associated management.
- Develop Traditional Cultural Property nominations for the Spring Mountains, Black Canyon Archaeological District and others.
- Create opportunities for co-stewardship around invasive species eradication.
- Create educational programs that include tribal youth and the public.
- Conduct intergenerational spring restoration in an event format.

- Conduct intergenerational native plant re-vegetation.
- Conduct collaborative fire management between Nuwuvi and agencies that includes preparing the landscape for the disturbance.
- Conduct collaborative fire fuel load reduction that includes preparing the landscape for the disturbance.
- Conduct job training for Nuwuvi youth in natural and cultural resource management as well as firefighters.
- Conduct intergenerational *poh* restoration and mapping.
- Enact culturally appropriate songs, prayers, and education at massacre sites (e.g., in Pahranagat National Wildlife Refuge).



- Create culturally sensitive opportunities to collaborate with non-Indian volunteers on natural and cultural resource management.
- Create a youth summer camp that includes teaching about native foods, cleaning springs, management resources, habitat restoration, etc.
- Distribute the information from Kelly/Fowler out to a larger group of Nuwuvi individuals. This information can be used to perpetuate and renew the culture and share with relatives of some of the informants who participated. It needs to be used to expand Nuwuvi knowledge.
- Conduct more collaborative research to help manage co-steward resources.
- Identify and communicate opportunities for Nuwuvi to go out and manage on their own.

Forest Service

- Recognize the interconnectedness of landscape, regardless of federal agency administration.
- Keep momentum going generated through collaboration.
- Identify diverse funding opportunities; resources are limited.
- Holding an annual meeting is critical.
- Address Consultation Handbook at each annual meeting.
- Provide quarterly updates, which work with the NEPA calendar and can be thought of as seasonal. Issues that cannot wait until the annual meeting can be communicated here.

- Identify what can be communicated electronically (e.g., email, teleconferencing, skype, etc.)
- Enact quarterly updates and follow-up phone calls as opportunities to discuss areas for collaboration or new ideas.
- Identify sites to nominate on the National Register of Historic Places.
- Identify resources and species to co-steward/monitor.
- Create educational programs at the new visitors center.
- Increase the scale of Nuwuvi stewardship through volunteers.
- Notify Nuwuvi about employment opportunities.

Fish and Wildlife

- Hold a combined annual meeting with multiple agencies to save on costs.
- Ensure that the Nuwuvi Working Group has alternates from each tribe to ensure full participation in all meetings.
- Enable Fish and Wildlife staff to assist with logistics and other in-kind support and infrastructure.
- Communicate to Nuwuvi volunteer opportunities on the Refuge.
- Create opportunities for Nuwuvi to become members of the Friends of Desert National Wildlife Refuge.
- Develop an annual plan/schedule for Nuwuvi resource stewardship activities, which could be presented at the annual meeting.
- Identify opportunities for Nuwuvi to assist with managing and protecting cultural resources, managing and monitoring PJ habitat, and maintaining water sources and *pohs* for wildlife.
- Provide opportunities for Nuwuvi youth employment through the summer Youth Conservation Corps.



Proposed Collaborative Stewardship Activities

The following proposed collaborative resource stewardship activities are focused on information collection/sharing or management/restoration strategies or activities. They can be conducted in individual/family/ specialist group and event formats as indicated in the previous chapter.

Designated Stewardship Areas for Single or Multiple

Nations – This activity entails providing a level of governance for Nuwuvi to co-manage and monitor a particular area. Nuwuvi families, groups of families, specialist groups or Nations, could adopt portions of the grid system suggested in the previous chapter. Land management activities could include many practices described below. This collaborative resource stewardship strategy entails dedicated Nuwuvi participation and constant two-way communication with the federal agency.



Individual/Family, Specialist Group and Event Formats recommended with specialized training.

Participatory Mapping and Monitoring – Nuwuvi embody thousands of years of lived experience in the SMNRA and DNWR. By operationalizing this knowledge, Nuwuvi from various age groups could assist the agencies in collecting data on various habitats and monitoring restoration sites to ensure that they achieve the appropriate outcomes desired by both the agency and the culturally affiliated nations. This could be an excellent opportunity to involve tribal land managers, interested elders, and youth interns. Participants would work hand in hand with agency staff to map and monitor designated stewardship areas. The method entails GIS training for participants and the necessary equipment.

Individual/Family, Specialist Group and Event Formats recommended with specialized training.

Nuwuvi Place Name Identification and Mapping – Several Nuwuvi consultants expressed interest in working with the agencies to document native place names or peaks, canyons, springs, and other features and locations within the Spring and Sheep Mountains. Some living elders may be the last knowledge holders who still remember these names and attendant stories that accompany them. Some individuals are open to sharing these names with recreational users and visitors to the Spring and Sheep mountains, feeling that this would help non-native people move towards understanding and respecting Nuwuvi relationships with the land. Others would like to be more discrete with this knowledge, validating the importance of recording such information before it is gone, but being more selective about who gains access to the information. If agreement regarding the sharing of native place names can be achieved, interpretive panels, educational displays, and maps could list Nuwuvi names alongside English names, or eventually even replace the more recent English names.

Individual/Family and Specialist Group formats recommended.

Pinyon-Juniper Ecosystem Management and Pine Nut Harvests– Nuwuvi have managed Pinyon-juniper woodlands for thousands of years. This process entails whipping the trees to knock old cones and debris off the trees. If the timing is appropriate, this management can lead up to or be paired with pine nut harvesting at multi-generational events. The timing of the pine nut harvest is critical. It may be difficult to coordinate the schedules of larger groups with the timing and availability of the pine nuts, which varies year-to-year and location-tolocation. Several harvests in different areas over consecutive weeks may be a useful strategy to maximize participation and enhance the learning experience. Pinyon-juniper management (with or without pine nut harvesting) can be conducted more easily in larger groups.

Individual/Family, Specialist Group and Event Formats recommended.

Spring Restoration - Springs, seeps and related water sources are often overlooked and not traditionally managed. Typically, plants, debris, rock fall and other changes to the environment, i.e., geology and botany can cause limitations to water flow creating an imbalance from a Nuwuvi perspective. In order to restore the springs and maintain balance



to the area, it is necessary to do physical inventory and remove debris while conducting traditional prayers and communicating with the mountain to ask for assistance to supplement the traditional cleaning. If the timing is appropriate, this management activity can occur at a multigenerational event with updates provided at subsequent events. Consideration must be given to disturbing sensitive species or habitats to achieve meaningful results.

Individual/Family, Specialist Group and Event Formats recommended.

Poh Restoration - Natural rock basins/tinajas (*poh*) were used traditionally as catchment areas to provide water for animals, and insects. Typically, over time, sediment collects within making them unsuitable to collect larger amounts of rain and moisture. Nuwuvi culture talks about the importance of systematically cleaning out these features to restore the water. Unfortunately, they have not been able to restore these features because of visitor distraction and plant overgrowth creating a void in proper

traditional management. In order to restore water, animal habitats, certain plant species and balance to the area, it is necessary to conduct traditional prayers and communicate with the mountain to ask for assistance to supplement the traditional cleaning. *Poh* restoration is a natural complement to augment federal guzzler projects. If the timing is appropriate, this management can occur or be discussed at a multi-generational event.

Individual/Family, Specialist Group and Event Formats recommended.

Re-vegetation - Typically after forest fires, removal of invasive species, or construction, botanists and others will develop a restoration plan, which include re-vegetation of appropriate and compatible native species. Native people are generally not included in this process, which creates a physical disconnect that can be perceived as disinguine. While Nuwuvi by and large support this effort, there is no mechanism to assist in preparing the land, overseeing and assisting with plant selection, conducting cultural monitoring, and enacting traditional closure to the activity. If the timing is appropriate, this management can occur or be discussed at a multi-generational event.

Individual/Family, Specialist Group and Event Formats recommended.

Mistletoe Removal - Mistletoe removal is necessary for healthy forests. Nuwuvi plant management that includes whipping trees and removing this predatory plant from overtaking or affecting the trees accomplishes this. When removed along with associated dead branches, fire fuel loads are ultimately reduced coinciding with agency goals. In order to restore the plants and bring balance to the area, it is necessary to conduct traditional prayers and communicate with the mountain to ask for assistance to supplement the traditional removal. If the timing is appropriate, this management can occur or be discussed at a multigenerational event.

Individual/Family, Specialist Group and Event Formats recommended.

Fuel Load Reduction - Increased fuel loads are attributed to debris or the presence of dead branches, dry needles, leaves and other associated and unmanaged undergrowth. When removed in a culturally compatible manner, plants and trees thrive, making the entire forest healthier. Traditionally, removed debris would be burned using a small fire in a shallow pit and given back to the earth. Similar undertakings were successful on other federal lands with modern fire suppression equipment. In order to reduce fuel loads, it is necessary to conduct traditional prayers and communicate with the mountain to ask for assistance to supplement the traditional cleaning. If the timing is appropriate, this management can occur or be discussed at a multi-generational event.

Individual/Family, Specialist Group and Event Formats recommended.

Prescribed Burns – Fire is considered to be an important management tool by federal land managers and Nuwuvi, if used correctly. Nuwuvi have conducted small-scale prescribed burns in the Spring and Sheep Mountains for thousands of years. If the safety risk can be minimized, this activity could help to regenerate the native seed bank and minimize invasive non-native species. Integral to this activity is the importance of Nuwuvi conducting prayers that help the land achieve the appropriate balance before, after, and during the fires.

Individual/Family or Specialist Group recommended with specialized training.

Bio-Indication through Lichens – This project will focus on lichen communities in the SMNRA and DNWRC and how they reflect air quality and climate change. Nuwuvi have a tradition of searching out environmental indicators that express broader landscape-level environmental phenomena. Lichen are such an indicator and serve similar roles for both

western land managers and the Nuwuvi Nations as species that express the state of the environment and how it is changing. This project will thus combine lichen sampling with collaborative ethnographic research to understand how the natural and cultural landscapes are being affected by urban Las Vegas, military presence, and anthropogenic climate change. This project would be used to promote knowledge and future careers in environmental sciences and management. Once completed, specific restoration projects can be determined depending on project results.

Individual/Family and Specialist Group formats recommended with specialized training.

Other Opportunities

Native Employment – In order to more fully integrate Nuwuvi perspectives into management by continuing to share knowledge, and build rapport, Nuwuvi have suggested that training, scholarships, and employment opportunities in natural and cultural resource management and interpretation be made available to interested tribal members. Positions with fire crews, ecological monitoring crews, educational displays, and visitor centers were specifically mentioned and determined appropriate. Announcements could be made at various events to encourage fuller participation.



APPENDIX A: Project Methodology

The Nuwuvi Knowledge-to-Action Project was a three-year (2010-12) collaborative initiative among seven nations of Nuwuvi (Southern Paiute), U.S. Forest Service, U.S. Fish and Wildlife Service, The Mountain Institute, and the Office of Applied Anthropological Research (OAAR), Department of Anthropology, Portland State University. The project created a Consultation Handbook and Collaborative Stewardship Plan for the seven Nations and the Spring Mountains National Recreation Area and Desert National Refuge Wildlife Complex.

Project activities included:

1) *Planning meetings* with U.S. Forest Service, U.S. Fish and Wildlife Service, a Working Group of tribally designated representatives, and Tribal Governments.

2) *Ethnographic research* on Nuwuvi and federal agency ecological knowledge of pinyonjuniper landscapes and hydrological resources with expert knowledge holders and agency representatives.

3) Habitat surveys with Nuwuvi individuals and specialist groups in multiple habitats.

4) *Collaborative stewardship events* at culturally appropriate times of year based upon Nuwuvi ecological knowledge with multi-generational participation.

The *Collaborative Stewardship Plan* benefited from five *planning meetings* (May-December 2010 and December 2012), two *pinyon-juniper habitat surveys* (August 2011 and 2012), a *poh or water catchment survey* (August 2012) and *two collaborative stewardship events* (June and October 2012). Various Nuwuvi Working Group and tribal members attended these activities. Select individuals from each federal agency participated, including Line Officers, Natural Resource Specialist, Cultural Resource Specialist, Archaeologists, Tribal Liaison, Interpretive Planner, NEPA Coordinator, etc. Meeting outcomes were documented in meeting notes, which were reviewed by all participants before submitted as final.

The *Plan* was augmented by *ethnographic research* conducted by two Portland State University Graduate Researchers in January-March and August-October 2012 with 28 Nuwuvi knowledge holders and six federal agency representatives from various management roles (see Appendix B).

A draft *Collaborative Resource Stewardship Plan* was developed with guidance from participating federal agencies and the Nuwuvi Working Group in December 2012. Comments were collected from various federal agency and Nuwuvi representatives before revision and submission as final.

Final Comments on the Nuwuvi Knowledge-to-Action Project

On December 9, 2012, summary remarks were shared about the project. They help to capture the experience of the participants and illustrate their thoughts upon completion of the three-year project cycle:

Nuwuvi Working Group

- We took this beyond a level that people thought this would be; created a model; brought agencies together that hadn't worked together before; agencies are talking about sharing information.
- Glad to see the project come full circle
- It's been a long time since I've been part of something this close, people remembering others' names; hopefully it will continue, sad to see it end.
- Had fun talking to a lot of people, will be sad to see it end.
- Management concerns for agencies are also challenges for tribes; we have to ensure continuation; young people need to be involved to help us sustain our efforts.
- People had a nice time even though it was hard work; I appreciate the efforts of fellow Nuwuvi Working Group members.
- Really enjoyed working with other Nuwuvi.
- At the beginning we didn't know where this was going and we had some uncertainties; Nuwuvi people are grounded in our traditions, we have an obligation to share things, we've shared things that we've never shared before; built positive relationships, interpretation; the group stuck together even though some passed or moved on.
- This project allowed tribes to impart knowledge about the significance of the land; all of the people who have been part of this were vital to its success.

Forest Service

- The Forest Service and Fish and Wildlife Service are as different as possible within the agencies and it's amazing that it's worked this well, it's exciting; we can't let go of this even with dwindling budgets, we have to keep this model going.
- The project built a lot of capacity; working with students, a lot of work, logistics, events, a huge feat.
- Nuwuvi Working Group has done a lot of work with consultation protocols, restoration plans, above and beyond government-to-government consultation; promote the NWG to other agencies; have Nuwuvi voices heard.
- The strongest thing about the group is how inclusive it is; weak groups hold others at bay and protect; loving the land is what we have in common.

Fish and Wildlife Service

- Proud to have part of this, we've gotten as many goals as were possible accomplished in this time frame; this will be held up nationally as something that should be striven for.
- It's amazing to work with the NWG; NWG efforts are appreciated, and patience with the agency learning to look at things differently; will be sharing handbook with liaison in DC and other higher ups; hopefully this will become the model for future consultation.
- Look forward to where we'll go in the future.
- Looking forward to future interpretive projects with Nuwuvi.
- Thanks for welcoming new members in; we have more common goals than might be apparent.
- I'm involved with a lot of consultation events with tribes, this is hands-down the most productive consultation process in the 6 state region I manage; we can't to good cultural resource or land management without good tribal consultation; thanks for being so positive and productive.

The Mountain Institute/Portland State University

- Grateful to all; good to see how many faces have been here since the beginning.
- It was great to learn about Nuwuvi and agency cultures and to be shown the ropes in this field.
- We accomplished everything we intended to do; thanks to the openness of the NWG; agency partners thanks for candid talk about what's going on, transparency; thanks to everyone involved!

APPENDIX B: Ethnographic Research Methodologies

Nuwuvi (Southern Paiute) and Federal Agency Ecological Knowledge and Understanding of Pinyon-Juniper Ecosystems in the Spring Mountains National Recreation Area and the Desert National Wildlife Refuge, Nevada

Brian Lefler Graduate Student, Anthropology Department Portland State University

Abstract

Nuwuvi (Southern Paiute) are a group of Native Americans inhabiting the southern Great Basin, Mojave Desert, and Colorado Plateau regions of the Western United States. Their ancestral territory spans parts of Nevada, Utah, Arizona, and southern California. Currently, large portions of their traditional lands are managed by various federal agencies as protected areas. This report focuses on two mountain ranges predominately falling within two protected areas managed by two respective federal agencies in southeastern Nevada. The Spring Mountains, situated to the northwest of Las Vegas, are mostly contained within the boundaries of the Spring Mountains National Recreation Area (SMNRA), managed by the US Forest Service (USFS). Across the Las Vegas Valley to the east lies the Sheep Range, ensconced by the Desert National Wildlife Refuge (DNWR) and stewarded by the US Fish and Wildlife Service (USFWS). Occurring at the lower elevations of these and other Great Basin mountains are large tracts of pinyon-juniper woodlands. This ecosystem is a significant management concern for both Southern Paiutes and federal land management agencies. This report summarizes the key findings from ethnographic research with Southern Paiute knowledge holders and select agency personnel from the USFS and USFWS regarding select life forms, landscape features, landscape interconnectivity, and natural and cultural resource management within pinyon-juniper woodlands in these two desert mountain ranges.

I. Introduction

This report presents the results of a three-month field work period for the Nuwuvi Knowledge to Action Project, a collaborative land management and ethnographic project among seven Southern Paiute Nations, the US Forest Service and the US Fish and Wildlife Service. During the course of the field work knowledge holders from each of the seven Nations were interviewed about their knowledge and perceptions of plants and landscape features in pinyon-juniper ecosystems in the Spring and Sheep Mountains. These mountain ranges are largely contained respectively within the boundaries of the Spring Mountains National Recreation Area and the Desert National Wildlife Refuge. Agency personnel were also interviewed about management protocols and philosophies in order to illuminate commonalities and differences between and among federal agencies and the seven participant Southern Paiute Nations. It is the hope of this researcher that the results of this work be considered and integrating into pinyon-juniper management plans in both protected areas in order to work towards more holistic and sustainable land management while working towards co-management of these lands by Southern Paiute people alongside federal agency land managers.

II. Research Questions and Hypotheses

1) What is the character of knowledge held by select Southern Paiute expert knowledge holders regarding plants and landscapes within pinyon-juniper ecosystems in the Sheep and Spring Mountains?

H₁: Ethnoecological knowledge will be fragmented, with different knowledge domains held to varying degrees by select Southern Paiute expert knowledge holders.

2) <u>Primary question</u>: How do management approaches and explanations of ecological phenomena within pinyon-juniper habitats differ among select Southern Paiute knowledge holders and select U.S. Forest Service and U.S. Fish and Wildlife Service land managers?

<u>Secondary question</u>: How can Southern Paiute and Western ecological knowledge and land management inform sustainable and collaborative resource management plans for the Spring Mountain National Recreation Area and the Desert National Wildlife Refuge?

H₁: Southern Paiute and federal land manager perspectives and management approaches will vary within and among groups. Many management techniques will prove complementary or virtually analogous, while others will lie in opposition.

III. Methodology

<u>Sampling</u>

Sample selection of interview consultants consisted of three primary expert knowledge holders from each of the seven participant Nations (21 total), with an additional four family members who joined some of the interviews. Participant Southern Paiute Nations included: the Las Vegas Paiute Tribe, the Moapa Band of Paiute Indians, The Paiute Indian Tribe of Utah, Colorado River Indian Tribes, the Kaibab Band of Paiute Indians, the Pahrump Paiute Tribe, and the Chemehuevi Indian Tribe. An additional sample of two agency employees from each protected area (DNWR and SMNRA) were also selected. The applied nature of this project empowered Southern Paiute Working Group (NWG) members-triballydesignated representatives of each of the seven participant Nations-to actively select three expert knowledge holders from their own respective Nation as consultants for my Southern Paiute sample. The NWG plays a crucial collaborative and co-decision-making role throughout most stages of the larger project. Due to my small sample size and a focus on pinyon-juniper woodlands, my study is not intended to achieve a comprehensive understanding of the state of knowledge throughout Southern Paiute Nations or across all culturally-significant ecosystems. Rather, it is designed to illuminate the character of pinyonjuniper habitat ecological knowledge held by select expert knowledge holders, while applying it to the development of collaborative and sustainable land management plans.

Agency consultants were selected by the researcher based on known knowledge of the target ecosystem and its management and included biologists and administrators with land management knowledge. With Native informants, a gender-balanced sample was sought in order to access potentially gender-specific information. Due to the collaborative nature

of consultant selection, an exact balance was not achieved. The gender ratio for primary interviewees was 10 woman and 8 men, and including secondary participants consisted of 12 women and 10 men. Interviews with Native knowledge holders were conducted in participants' homes, both on and off reservations, and utilized semi-structured interviews, and photo recognition exercises. Semi-structured interviews with agency personnel occurred both in person at agency offices and over the phone. Interviews attempted to elicit perceptions and explanations of ecological phenomena and approaches to land management.

Data Collection

Research instruments for Southern Paiute consultants were initially developed by the researcher and later refined during focus groups with the project co-directors Jeremy Spoon and Richard Arnold to ensure that they are tailored to relevant knowledge domains and project goals. Free-listing exercises with a Southern Paiute knowledge-holder and a conservation biologist were used to generate a core list of significant taxa and landscape features. These identified taxa and features were cross-checked against ethnographic references of culturally important plants, plants of concern to Western land management identified in the natural science literature, and plant lists for both mountain ranges, to ensure that all species occurred in both protected areas. Photos were either borrowed with permission from reputable botanical photo databases, or taken by the researcher after a positive identification was obtained. Photos were displayed for informants on an Apple iPad. Interviews with Southern Paiute knowledge holders began with demographic questions concerning age, ethnic background/Nation, spiritual affiliation, education, and work experience, in order to contextualize subsequently-elicited ecological knowledge. The following questions sought to elicit knowledge of landscape features, biota, biophysical processes, and interconnectivity. Questions began by asking for names, locations, and stories regarding target taxa and features. Questions then scaled up to the landscape level, addressing both ecological and biophysical interactions among biota and landscape features. Next, information regarding human interaction, relationship, and management of the land at both the species and landscape level was collected. Finally, opinions regarding current management approaches utilized by federal agencies and suggestions for improved management, cooperation, and co-management were gathered. Agency interviews were semi-structured and collected knowledge and opinions regarding ecosystem health, management concerns and approaches, interactions with Native stakeholders, and challenges. Pending consent, all interviews will be recorded for transcription and coding and the results will be returned at the end of the study.

The knowledge domains of plants and landscape features were selected as my research foci due to their significance in land and cultural resource management. Current paradigms of Western land management operate at the ecosystem scale, often beginning with considerations of plant communities. Although conservation campaigns are often driven by charismatic mega fauna, viable habitat – consisting largely of plant communities for terrestrial species – is a primary concern. Landscape features such as caves, springs, and rock writing (rock art), were selected as a theme partly due to their significance to the Southern Paiute as part of a living landscape. They were also selected because of legislative obligations of federal agencies to consult with tribes regarding management of cultural resources, including some of these features. By adopting a broader definition of land management that

97

encompasses both cultural and natural resources and by considering ecological phenomena at a variety of spatial scales from both Southern Paiute and Western perspectives, I hope the results of this research will aide the development of more holistic management plans for the SMNRA and the DNWR.

Data Analysis

Qualitative methods were used to analyze data collected from interviews. Content analysis was utilized to identify reappearing themes emerging within interview transcripts. This procedure includes creating codes for the texts, systematically applying the codes to the texts, and analyzing the results.

IV. Informed Consent Scripts

Nuwuvi (Verbal)

Greetings. My name is Brian Lefler. I am a graduate student from the Anthropology Department at Portland State University (PSU). I am conducting research that is part of the Nuwuvi Knowledge-to-Action Project, directed by Jeremy Spoon and Richard Arnold, which partners with PSU, The Mountain Institute, seven Nuwuvi Nations, the Spring Mountains National Recreation Area (U.S. Forest Service), and the Desert National Wildlife Refuge (U.S. Fish and Wildlife Service). The project seeks to document Nuwuvi knowledge of plants, landscapes, and landscape features such as caves, springs, and mountains. I will also generate a proposed collaborative resource management plan for both areas. Additionally, individual interview transcripts and audio CDs will be given back to each consultant.

I am approaching you because you were recommended as a key individual with expert knowledge related to the project. If you are willing to participate, I would like to ask you some questions about your knowledge related to piñon-juniper habitats in the Spring and Sheep mountains. With your permission, I would like to record what you say by both taking notes and with this recorder (show them recorder). You may refuse to have it recorded or may ask me to turn it off at any time. The notes and recordings are intended for project use to help me accurately remember everything that you say. The recorded information that I obtain from interviews will be kept secure at all times either on my person or locked in my luggage. I also request that I am able to take your photo so that we can have a visual record of you with the important information that you provide us.

I understand that this interview may take you away from your work or domestic tasks. For your participation, you will receive a \$150 stipend. If any of the questions upset you, please tell me and we can pause the interview or move onto the next question. I feel this project is important because it will potentially help to improve consultation between Nuwuvi and the U.S. Government, to provide enhanced opportunities for collaborative management of the Spring, Sheep, and other mountain landscapes, as well as to perpetuate and revitalize the culture through multi-generational participation and knowledge transmission. I want you to be an active collaborator in the project, so please give us feedback and advice on all stages of the research and writing processes.

Your participation in this project is completely voluntary and you can withdraw your involvement or statements at any time during or after the interview, or refuse responses to

any questions. If you have any questions or concerns at any time, please contact me, Brian Lefler, the researcher, or Cathleen Gal, at the Human Subject Research Review Committee, Portland State University, using the provided contact information.

Permission will be given or denied; the interview will also be conducted without recording or photos if necessary

Researcher:

Human Subject Research Review Committee:

Brian Lefler Department of Anthropology Portland State University P.O. Box 751 Portland, Oregon 97213 785.550.8658 blef@pdx.edu Cathleen Gal Research and Strategic Partnerships 1600 SW Fourth Ave, Suite 620 Portland State University Portland, OR 97201 503.725.4288 cgal@pdx.edu

Federal Agency (Written)

You are invited to participate in a research study conducted by Brian Lefler from Portland State University, Anthropology Department. The researcher hopes to learn the character of ecological knowledge and management techniques held by select Southern Paiutes, and USFS and USFWS land managers. This project is being conducted in partial fulfillment of the requirements for a master's degree under the supervision of Jeremy Spoon, PhD. You were selected as a possible participant in this study because of your position and knowledge regarding piñon-juniper woodlands in either the Spring Mountains National Recreation Area or the Desert National Wildlife Refuge.

If you decide to participate, you will be asked to take part in an interview at your office or a convenient location in the Las Vegas area for a period of 1-2 hours. The interview will be recorded and transcribed and will consist of a serious of questions regarding plants, landscape features, ecological phenomena, and management approaches in piñon-juniper woodlands. I am not aware of any risks that you will be exposed to. You may not receive any personal benefit from taking part in this study, but the study may help to produce management recommendations based on the dual finding from Southern Paiute and USFS/USFWS interviews.

Your identity in public reports will be protected with pseudonyms unless you provide consent for use. Information regarding medicinal plant knowledge and the location of sacred sites will be kept confidential unless agreed by the participants that it is important to include as part of project report. Audio recordings will be kept on the researcher's person at all times or locked in his luggage and will be stored on a password-protected computer. Your participation is voluntary. You may also withdraw from this study at any time without affecting your *relationship* with Portland State University.

If you have concerns or problems about your participation in this study or your rights as a research subject, please contact the Human Subjects Research Review Committee, Office of Research and Sponsored Projects, 600 Unitus Bldg., Portland State University, (503) 725-4288 / 1-877-480-4400. If you have questions about the study itself, contact Brian Lefler at 1815 NE 46th Ave, Portland, OR; 785.550.8658.

Your signature indicates that you have read and understand the above information and agree to take part in this study. Please understand that you may withdraw your consent at any time without penalty, and that, by signing, you are not waiving any legal claims, rights or remedies. The researcher will provide you with a copy of this form for your own records.

Signature

Date

Nuwuvi (Southern Paiute) and Federal Agency Ecological Knowledge and Understanding of Water and Perceptions of Restoration in the Spring Mountains National Recreation Area and the Desert National Wildlife Refuge, Nevada

Kendra Wendel Graduate Student, Anthropology Department Portland State University

Abstract

Nuwuvi (Southern Paiute) are an indigenous culture group of the southern Great Basin whose ancestral territory spans four states: Nevada, California, Utah, and Arizona. This research focuses on Nuwuvi ethnohydrological knowledge, including management knowledge, and investigates perceptions of hydrological restoration among Nuwuvi and agency participants from the U.S. Forest and Fish and Wildlife Services. This topic was addressed using a methodology that included semi-structured interviews and demographic questionnaires with 16 Nuwuvi knowledge holders and four federal agency participants carried out over two months of fieldwork. Text analysis was conducted using inductive coding on partial transcriptions of these interviews in order to identify themes and concepts related to hydrology, management, and restoration. This report summarizes key findings and is intended for use in identifying opportunities for collaborative stewardship in two protected areas in southern Nevada-- Spring Mountains National Recreation Area (SMNRA) and Desert National Wildlife Refuge (DNWR).

I. Introduction

This report details findings from two months of research contributing to the Nuwuvi Knowledge–to-Action Project (NKTA): a collaborative effort among the seven Nuwuvi Nations, the U.S. Forest Service (USFS), and the U.S. Fish and Wildlife Service (USFWS), facilitated by The Mountain Institute (TMI). This research evaluates the character of Nuwuvi knowledge of hydrological phenomena and management as well as gauge perceptions of hydrological restoration in two protected areas: Spring Mountains National Recreation Area (managed by USFS) and Desert National Wildlife Refuge (managed by USFWS).

II. Research Questions

- 1) What is the character of hydrological knowledge held by select Nuwuvi participants?
- 2) How do hydrological management strategies of Nuwuvi participants and USFS and USFWS managers converge and differ?
- 3) How is hydrological restoration perceived by Nuwuvi and agency participants?

III. Methodology

<u>Sampling</u>

Six of the seven Nuwuvi Nations participated in this research phase: Chemehuevi Indian Tribe, Chemehuevi representatives from Colorado River Indian Tribes, Kaibab Paiute Tribe, Las Vegas Paiute Indian Tribe, Moapa Band of Paiute Indians, and Pahrump Paiute Indian Tribe. Interviewees were selected based on recommendations from the Nuwuvi Working Group (NWG)—a group comprised of tribally designated representatives from each Nuwuvi Nation. Between two and three expert knowledge holders were sought from each Nation for interviews. In total, sixteen Nuwuvi consultants (5 men and 11 women between the ages of 42 and 86) participated in the study. This sample is not demographically representative of the population from which it is drawn, but the specialized knowledge held by select consultants works to illuminate the character of Nuwuvi hydrological knowledge, without being wholly representative.

Agency consultants were selected through discussions with the Line Officers from each agency. The intent of these interviews was to gain a greater understanding of agency perspectives on hydrological management, ecological restoration, and consultation with Native American Nations, so interviewees were sought who worked with hydrological management and/or restoration in either SMNRA or DNWR. In total, there were two participants from each agency (one man and one woman from each between the ages of 28 and 58).

Data Collection

Prior to research commencement, the project was designed in collaboration with NKTA Principle Investigators Jeremy Spoon and Richard Arnold. In addition, a comprehensive literature review was conducted using relevant historical, anthropological, and ecological analyses of the region to establish context for the study.

Primary data was collected during a two-month fieldwork period in August and September of 2012. During this time, a series of semi-structured interviews were carried out during home visits with Nuwuvi participants, and at agency offices and field stations with agency consultants. Interviews contained a series of demographic questions covering participants' educational, professional, and cultural backgrounds. Topical questions on water, water management, and restoration followed. All consultants were presented with an informed consent script prior to being interviewed. The informed consent document detailed the purposes of the project, the proposed use of the data to be collected, and a full explanation of participants' rights as research subjects. All interviews were recorded using a digital audio recorder.

Nuwuvi interview questions examined definitions of different types of water (such as springs, streams, and subterranean water), as well as ecological interactions among water, humans, plants, animals, and other landscape features. Questions considered historical interactions with water sources as well as consultants' current relationships with water and the land. Current trends affecting SMNRA and DNWR, such as increasing levels of recreation, tourism, and urban population growth, were also discussed. Finally, participants were asked for their opinions about present-day water health in the Spring and Sheep Mountains and asked about potential strategies for ecological restoration. Maps were also presented to participants to identify areas of hydrological significance.

Agency interviews included a series of demographic questions focusing on the educational and professional background of participants. Additional questions focused on the hydrological management strategies and restoration techniques of the agency in question. Participants were also asked to discuss current trends affecting water resources in SMNRA and DNWR, including climate change, growing urban populations, and increasing levels of tourism and recreation.

Data analysis

Partial transcripts were derived from audio recordings of all Nuwuvi and agency interviews. Following transcription, inductive coding was carried out on these transcripts. The inductive coding method involves deriving a set of important themes from the texts, identifying how those themes are related to one another, and linking the themes back to exemplar quotes. The categories of knowledge domains outlining this report are derived from this coding method, as are the summaries of findings written by the researcher.

V. Informed Consent Scripts

Nuwuvi (Verbal)

Hello. My name is Kendra Wendel. I am a graduate student in Anthropology from Portland State University (PSU). I am conducting research that is part of the Nuwuvi Knowledge-to-Action Project, directed by Jeremy Spoon and Richard Arnold, which partners with PSU, The Mountain Institute, seven Nuwuvi Nations, the Spring Mountains National Recreation Area (U.S. Forest Service), and the Desert National Wildlife Refuge (U.S. Fish and Wildlife Service). The project seeks to document Nuwuvi knowledge of water and understand Nuwuvi perceptions of water health and restoration in the area. After I collect data, I will provide water management recommendations for both areas based on information from these interviews.

I am approaching you because you were recommended as a key individual with expert knowledge related to the project. If you are willing to participate, I would like to ask you some questions about your knowledge related to water in the Spring and Sheep mountains. With your permission, I would like to record what you say by both taking notes and with this recorder. You may refuse to have it recorded or may ask me to turn it off at any time. The notes and recordings are intended for project use to help me accurately remember everything that you say. The recorded information that I obtain from interviews will be kept secure at all times either on my person or locked in my luggage. You will receive an audio CD of this interview to keep. Your identity will be kept confidential in written reports will be protected with pseudonyms unless you provide consent for use. Information regarding the location of sacred sites will be kept confidential unless you agree that it is important to include as part of project report. If family members are present for your interview, the confidentiality of your statements cannot be guaranteed. I also request that I am able to take your photo so that we can have a visual record of you with the important information that you provide us.

I understand that this interview may take you away from your work or domestic tasks. For your participation, you will receive a \$150 stipend. If any of the questions upset you, please tell me and we can pause the interview or move on to the next question. I want you to be an active collaborator in the project, so please give me feedback and advice on all stages of the research and writing processes.

Your participation in this project is completely voluntary and you can withdraw your involvement or statements at any time during or after the interview, or refuse responses to any questions. If you have any questions or concerns at any time, please contact me, Kendra Wendel, the researcher, or Cathleen Gal, at the Human Subject Research Review Committee, Portland State University, using the provided contact information.

Permission will be given or denied; the interview will also be conducted without recording or photos if necessary

Researcher:

Kendra Wendel Department of Anthropology Portland State University P.O. Box 751 Portland, Oregon 97213 (425) 750-0677 kwendel@pdx.edu Human Subject Research Review Committee:

Cathleen Gal Research and Strategic Partnerships 1600 SW Fourth Ave, Suite 620 Portland State University Portland, Oregon 97201 (503) 725-4288 cgal@pdx.edu

Federal Agency (Written)

You are invited to participate in a research project conducted by Kendra Wendel, a graduate student in Anthropology from Portland State University. The researcher hopes to learn the character of ecological knowledge of water, hydrological management techniques, and perceptions of restoration held by select Nuwuvi (Southern Paiutes), and USFS and USFWS land managers. This project is being conducted in partial fulfillment of the requirements for a master's degree under the supervision of Jeremy Spoon, PhD. You were selected as a possible subject in this study because of your position and knowledge regarding hydrological management and/or restoration in either the Spring Mountains National Recreation Area or the Desert National Wildlife Refuge.

If you decide to participate, you will be asked to take part in an interview at your office or a convenient location in the Las Vegas area for a period of 1-2 hours. The interview will be recorded and will consist of a series of questions regarding hydrological features, management techniques, and approaches to hydrological restoration. I am not aware of any risks that you will be exposed to. You may not receive any personal benefit from taking part in this study, but the study may help to produce management recommendations based on the dual finding from Southern Paiute and USFS/USFWS interviews.

Your identity in public reports will be protected with pseudonyms unless you provide consent for use. Although every effort will be made to keep your identify confidential, there is still a chance your comments could be identified, and confidentiality cannot be guaranteed. Audio recordings will be kept on the researcher's person at all times or locked in her luggage and will be stored on a password-protected computer. Your participation is voluntary. You may also withdraw from this study at any time without affecting your relationship with Portland State University or the researcher.

If you have concerns or problems about your participation in this study or your rights as a research subject, please contact the Human Subjects Research Review Committee, Research and Strategic Partnerships, 1600 SW Fourth Ave, Suite 620 Portland, Oregon 97201, Portland State University, or by phone at (503) 725-4288 / 1-877-480-4400. If you have questions about the study itself, contact Kendra Wendel in the Department of Anthropology, Portland State University, P.O. Box 751, Portland, Oregon 97213, or by phone at (425) 750-0677.

Your signature indicates that you have read and understand the above information and agree to take part in this study. Please understand that you may withdraw your consent at any time without penalty, and that, by signing, you are not waiving any legal claims, rights or remedies. The researcher will provide you with a copy of this form for your own records.

Signature

Date

APPENDIX C: Case Studies of Collaborative Stewardship/ Management Projects

General Papers (United States)

Austin, D., S. Gerlak, and C. Smith

2000 Building Partnerships with Native Americans in Climate-Related Research and Outreach. Climate Report Series CL2-00. Institute for the Study of Planet Earth. The University of Arizona, Tucson.

This report discusses federal partnerships with Native American Nations in relation to climate research. It begins with a summary of the legal basis for federal-Native American consultation relationships, including a discussion of the seven eras of federal-tribal policy in the U.S. Next, the government-to-government consultation process is reviewed, along with the nine steps of consultation: 1) defining consultation, 2) determining affiliations, 3) contacting tribes, 4) orientation meetings, 5) creating a committee, 6) site visits, 7) drafting recommendations for each site, 8) continuing to interact and monitor, and 9) ending the process. Six steps to participatory research are offered as well: 1) defining the partnership, 2) contacting tribes, 3) orienting, 4) research design and group formation, 5) performing research, and 6) analyzing and presenting results. Intellectual property rights are briefly discussed in addition to the impacts of the Paperwork Reduction Act and the Freedom of Information Act.

Ballard, H. L., M. E. Fernandez-Gimenez, and V. E. Sturtevant.

2008 Integration of Local Ecological Knowledge and Conventional Science: A Study of Seven Community-Based Forestry Organizations in the USA. *Ecology and Society* 13(2): 37.

Available online at: http://www.ecologyand society.org/vol13/iss2/art37/

This article examines seven community forestry operations and assesses their integration of local ecological knowledge (LEK) into forest management. Although the examples include local communities, none of them involve Native communities. The researchers found that LEK is in fact incorporated into the projects in several ways. These include involving locals in data collection and interpretation as well as the co-producing reports with scientists. The authors conclude that local participants use both local knowledge and science to perform monitoring and research.

Donogue E., S. Thompson, and J. Bliss

2010 Tribal-Federal Collaboration in Resource Management. *Journal of Ecological Anthropology* 14:1.

Available online at: http://shell.cas.usf.edu/jea/PDFs/DonoghueJEAVol14.pdf

In this article the authors examine collaborative resource management between tribes and federal agencies in the United States. They analyze themes including: decision-making authority, knowledge sharing, the transferral of funds from agencies to tribes, field work duties, and forms of mutual dependency. Several existing projects are highlighted including: the Maidu Stewardship Project, the Gray Wolf Recovery Project, a polar bear hunting and management agreement, watershed restoration, forest stewardship, and more.

<u>Alaska</u>

http://www.fakr.noaa.gov/protectedresources/comanagement.htm

This is a link to several management agreements between the National Marine Fisheries Service and the U.S. Fish and Wildlife Service and involving Native communities. These agreements were granted under Section 119 of the Marine Mammal Protection Act Amendments of 1994. Tied to these agreements are a variety of councils and committees constituted by both federal employees and Native representatives. Represented groups include: the Alaska Beluga Whale Committee, the Alaska Eskimo Whaling Commission, the Aleut Marine Mammal Commission, the Alaska Native Harbor Seal Commission, the Cook Inlet Marine Mammal Council, and the Ice Seal Committee, among others.

Alaska Beluga Whale Committee and the National Marine Fisheries Service 1999 Agreement Between the National Marine Fisheries Service and the Alaska Beluge Whale Committee for the Co. Management of the Western Alaska

Beluga Whale Committee for the Co-Management of the Western Alaska Beluga Whale Populations.

Available online at: http://www.fakr.noaa.gov/protectedresources/whales/beluga/ abwcagrefinal.pdf

This co-management plan builds upon the 1972 Marine Mammal Protection Act which provides exemptions for Native Alaskans when hunting is undertaken for subsistence, Native art or utilitarian goods. This document lays out the roles for both of the organizations associated with this agreement. The Alaska Beluga Whale Committee (ABWC), composed of Native representatives, scientists, and agency personnel, is responsible for managing subsistence hunts, inspecting and reporting biological samples, and performing research on biology and Traditional Ecological Knowledge (TEK) relating to beluga whales. The National Marine Fisheries Service also manages the subsistence hunt, enforces the Marine Mammal Protection Act, and performs research in consultation with the ABWC.

<u>Midwest</u>

National Park Service

2012 Badlands National Park - South Unit, Final General Management Plan and Environmental Impact Statement.

Available online at: http://www.parkplanning.nps.gov/document.cfm?parkID=117&projectI D=17543&documentID=47117

This document proposes several options for the future management of the South Unit of Badlands National Park, the entirety of which lies within the Pine Ridge Reservation. The options include: 1) continuing the current form of management with the National Park Service (NPS) administrating, 2) creating the first Tribal National Park (the preferred option), 3) sharing management between the Oglala Sioux and the NPS, and 4) creating a new National Park that would be managed by the Oglala Sioux Tribe. The preferred tribal park option would transfer all management to the tribe as soon as possible after a period of on-the-job training and transitioning had occurred. Federal law would still trump tribal law when in conflict, and a partial waiver of tribal sovereignty would allow citizen involvement in
the park and to ensure laws such as NEPA and NHPA would stay in effect. Currently, tribal members hunt and gather plants, fruits, and nuts in the South Unit as specified in a 1976 MOU, the AIRFA, and a provision, PL 90-468.

Great Lakes Region

Busiahn, T., and J. Gilbert

2009 The Role of Ojibwe tribes in the Co-Management of Natural Resource in the Upper Great Lakes Region: A Success Story. Great Lakes Indian Fish and Wildlife Commission.

Available online at: http://www.glifwc.org/minwaajimo/Papers/Co-management%20 Paper%20 Busiahn%20%20FINAL.pdf

In the 1980s the Ojibwe tribes asserted their rights to harvest resources on ceded lands. This was affirmed in the courts and resulted in a revival of traditional harvesting practices. What arose were co-management agreements with federal agencies and the development of an intertribal organization of eleven tribes, the Great Lakes Indian Fish and Wildlife Commission, which enabled coordination and cooperation without the risk of impacting the sovereignty of individual tribes. Among the agreements in place are a pledge among participating tribes not to over-harvest resources and a federal-tribal joint-assessment of harvesting practices and impacts. Walleye is one highlighted resource that is traditionally harvested with spears. Thanks to cooperative efforts between biologists and tribal members, walleye populations are healthier than they were before cooperation began. Also partly due to tribal co-management, lake trout populations have been restored in Lake Superior. Co-management of deer is also discussed, including the conflicting cultures of deer hunting held by tribal members, state biologists, and non-tribal hunters. Positive benefits to co-management are substantiated in this report, but the authors concede that continued efforts are required in the future for on-going success.

USDA Forest Service

1999 Memorandum of Understanding Regarding Tribal – USDA Forest Service Relations on National Forest Lands Within the Territories Ceded in Treaties of 1836, 1837, and 1842.

This Memorandum of Understanding (MOU) covers relations between the Lake Superior Chippewa Indians and the US Forest Service. Treaty rights to hunting, fishing, and gathering wild plants on public lands are recognized in this document. The purposes of this MOU are to develop government-to-government relationships, allow tribes to exercise land access rights, and to conserve resources. The participant tribes and the US Forest service agree to monitor and regulate harvesting in a sustainable manner, utilize a permit system, exchange monitoring data, and develop a specific management plan for tribal sugar bushes (stands of sugar maples). Other issues such as timber sales and an unresolved disagreement between the tribes and the USFS regarding tribal requests for motorized use of a wilderness lake are also discussed.

Wrobel, Alexandra

2011 Tribal Wild Plant Gathering on National Forest Lands Harvest Season 2009-2010. Administrative Report 11-14. Great Lakes Indian Fish and Wildlife Commission, Biological Services Division.

This report summarizes wild plant gathering on USFS lands in connection with the abovementioned MOU between the USFS and several Great Lakes tribes. As of this report, 10 tribes have ratified the MOU. The results of this report are from the 2009-2010 season. A permit system is in effect that issues off-reservation natural resources permits and tribal commercial natural resource harvesting permits. The former category are used to monitor the interest of tribal members in gathering resources for personal use. The latter is also used to monitor tribal interest and is required for commercial harvesting of ginseng, princess pine, and conifer boughs. Other plants may be harvested without a commercial permit and multiple individuals may be registered on a single permit. Of the former permit type, 2, 145 were issued for the 2009-2010 season, whereas 163 commercial permits were issued for a total of 422 harvesters. The National Forests selected for harvesting in order of frequency were the Chequamegon-Nicolet NF, followed by the Ottawa NF, Hiawatha NF, and Huron-Manistee NF.

<u>California/Nevada</u>

Adelzadeh, Mary

2006 Empowerment in an Era of Self-Determination: The Case of the Washoe Tribe and US Forest Service Co-Management Agreement. Masters Thesis. University of Michigan.

This Master's thesis examines a co-management agreement signed between the USFS and the Washoe Tribe of California and Nevada as part of the Lake Tahoe Summit in 1999. The details of this agreement are described in detail. Some aspects of the agreement include: lake access for tribal members, a long-term special-use permit for harvesting plants and providing education at Meeks Meadow, a thirty-year agreement for the use of 12-15 acres for a cultural center, and several MOUs, including one that recognizes the Washoe as the indigenous people of the Lake Tahoe Basin.

Bureau of Indian Affairs

2012 Maidu Stewardship Project. Smoke Signals. Volume 24.

Available online at: http://www.bia.gov/cs/groups/xnifc/documents/text/idc-018695.pdf

This BIA-produced newsletter briefly describes activities that are part of the Maidu Stewardship Project including: thinning, fuel-wood reduction, and tending and harvesting of cultural plants.

Cunningham F. and K. Bagby

2004 The Maidu Stewardship Project: Blending of Two Knowledge Systems in Forest Management. Pacific West Community Forestry Center.

Available online at: http://www.sierrainstitute.us/PWCFC/publications/2004/MCDG_ Final_Report_5_04.doc.pdf This report describes the Maidu Stewardship Project, an agreement occurring on the Plumas National Forest and Lassen National Forest in California. The project involves both the Maidu Tribe and the U.S. Forest Service. The proposal, begun in 1997, involves collaborative communication, TEK demonstrations, and cultural revitalization. The project seeks to include TEK in meadow, riparian, and forest management while improving economic stability over time. More specific project details are included within.

Yurok Tribe

2005 Draft Tribal Park Concept Plan.

Available online at: http://www.yuroktribe.org/government/selfgovern/YUROK%20TRIB-AL%20PARK%20%20final%20lori%20edits%2013106.pdf

This document describes the efforts of the Yurok Tribe of California to create a tribal park on traditional territories. They seek an active management role in this park and highlight the following primary goals: sacred site protection, conservation, development of a healthy and abundant elk population, and creation of tourism opportunities. Currently a portion of the land where they wish to site the park is owned by the Green Diamond Resource Company. Some of the desired lands also occur within state and federal agency boundaries. The Yurok tribe wishes to potentially enter into co-management agreements with the NPS, BLM, USFS, and the California Parks Department.

<u>Northwest</u>

Camas Prairie Project

Available online at: http://www.fs.fed.us/r6/fire/success/camas-prairie-restoration/

This project began in 1996 and involves the Forest Service, the BLM, the Siletz and Grand Ronde Tribes, and private nursery companies. The site is approximately 10 acres and is located near Eugene, Oregon. So far activities have included archeological surveys, botanical surveys, seed and propagule collection, invasive plant removal and prescribed burns, although it is unclear how much tribal involvement there is on each of these actions. Prescribed burns have occurred at two-year intervals and included tribal personnel. In 2001 a camas (*Camassia* spp.) bake was held.

Jones, Eric T.

2010 West Eugene Wetlands Ethnobotany Resource Area Project Final Report.

Available online at: http://www.ifcae.org/projects/wewera/WEWERA%20Project%20 Final%20Report%2009-01-10.pdf

This project involved partners from regional Native American tribes, multiple agencies at federal, state, and local levels, the Institute for Culture and Ecology, the West Eugene Wetland Partnership, and the University of Oregon. The project sought to identify and restore wetland areas and associated cultural plants to enable traditional harvesting activities for local tribes. Additional Information:

U.S. Bureau of Land Management

2008 West Eugene Wetlands Ethnobotany Project. Categorical Exclusion Review and Extraordinary Circumstances Checklist.

Available online at: http://www.blm.gov/or/districts/eugene/plans/files/08-07-CE.pdf

Sanders, Marren

2008 Ecosystem Co-Management Agreements: A Study of Nation Building or a Lesson on Erosion of Tribal Sovereignty? Unpublished.

Available online at: http://ssrn.com/abstract=1289452

This article provides some of the history of the involvement of the Nez Perce Tribe in gray wolf recovery. The federal government approved the Northern Rocky Mountain Wolf Recovery Plan in 1987. Although states were mandated with enacting the plan, the state of Idaho refused. This allowed the Nez Perce Tribe to take on a role in the project. Working together with the USFWS, they signed an agreement in 1995.

Mack, C.M., I. Babcock, and J. Holyan

2002 Idaho Wolf Recovery Program: Recovery and Management of Gray Wolves in Idaho. Progress report 1999-2001. Nez Perce Tribe, Department of Wildlife Management, Lapwai, ID. 34 pages.

Additional Information:

Mack, C. M. and J. Holyan

2004 Idaho Wolf Recovery Program: Restoration and Management of Gray Wolves in Central Idaho. Progress Report 2003. Nez Perce Tribe, Department of Wildlife Management, Lapwai, ID. 47 pages.

<u>Canada</u>

Beverly and Qamanirjuaq Caribou Management Board2005 Beverly and Qamanirjuaq Caribou Management Plan 2005-2012.

Available online at: http://www.arctic-caribou.com/PDF/Management_plan_2005_2012.pdf

The Beverly and Qamanirjuaq Caribou Management Board collectively manages barrenground caribou herds that migrate through Saskatchewan, Nunavut, Manitoba, and the Northwest Territories in Canada. These herds are hunted by several Native and non-Native communities, including Dene, Inuit, Metis, and Cree. The Management Board combines local community members, both Aboriginal and non-Aboriginal, along with government agencies and scientists.

Additional Information:

http://www.arctic-caribou.com/publications_reports.html

Clayoquot Sound Scientific Panel

1995 First Nations' Perspectives Relating to Forest Practices Standards in Clayoquot Sound.

Available online at: http://archive.ilmb.gov.bc.ca/slrp/lrmp/nanaimo/ clayoquot_sound/ archive/reports/clay3.pdf

This report presents information from a First Nations scientific panel in Clayoquot Sound, British Columbia, Canada. Among the recommendations are: the incorporation of TEK in management and monitoring activities, co-management with governmental entities, full consultation, the expansion of the concept of cultural resources beyond cultural heritage sites, restoration of damages sites, the training of Native workers, and more.

Additional Information:

http://archive.ilmb.gov.bc.ca/slrp/lrmp/nanaimo/clayoquot_sound/archive/reports/panel. html

Peters, Evelyn J.

2003 Views of Traditional Ecological Knowledge in Co-Management Bodies in Nunavik, Quebec. *Polar Record* 39(1): 49.

This article explores the challenges of integrating traditional ecological knowledge (TEK) into co-management agreements, namely the difference between TEK and science, the power of western science and its practitioners, and the difficulties of documenting and presenting TEK. Several co-management committees in Nunavik, northern Quebec are highlighted including the: Hunting, Fishing, Trapping Coordinating Committee, Kativik Environmental Advisory Committee, Kativik Environmental Quality Commission, and Federal Review Committee North. Figures provide details of the role of these committees and their composition of representatives from Aboriginal and other groups.

<u>Australia</u>

 Haberkern, N., A. Intern, T. Bauman, S. Robin, NTRU, and AIATSIS
2009 Overview of Native Title and Joint Management Arrangements for Protected and Other Conservation Areas in Queensland.

Available online at: http://www.aiatsis.gov.au/ntru/docs/projects/ntlw/ jointmanagementQLD.pdf

This document begins by covering all relevant legislation and agreements concerning joint management agreements in Queensland, Australia between governmental agencies and Aboriginal and Torres Strait Islander peoples. Among the actions of the various agreements for one protected area, the Wet Tropics World Heritage Area, are recruitment efforts to employ indigenous peoples within agencies and on-the-ground for trail maintenance, education, interpretation, and cultural heritage, and additionally with fire, weed and pest management activities. Indigenous involvement also occurs in consultation, policy developing, strategic planning, and park management planning. Also in the works are the co-development of a cultural heritage management program, cultural heritage mapping system, and the development of use and access agreements for traditional land use in the protected area for burials, ceremonies, and harvesting.

Broader policy developments in Queensland under the "Looking After Country Together" initiative aim to increase indigenous access to traditional territories, increase involvement in management of both land and sea, and to broad resource planning and policy development. The master plan for Queensland's park system, a separate document, seeks indigenous partnerships and involvement in policy development and park presentation by offering employment opportunities and assisting indigenous business enterprises associated with parks.

Indigenous Land Use Agreements (ILUAs) are also listed with relevant national parks and associated indigenous people. Some of the provisions of such agreements and MOUs include conditional hunting rights, access that is consistent with conservation, sustainable use of natural resources, and camping for limited durations. Suggestions for future management plan additions include involvement in fire management, exemptions from group-size restrictions for gatherings, and restricted access for non-indigenous visitors to cultural sites unless led by an Aboriginal guide. Restricted behaviors are also mentioned including firearm usage and rare species harvesting. Specifics of each agreement are provided in the text.

Maclean, K. and L. Cullen

2009 Research Methodologies for the Co-Production of Knowledge for Environmental Management in Australia. *Journal of the Royal Society of New Zealand* 39(4): 205-208

This article discusses two projects from the Wet Tropics World Heritage Area (WTWHA) of North Queensland, Australia. The first project uses cooperative research to develop cultural indicators that can be linked to biophysical indicators for monitoring of the WTWHA. representatives from each of the eighteen local aboriginal groups participated from the outset of the project, thereby influencing the direction of the research. Indigenous rangers of the protected area monitor, use, and report these cultural indicators at the WTWHA. The second project uses photovoice methodology to co-produce knowledge about water value. This research will be used to inform management decisions.

Nursey-Bray, M. and P. Rist

2009 Co-Management and Protected Area Management: Achieving Effective Management of a Contested Site, Lessons From the Great Barrier Reef World Heritage Area (GBRWHA). *Marine Policy* 33: 118-127.

The authors examine the intersection of two management paradigms – marine protected management and co-management – with a case study of the Great Barrier Reef World Heritage Site. Co-management has come about in stages. The first stage includes the development of an indigenous ranger unit. The second stage involves Indigenous Australians in tourism enterprises. The third stage is the development of traditional use of marine resources agreements (TUMRAs). These are legal agreements that describe how traditional owners will manage their respective marine resources. The authors assert that this example can be built upon world-wide to achieve socially-just conservation.

Zurba, M., H. Ross, A. Izurieta, P. Rist, E. Bock, and F. Berkes

2012 Building Co-Management as a Process: Problem Solving Through Partnerships in Aboriginal Country, Australia". *Environmental Management* 49(6): 1130.

This article describes a co-management approach taken by the Girringun Aboriginal Corporation in Queensland Australia, which focuses on process rather than product. Typically, co-management agreements are negotiated. An alternative approach based upon a sequence of initiatives is taken here. Steps taken include the creation of indigenous rangers, the development of an agreement for the traditional utilization of marine resources, and the establishment of an indigenous protected area.

Additional Information:

http://www.aiatsis.gov.au/ntru/workshopspapersandpresentations.html#two

http://assets.wwfau.panda.org/img/original/ic_indigenous_protected_areas_ipa_map.png

http://www.environment.nsw.gov.au/jointmanagement/index.htm

New Zealand

Gaze, P. and R. Smith

2009 A Harvesting Wananga on Titi Island: Maintaining Connections by Rekindling a Wildlife Harvest. *Journal of the Royal Society of New Zealand* 39(4): 193-196.

This article discusses a joint management project between the Ngati Kuia iwi and the Department of Conservation concerning seabirds on Titi Island, New Zealand. The goal of the project is to conserve seabird populations while allowing small harvests to occur in order to perpetuate traditional knowledge and practices. Monitoring methods often occur in tandem with harvesting, at times resulting in a harvest prohibition rather than a harvest, depending on the health and stability of the seabird population. Harvests have recently resumed for the first time in fifty years.

Lowe, B.J., D.J. Carr, R.E. McCallum, T. Myers, A. Gorham, H. Holmes, C. Hotham, L. Matenga, L. Miller, R. Ngarimu-Cameron, W. Raumati, and K. Te Kanawa

2009 Consultation, Collaboration, and Dissemination. *Journal of the Royal Society of New Zealand* 39(4): 225-228.

This project involves the joint-management and research regarding two cultivars of weaving plants (*Phormium tenax*, and *P. cookianum*) at the Dunedin Botanic Garden in New Zealand. Project partners include indigenous representatives from Kaimahi Harakeke and scientists from various disciplines. Maori partners help set boundaries to scientific methods, select plants for study, and assess textile properties of the plants.

Memon, P. A., B. Sheeran, and T. Ririnui

2003 Strategies for Rebuilding Closer Links Between Local Indigenous Communities and Their Customary Fisheries in Aotearoa/New Zealand. *Local Environment* 8(2): 205-219.

This article examines policy initiatives in New Zealand enabling Maori tribes to co-manage local fisheries as they harvest marine resources. These agreements build off of the Treaty of Waitangi, which prepared for English colonization in 1840 while allowing Maori to continue to own and manage their land and resources. One of the difficulties with this agreement is the government's duty to recognize the needs of other larger and politically and economically more powerful non-Native user groups as well. Currently Maori own 70% of the national commercial fisheries quota, and own one of the largest private fishing companies, although there is disagreement within Maori communities about whether this is the best model for fisheries management. Taiapure, or local fishery areas, can be applied for and designated at the federal level to protect significant areas of special significance for cultural or spiritual reasons. Hurdles to the creation of *taiapure* primarily originate from objections from the commercial fishing interests. At the time of this article, thirty applications are on record, although only 6 current taiapure exist. In addition to taiapure, mataitai, or traditional fishing areas of special significance, allow for Maori management and non-commercial harvest. As of yet two mataitai had been established, with two additional candidates under consideration.

Moller, H. P. O'Blyver, C. Bragg, J. Newman, R. Clucas, D. Fletcher, J. Kitson, S. McKechnie, D. Scott, and the Rakiura Titi Islands Administering Body

2009 Guidelines for Cross-Cultural Participatory Action Research Partnerships: A Case Study of a Customary Seabird Harvest in New Zealand. *New Zealand Journal of Zoology* 36(3): 211-241.

This article describes a study of the sustainability of titi (a bird species) by Rakiura Maori in southern New Zealand. Two community groups, the Rakiura Titi Islands Committee and the Rakiura Titi Islands Administering Body, have worked together with the New Zealand Department of Conservation since 1987 on the annual harvest of titi. Several fears from community members have been voiced, including a fear of an imposed harvest quota, interference with Maori rights and governance, expectations that Maori hunting should be controlled because other factors effecting conservation (e.g. climate change) cannot be controlled, and others. Recommendations for capacity-building and successful projects are offered.

Prystupa, M. V.

1998 Barriers and Strategies to the Development of Co-Management Regimes in New Zealand: The Case of Te Waihora. *Human Organization* 57(2): 134-144.

This article discusses co-management of Lake Te Waihora on the South Island of New Zealand. A local Maori tribe, the Ngai Tahu, has shown interest in managing the lake, but conservation groups had thwarted efforts in this direction. By utilizing five strategies, the Nagai Tahu finally succeeded. These strategies included: working towards a clearer legal definition of their rights, displaying the benefits of co-management, creating partnerships, develop financial and human resources to effectively engage with the government, and achieving a synergy by utilizing multiple methods. There is also brief mention of a successful and long-standing co-management agreement with the Ngai Tahu Tribe managing the Titi Islands since 1886, although some interest groups were concerned that overharvesting of birds has been occurring. Another co-management agreement exists concerning the Tutae

Patu Lagoon. This agreement has gained the support of a bird conservation group, viewing some form of management as a better alternative to the absence of management. This group did not however treat the agreement as a precedent for other co-management agreements.

Yandle, T.

2003 The Challenge of Building Successful Stakeholder Organizations: New Zealand's Experience in Developing a Fisheries Co-Management Regime. *Marine Policy* 27(2)179-192.

This article examines the level of success achieved by New Zealand's co-managed fisheries. The Ministry of Fisheries devolved certain responsibilities to commercial stakeholder organizations (CSOs) which exclude other interested parties such as Maori fishers, environmentalists, and others. In some cases consultation with these other groups occurs, but there is no obligation to integrate these concerns. The research methods employed by the author included two sets of surveys, space two years apart, that were sent to members of CSOs. The author uses design principles from Ostrom's (1990) work on governing the commons to analyze the success of CSO's. Recommendation's for improvement include: the creation of a more inclusive voting structure, an increase in the role of non-commercial stake holders, and the building of institutional capacity.

<u>World</u>

Castro, A. P. and E. Nielsen

2001 Indigenous People and Co-Management: Implications for Conflict Management. *Environmental Science and Policy* 4:229-239.

This article looks at the role of conflict in co-management agreements. Case studies are examined from Canada, India, and Bangladesh. In Clayoquot Sound, British Columbia, a collaborative forest management agreement arose when a private timber company attempted to clear-cut large areas. First Nations and other allied groups forced the government and other stakeholders into negotiations. Also in Canada, the James Bay and Northern Quebec Agreement came about after a hydroelectric project was planned on Inuit and Cree traditional territories. The eventual co-management agreement was created as an out-of-court settlement. In India, the Joint Forest Management program involves more than 10,000 local committees in conjunction with governmental agencies to protect forest lands. This program arose from clashes between villagers and the state. Similarly in Bangladesh, a Social Forestry Program was eventually developed by the state after previous approaches which demonized and punished local harvesters as poachers continually failed.

Craig, Donna

2002 Recognising Indigenous Rights through Co-Management Regimes: Canadian and Australian Experiences. *New Zealand Journal of Environmental Law* 6: 199-254.

This article presents case studies of co-management agreements in Canada and Australia. These countries were chosen since they have the most developed co-management approaches in the first world. The author contends that a rights-based approach to co-management needs to be taken for more successful projects with indigenous peoples. Upon a review of the literature, the author found the following to influence co-management agreements: the history of the indigenous group, the institutional entity involved, and the purpose of the agreement (whether it is rights-based, or conservation-based, or a part of energy development or impact assessments). It is noted that some definitions of co-management avoid discussions of power-sharing, focusing instead upon stakeholders working together towards sustainable management. In Australia, joint management involves power-sharing, predominantly in protected areas where indigenous peoples live within the boundaries. Collaborative management may include both indigenous and other stakeholders, and rarely involves power devolution. Detailed examinations of power-sharing agreements at Kakudu and Uluru National Parks are offered. Other Australian examples at the state-level also exist and are detailed later in the article (241). Canadian examples illustrate power devolution stemming from land claim settlements and treaties, as well as the Veverly-Quaminirjuaq Caribou Management Board, which arose out of a supposed crisis situation with the caribou population. This group focuses on wildlife management as opposed to power-sharing. This lengthy article should be referenced for particulars about treaty and co-management agreements.

Erdman, MV, PR Merrill, M Mongdong, et al.

2004 Building Effective Co-management Systems for Decentralized Protected Areas Management in Indonesia: Bunaken National Park Case Study. Natural Resources Management Program.

Available online at: http://www.irgltd.com/Resources/ Publications/ANE/200405%20 Bunaken%20National%20Park.pdf.

Bunaken National Park involves partnerships with villagers, dive operators, and other groups. Indonesia's national park approach originated with policies that put up fences and kept people out. Presently, efforts are oriented towards decentralization and regulated openaccess of parks. The park has a multi-stakeholder board composed of seven governmental seats and eight non-governmental seats. Five of the non-governmental seats are held by local villagers. Other co-management features of the park include a patrol team composed of seventy villagers living within the park and twenty-seven other rangers and officers. The use of entrance fee revenues are utilized to support village-based conservation projects.

Matzke, G. E., and N. Nabane

1996 Outcomes of a Community Controlled Wildlife Utilization Program in a Zambezi Valley Community. *Human Ecology* 24(1): 65-85.

This article discusses the Communal Areas Management Program for the Indigenous Resources (CAMPFIRE) program in Zimbabwe. One case study is detailed in Masoka, in the Zambezi Valley. The authors contend that the CAMPFIRE program seems to have benefitted both conservation and local economic development. The program helped to develop a land use plan and provided employment, money to provide for household needs, and education. It has also reduced animal attacks and crop losses.

Nielsen, M. R.

2011 Improving the Conservation Status of the Udzungwa Mountains, Tanzania? The Effect of Joint Forest Management on Bushmeat Hunting in the Kilombero Nature Reserve. *Conservation and Society* 9(2): 106-118.

This paper analyzes a Joint Forest Management (JFM) agreement in the Kilombero Nature Reserve in Tanzania. The article reveals that bushmeat hunting has shown a general decrease since the Tanzania National Park rangers have begun patrolling. However hunters have begun to focus more on forest hunting rather than in grasslands, and are primarily using traps and dogs instead of guns, the previous hunting implement of choice used in grassland environments. This switch has put more pressure on sensitive forest species. The management plan attempts to encourage less hunting in exchange for various incentives. Many locals believe there to be corruption in the program and are generally dissatisfied. The author suggests that more generation of local economic opportunities must occur in order for the program to become more successful.

Swain, Debabrata

2001 Joint Protected Area Management: A Proposal for the Management of Sanctuaries and National Parks in India. *International Journal of Sustainable Development and World Ecology* 8: 257-267.

This article proposes joint-management of Kuldiha Sanctuary, India, with local villagers. The author, an employee of the India Forest Service, presents data from a demographic questionnaire distributed among villagers regarding firewood collection and livestock use of the protected area. These data are used to strengthen his argument. He closes with suggestions for economic development and accessing various funding streams.

Thomas, W.

2009 The Forest Stewards Initiative: A New Institution for Safeguarding Traditional Ecological Knowledge in Papua New Guinea. *Journal of the Royal Society of New Zealand* 39(4): 187-191.

The author describes the Forest Stewards Initiative in Papua New Guinea, which helps indigenous people market their TEK to outside researchers while still owning the intellectual property rights. The project aims to create sustainable income while simultaneously conserving biological resources. Forest Stewards act as guides for researchers, maintain trails, and monitor areas using photo-documentation.

Timko, J. A., and T. Satterfield

2008 Seeking Social Equity in National Parks: Experiments with Evaluation in Canada and South Africa. *Conservation and Society* 6(3): 238-254.

The authors offer a formula to measure the equity of indigenous involvement in National Parks (NPs) and Protected Areas in Canada and South Africa. Interviews with indigenous and non-indigenous representatives involved with each co-management project provided data for the formula. Canadian site examples included Waterton Lake NP, Kluane NP and Reserve, Gwaii Haanas NP Reserve, and the Pacific Rim NP Reserve. South African case studies were the Kruger NP and Kgalagadi NP. Findings suggest that more can be done to improve access and economic benefits to indigenous people associated with NPs. Two of the parks, Waterton Lakes and Kgalagadi, especially have far to go in order to attain equitable inclusion of indigenous people in park co-management.

APPENDIX D: Select Pinyon-Juniper Ecosystem and Management Resources

Aldron, E. F. and D.W.Shaw, editors.

1993 Managing Pinyon-Juniper Ecosystems for Sustainability and Social Needs: Proceedings of the Symposium, Santa Fe, NM, April 26-30. General technical report r M-236. USDA Forest Service, Fort Collins, Colorado.

This article discusses the ecological variability and historical use of pinyon-juniper in the Western United States.

Arbachakov, A. N.

2009 Harvesting of Siberian Pine Nuts in Mountain Shoria Traditions and Nowadays. *Archaeology, Ethnology and Anthropology of Eurasia*, 37(2), 110-118.

This article discusses the harvesting characteristics of the Shor, a minority group in Russia. The harvesting process is partially management and partially for the maintenance of cultural heritage. The author argues that the local harvesting process is cultural, ecological, and economic.

Belsky, A. J.

1996 Viewpoint: Western Juniper Expansion: Is it a Threat to Arid Northwestern Ecosystems? *Journal of Range Management*, 53-59.

Combining pinyon-juniper and water management, this article calls into question the impact that woodland growth is having on the hydrological management of the area. At the time of the article, many woodland areas were being cut back in the name of water management as it was believed that juniper forests added to erosion, depleted water quality and filtration, and would dry up springs. Compiled as a literature review rather than formal new study, the author finds that the assumptions about negative impacts from pinyon-juniper to be unfounded or support from research.

Clemmer, R.

1985 The Pinon-Pine: Old Ally or New Pest? Western Shoshone Indians vs. the Bureau of Land Management in Nevada. *Environmental Review*, 9 (2), 131-149.

This article traces the relationship of the pinyon-pine to the Bureau of Land Management and the Western Shoshone across time. It discusses the specie's cultural relevance, harvesting process and the conflict occurring between the BLM and Native populations regarding conservation and use.

Clemmer, Richard O.

1991 Seed-Eaters and Chert-Carriers: The Economic Basis for Continuity in Historic Western Shoshone Identities. *Journal of California and Great Basin Anthropology*, 13(1).

This article illustrates the history of the Western Shoshone people in the Great Basin. It discusses the relevance of pine nut harvesting to the affirmation of social bonds.

Cline, N.

2008 First-year Hydrologic Response to Mechanical Mastication in Juniper Woodlands. M.S. Thesis, Brigham Young University, Provo, Utah.

This MS thesis looks at the management of Juniper forests in association with fire and water control. It finds that while Utah management is using mechanical means to chop Juniper woodlands (in an effort to control wild fires), they are not having a negative impact on the water runoff of the area. By using the mulch of trees rather than synthetic means, the management system had no adverse effect on erosion or soil quality.

Evans, R. A.

1988 *Management of Pinyon-Juniper Woodlands*. US Department of Agriculture, Forest Service, Intermountain Research Station.

This report focuses on the overall conservation and management of pinyon-juniper woodlands. It briefly discusses how native populations and non-native populations look at the use and preservation of the species differently.

Fog, G.

1966 The Pinyon Pines and Man. *Economic Botany*, 20(1), 103-105.

This article discusses the use of pinyon pine across several Native American groups. The author suggests that the trees could be used for hydrological management because they help maintain soil quality and allow for the replenishment of subterranean hydrological resources. The author concludes that with economic incentives and shifts in communities the relationships between people and the pinyon will need to be balanced and controlled in the future.

Forest Service, Humboldt-Toiyabe National Forest: Ely Ranger District. 2010 *Collaborative forest landscape restoration program proposal.*

This is project proposal for pinyon-juniper management in the Humboldt-Toiyabe National Forest. It suggests a need to control the growth of pinyon-juniper ecosystems in order to diversify and support the local environment. Through the collaborative efforts of the Forest Service, BLM and community partners, this proposal suggests economic and ecological advantages to utilizing pinyon-juniper timber products.

Harper, C.

2008 Beyond Firewood and Fence Posts: Exploring and Expanding the Commercial Potential of Colorado's Pinyon-Juniper Woodlands. Informally published manuscript, Colorado Wood and Marketing Program, Colorado State, Fort Collins, CO.

This manuscript discusses the expansion of pinyon-juniper ecosystems and the economic advantages to utilizing the timber for energy and other uses.

Lanner, R. M.

1981 The Pinon Pine: A Natural and Cultural History. University of Nevada Press.

This book discusses the natural and cultural history of the pinon pine throughout North America. The author explores human and ecological impacts on the forests. It compares cultures and the fluctuating distribution of the pinon pine across the Western U.S. and Mexico.

Miller, R. K.

19

1994 Responding to Tribal Voices in Managing Woodland Resources. *Shaw, DW, Aldon, EF and LoSapio, C.,(Technical coordinators)*, 8-12.

This ethnographic report discusses the relationship between woodland areas and indigenous populations. It argues that managers must understand both cultural and ecological relationships. In addition, Miller calls to attention the vast amounts of land which have pinyon juniper woodlands and the long relationship they have had with Native populations. The author presents multiple case studies from the Western U.S. about human-environment dynamics in woodland areas.

Miller, R., and P. Wigand

1994 Holocene Changes in Semiarid Pinyon-Juniper Woodlands. *BioScience*, 44(7), 465-474.

This article discusses the distribution of pinyon-juniper species in the Holocene with a focus on juniper. It specifically addresses the environmental conditions that impact the abundance of juniper trees over time.

Romme, W., C. Allen, J. Bailey, & W. Baker

2008 Historical and Modern Disturbance Regimes, Stand Structures, and Landscape Dynamics in Piñon-Juniper Vegetation of the Western U.S.. Informally published manuscript, Colorado Forest Restoration Institute, Colorado State, Fort Collins, CO.

This manuscript presents a history of pinon-juniper ecosystem habitat composition in the western U.S. It discusses woodlands, savannas and wooded shrub-lands.

Simms, Steven R.

1985 Pine Nut Use in Three Great Basin Cases: Data, Theory, and a Fragmentary Material Record. *Journal of California and Great Basin Anthropology*, 7(2).

This article discusses the bio-cultural relationship between pine nuts and Native American peoples over time.

Soulé, P. T., Knapp, P. A., & Grissino-Mayer, H. D.

2004 Human Agency, Environmental Drivers, and Western Juniper Establishment During the Late Holocene. *Ecological Applications*, 14(1), 96-112.

Exploring the impact of human activity on Western Juniper, this article looks at two sites with varying levels of human interaction. The results of the study found that the disturbances

from human activity were not a key factor in forest expansion, but rather that a variety of factors impacted forest growth: climatic change, increase in seed rain, carbon dioxide enrichment, and a lower occurrence of high impact fires.

Weisberg, P. J., Lingua, E., & Pillai, R. B.

2007 Spatial Patterns of Pinyon-juniper Woodland Expansion in Central Nevada. *Rangeland Ecology & Management, 60*(2), 115-124.

This article explores how topographical heterogeneity impacts the spread and vegetation of pinyon-juniper woodlands. Noting that it is a highly studied area, the article goes further to track to expansion of woodlands over the last three decades, and looks at what landscape patterns have impacted these shifts in growth.

Wilcox, B. P., Davenport, D. W., Pitlick, J., & Allen, C. D.

1996 Runoff and Erosion From a Rapidly Eroding Pinyon-juniper Hillslope (No. LA-UR--95-4042; CONF-960984--1). Los Alamos National Lab., NM (United States).

This article digs deeper into the assumptions that pinyon-juniper and ponderosa growth are to blame for soil erosion. Through a three-year study, the researchers found the following results: the area is naturally in a cycle of erosion concomitant with the forest growth, the intercanopy soil cannot be sustained at the growth of erosion, summer thunderstorms are the largest affecter to the erosion, erosion increased with the increase of scale area, and runoff is less than ten percent of the water budget.

Pinyon-Juniper Ecosystem and Pine Nut Harvest Websites		
Title	Website	Summary
American Pine Nut Crop Field Report 2012	http://pinenut.com/blog/blog1. php?title=the-american-pine-nut- field-report-2012-soft-shell-and- hard-shell-pinon-nuts-harvested- 2012&more=1&c=1&tb=1&pb=1	Reviews the yield and sell of pine nuts in the south- western U.S. Notes the extremely low account of pine nuts in Nevada due to drought.
Beatty Mu- seum and His- torical Society	http://www.beattymuseum.org/ native_americans_in_the_oasis_val- ley_food_gathering.html	Created in 2007 by Dr. John Thompson, discusses the gathering of pine nuts by natives peoples (par- ticularly women). Report focuses on the Southern Paiute, Shoshone, and Kawaiisu people.
Gathering Devah: An Ancient Pine Nut Harvest Tradition	http://shadowwolf32.wordpress. com/2011/02/21/gathering-devah- an-ancient-pine-nut-harvest-tradi- tion/	An individual's blog, pulls together YouTube videos created by Nellis Air force Base which shows 17 tribes returning to the site to harvest pine nuts in 1996.
Liston Pine Nuts	http://www.pinenuts.net/harvest- ing.html	A family history of harvesting the Nevada pine nuts. It discusses the harvest and sale of pine nuts.
Native Ameri- can Netroots	http://www.nativeamericanne- troots.net/diary/1048/indians- 101-pine-nuts	A brief article looking at the use and history of pine nuts in Native American tradition.
Nevada Maga- zine	http://www.nevadamagazine.com/ issues/read/reservations_colonies/	Discusses Nevada reservations and some specific cultural practices occurring on them. Notes pine nut harvests at Duckwater Reservation and Walker River.
Nevada Pinyon-Juniper Partnership	http://www.nvpjpartnership.org/ pinyon_summit.htm	A source for current links and suggestions from state departments and community initiatives in the control of pinyon-juniper reserve areas in Nevada. The Nevada Pinyon-Juniper Partnership began dur- ing a meeting from the USDA Rural Development fund to focus on its use in energy and economic production.
Pine Nuts .org	http://www.pinonnuts.org/	A site created to promote sustainable pine nut har- vesting. Mentions collaborations with the Washoe People, BLM, Good For the Woods, and Water and Ecology. Presents forecasts and methods, but ap- pears to have not been active since 2009.
Pine Nut	http://www.pinenut.com	A marketing website exploring the sale and use of pine nuts.
Pinon-Juniper Marketing and Utilization Project	http://csfs.colostate.edu/cowood/ pj-project.html#update	Information on the ongoing research between Colorado State University and the Colorado BLM. It identifies resource management and marketing potential for the area.
Pinon Juniper Web Zone	http://oregonstate.edu/dept/EO- ARC/pinon-juniper/index.html	An amalgamation of references surrounding pinyon-juniper in the U.S.
Sweet Pining	http://indiancountrytodaymedi- anetwork.com/2011/09/23/sweet- pining-55361	Discusses pine nut use in the Great Basin.

APPENDIX E: Select Water and Hydrological Management Resources

Regional/ Great Basin

Al-Hamdan, O. Z., Pierson, F.B., Nearing, M.A., Stone, J.J., Williams, C.J., Moffet, C.A., Kormos, P.R., Boll, J. and Weltz, M.A.

 2012 Characteristics of Concentrated Flow Hydraulics for Rangeland Ecosystems: Implications For Hydrologic Modeling. Earth Surf. Process. Landforms, 37: 157–168. doi: 10.1002/esp.2227

This article looks at the predictability of water using equations and study areas in the Great Basin. It explores water concentration as one of the highest imparters on water erosion and flow in rangelands. The study finds that the concentration and flow disturbances are highly different across vegetation landscapes and can be predicted use mathematical equations.

Brigham, W. R., and C. Stevenson

2003 Wildlife Water Catchment Construction in Nevada. U.S. Bureau of Land Management Papers, 25.

This article addresses process for constructing and managing water catchments for local fauna populations. It suggests and describes how to use a 'guzzler' system, which consists of an apron for collecting water, a tank for storage, and water access locations for a variety of wildlife.

Chambers, Jeanne C., J. R. Miller, and J. A. MacMahon

2004 Great Basin Riparian Areas: Ecology, Management, and Restoration. Washington, DC: Island Press.

This book presents an approach to conducting large-scale watershed and ecosystem management projects. It focuses on the semi-arid Great Basin area of the U.S., which is highly sensitive to both climate change processes and natural and human disturbance.

Halloran, A., and O. Deming

1958 Water Development for Desert Bighorn Sheep. *The Journal of Wildlife Management*, 22(1), 1-9.

This article discusses water management and the preservation of bighorn sheep habitats in southern Nevada. The authors argue that the loss of water in the region resulted in the decline of sheep populations. They suggest and test certain technologies in order to create accessible and sustainable locations for sheep to drink, including: earthen dams, underground storage tanks, reinforced concrete dams, and water collection aprons.

Sada, D.W. and S.E. Sharpe (eds.)

2004 Conference Proceedings, Spring-fed Wetlands: Important Scientific and Cultural Resources of the Intermountain Region, May 7-9, 2002, Las Vegas, Nevada. DHS Publication No. 41210.

This technical report presents the preservation of desert lands using various traditional practices. It discusses the use of ceramics and creek systems, water trapping, and minor spring capture zones used by native populations.

North American

Anderson, M. K.

2005 Tending the wild: Native American knowledge and the management of California's natural resources. University of California Press.

This book discusses how Native American knowledge and practice related to the natural resources of California. It shares historical and contemporary information about indigenous knowledge and practice.

Cronin, A., and D. Ostergren

2007 Tribal Watershed Management Culture, Science, Capacity, and Collaboration. *American Indian Quarterly*, *37*(1), 87-109.

The article explores natural resource management in American Indian communities. It focuses on the capacity of tribes to manage their local watersheds with integrated indigenous and western science knowledge. It also provides examples of native management in collaboration with regional watershed projects. The research found little distinction between tribal practices and those of western science, varying political and social impacts, and the occurrence of more robust outcomes when Tribal Councils and land management stakeholders co-develop management schemes.

Leffler, A. J., Ryel, R. J., Hipps, L., Ivans, S., & Caldwell, M. M.

2002 Carbon Acquisition and Water Use in a Northern Utah Juniperus Osteosperma (Utah juniper) Population. *Tree Physiology*, 22(17), 1221-1230.

This article addresses the relationships between carbon, water, and flora. Using elements of leaf size, gas exchange, and isotope ratios; the study found that plants react rapidly to changes in water conditions during summer months. This, in turn, has had an impact on the expansion of pinyon-juniper over the past century.

O'Brian, C., R. Waddell, S. Rosenstock, & M. Rabe 2006 Wildlife Use of Water Catchments in Southwestern Arizona. *Wildlife Society Bulletin*, 34(3), 582-591.

This article focuses on faunal access to water, specifically the types of water access points ideal for area mammals.

Gartin, M., B. Crona, A. Wutich, and P. Westerhoff

2010 Urban Ethnohydrology: Cultural Knowledge of Water Quality and Water Management in a Desert City.

This article explores the connections between economics and household yield. It finds that people of middle income are open to government paired with in-home water conservation methods; people of high income are likely to agree with more expansive management schemes and accept ethnohydrological methods; and people who live with low water security are likely to disagree with water management plans and ethnohydrology. It concludes that people with lower income and at-risk populations receive the poorest quality of water and have less power in hydrological management.

 Golet, G., Roberts M., Luster R., Werner G., Larsen E., Unger R., and G. White
2006 Assessing Societal Impacts When Planning Restoration of Large Alluvial Rivers: A Case Study of the Sacramento River Project, California. *Environmental Management*, 37(6):862-879.

This article discusses a case study of the Sacramento River Project in California, a restoration effort led by The Nature Conservancy. This project aimed to conserve flood prone lands, re-vegetate with native plant species and restore natural river processes. The authors contend that there has been a historic lack of attention to issues and complaints that arise during the public involvement stage of restoration projects. To remedy that, the authors attempted to develop appropriate tools for addressing stakeholder concerns.

Hart, D. D. & L. Poff

2002 Dam Removal: Challenges and Opportunities for Ecological Research and River Restoration. Bioscience 52(8): 669-681.

The authors developed a risk assessment framework for understanding how potential responses to dam removal vary with dam and watershed characteristics. The authors call for interdisciplinary work in the restoration of areas impacted and harmed by human activity.

Lurie, S., & Hibbard, M.

2008 Community-Based Natural Resource Management: Ideals and Realities for Oregon Watershed Councils. *Society and Natural Resources, 21, 5, 430-440.*

This article discusses watershed councils in Oregon as examples of community-based natural resource management. The authors define co-management as: 1) the integration of western science with social and political institutions for natural systems management utilizing adaptive, dynamic decision processes and 2) the devolution of authority and responsibility to lower levels of government and NGOs.

Maisel, David

2005 The Owens Lake Project. Neiman Reports 59(1): 17-19.

The report addresses the history and ecological condition of the perennial Owen's Lake. This landscape serves as an example of the destabilizing effect the extraction of surface water on land surfaces caused by in desert regions. The area held water for approximately 800,000 years and now is a dust bowl and one of America's largest air pollutant locations.

Pierson F.B., C. Williams, P. Kormos, S. Hardegree, P. Clark, and B. Raul 2010 Hydrologic Vulnerability of Sagebrush Steppe Following Pinyon and Juniper Encroachment. *Rangeland Ecology & Management*, 63(6), 614-629.

Looking into soil runoff and erosion, this article uses two case studies in the Western US to explore the relationship between fauna and hydrology. The researchers found that areas with tree and brush canopy store water and maintain soil, while the area between the canopies is subject to erosion and runoff. The management implications are that microsites and the spatial areas between woodlands and encroachment areas must be considered when doing hydrological management.

Schmidt, J. C., R. Webb, R. Valdez, G.R. Marzolf, & L.E. Stevens

1998 Science and Values in River Restoration in the Grand Canyon. *BioScience* 48(9): 735-747.

This article looks at the role of western science in determining the restoration of the Colorado River in the Grand Canyon. According to the authors, the decision to restore is too often based on values, which are by nature subjective.

Treitler, Inga and Douglas Midgett

2007 It's About Water: Anthropological Perspectives on Water and Policy. *Human Organization* 66(2):140-149.

This article discusses the utility of anthropological theory and method in the assessment of water issues on local and global scales. Through case studies, the authors illustrate how an anthropological perspective demonstrates the local perspective for policymakers and helps to create policies that are beneficial for both agencies and local communities.

Wood, M. K., & Javed, N.

1992 Hydrologic Responses to Fuelwood Harvest and Slash Disposal on a Pinyon-Juniper Dominated Grassland Site in the Gila National Forest. In *Proceedings of the 36th Annual New Mexico Water Conference: Agencies and Science Working for the Future* (pp. 25-30).

This presentation addresses hydrological management in pinyon-juniper grassland regions. The authors argue that slash-scattered practices are the most efficient in maintaining hydrological and soil conversations because they had had less sediment run-off, higher soil moisture was conserved, and took less time consuming compared to other practices.

Water and Hydrological Management Websites		
Chaco Resource Archive	http://www.chacoarchive.org/ cra/chaco-resources/bibliogra- phy/	Archival research on water management by indigenous people.
Desert Moun- tain	http://www.desertmountain- rcandd.org/Projects.aspx	Examples of resource management, water con- servation and educational projects.
Great Basin Water Projects	http://www.greatbasinwater. net/pubs/index.php	A massive collection of water resource manage- ment projects, debates, and work happening in the Great Basin.
Protect Goshute Water	http://www.goshutewater.org/ index.php/history.html	Discusses a native community struggling to protect their right to maintain and manage their water resources.
Sonora Desert Museum	http://www.desertmuseum.org/ books/nhsd_human_ecology. php	A historical look into the alteration of Deserts over time. It addresses native use of canals in water use and management.
Thinking with Water	http://thinkingwithwater.net	A compilation of ethnoecological work focus- ing on water.

References

Berkes, Fikret

2008 Sacred Ecology: Traditional Ecological Knowledge and Resource Management. Philadelphia: Taylor and Francis.

Kelly, Isabel T. and Fowler, Catherine S.

1986 Southern Paiute, in W. L. D'Azevedo (ed.), *Handbook of North American Indians: Great Basin.* Washington, DC: Smithsonian Institution, Vol. 11.

Pritzker, Barry M.

2000 *A Native American Encyclopedia: History, Culture, and Peoples.* Oxford: Oxford University Press.

Spoon, Jeremy, Arnold, Richard and the Nuwuvi Working Group

2012a Consultation Handbook: Nuwuvi (Southern Paiute), the Spring Mountains National Recreation Area and Desert National Wildlife Refuge Complex Portland: Portland State University and The Mountain Institute.

Spoon, Jeremy, Arnold, Richard and the Nuwuvi Working Group

2012b Nuwu-Vots (Our Footprints): Nuwuvi (Southern Paiute) and the Pahranagat Valley. Portland: Portland State University and The Mountain Institute.

Spoon, Jeremy, Arnold, Richard and the Nuwuvi Working Group

2012c Our Gathering Place: Nuwu (Western Shoshone), Nuwuvi (Southern Paiute) and the Ash Meadows Landscape. Portland: Portland State University and The Mountain Institute.

Spoon, Jeremy, Arnold, Richard and the Nuwuvi Working Group

2011 Nuwu Kanee, Nuwu Tooveenup (Our Home, Our Story): Nuwuvi (Southern Paiute) and the Spring Mountains. Portland: Portland State University and The Mountain Institute.

Spoon, Jeremy and Richard Arnold

2012 Collaborative Research and Co-Learning: Integrating Nuwuvi (Southern Paiute) Ecological Knowledge and Spirituality to Revitalize a Fragmented Land. *Journal for the Study of Religion, Nature and Culture* 6(4): 477-500.

Stoffle, Richard, Zedeno, Maria N., and Halmo, David

2001 American Indians and the Nevada Test Site: A Model of Research and Consultation-Washington, DC: U.S. Government Printing Office.