



## IMPACTS OF CLIMATE CHANGE ON THE BIG PINE PAIUTE TRIBE OF THE OWENS VALLEY

*Depleted groundwater, drought, air quality and decreased traditional foods are threatening the physical, cultural, and spiritual health of the Tribe, its habitats and ecosystems, and its built environment.*

*This document is written by L'eaux Stewart, a member of the Big Pine Tribe, and is based on her observations of climate change in the Owens Valley.*

### **Background:**

The Big Pine Paiute Peoples are comprised of three different groups from the Big Pine region: Tovowahazi, the people of Tovowahamatü (the land now currently containing the Big Pine Paiute Reservation); Panapitahahnwitü, the people of Panapita (the land on the west side of Big Pine currently known as The Indian Camp); and Tunigahahnwitü, the people of Tunigawitü (the land to the south of Big Pine known as Fish Springs). The overlapping areas inhabited by these groups and other Paiute neighbors are shown in Figure 1. The Big Pine Paiute People referred to themselves as Nümü, "The People", as did other tribes in the area, so for this document, we will refer to them as the Big Pine Nümü to differentiate them from other Paiute People in the community.

The boundaries of the traditional lands used by the Big Pine Nümü begin at Keogh's Hot Springs (seven miles north of Big Pine) and extend south to Fish Springs (two miles south of Big Pine). The two mountain ranges, the Whites and the Sierras, formed the east and west boundaries respectively. The entire area was considered territory of the Big Pine Nümü and was regarded as important to them for purposes of food and material collection, spiritual and ceremonial practices, and living space. Certain families and groups had unique sites that were important to them and those locations are passed on through lineal dependency via oral storytelling.

The traditional lands of the Big Pine Nümü have since been developed for wildland grazing, for grass grazing, for residential properties, for commercial properties, and for pumping by the Los Angeles Department of Water and Power (LADWP). The majority landowner is LADWP. Figure 2 shows the current lands of the Big Pine Nümü and the surrounding area.



Figure 1 Hand drawn map showing Paiute areas and boundaries

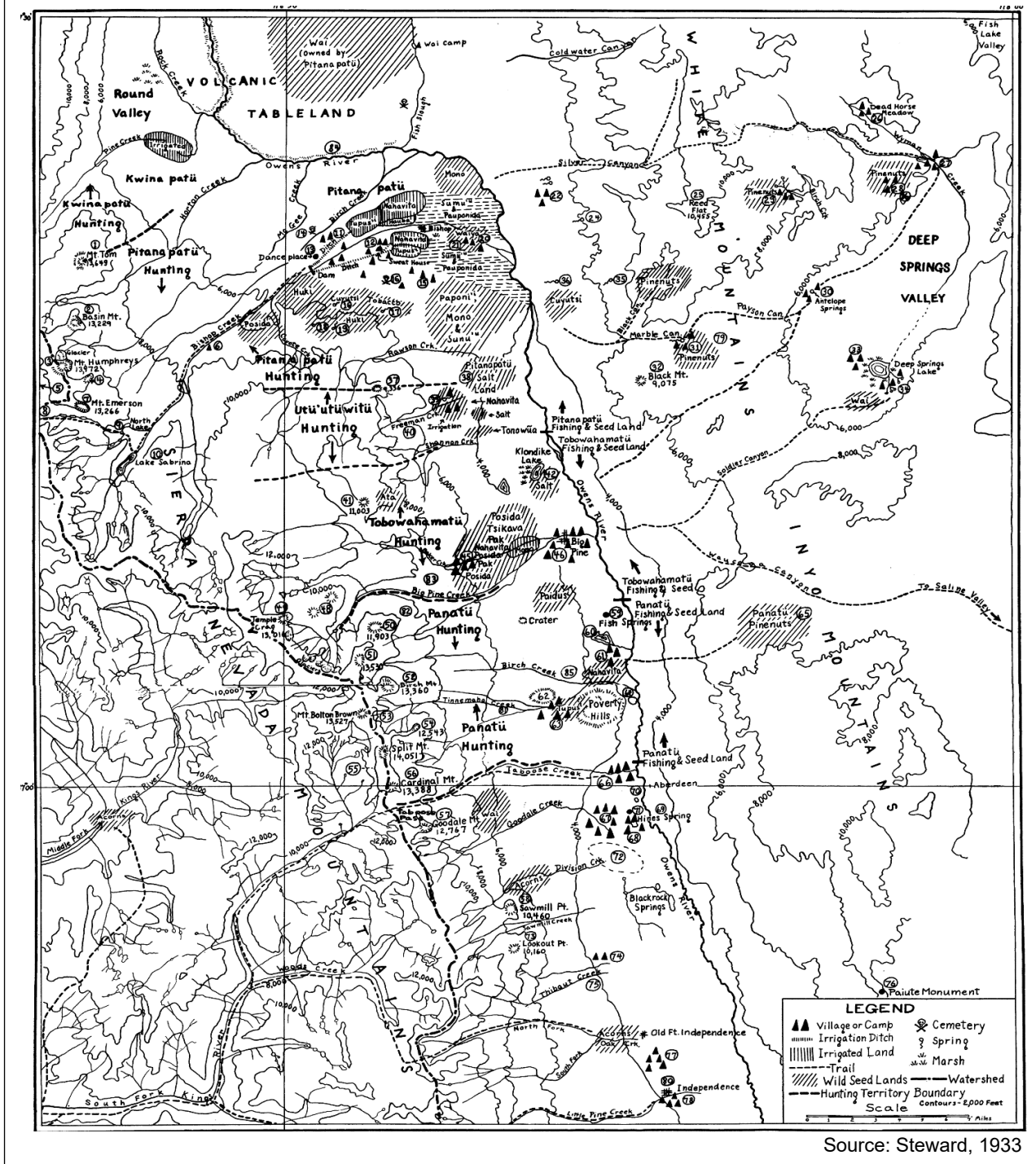


Figure 2. Map Showing the Owens Valley and Big Pine (below the word "Owens")





When the land that is now known as the Big Pine Reservation was originally set aside for Native Americans in the 1930s, it was originally designated as a Rancheria, which designated the land to be used as small homesteads for the people who were admitted to live upon it. In the 1970s, the Rancheria was converted into a reservation, which permitted more home building upon the land and agricultural practices became reduced.

**Figure 3. The Eastern Sierras route to the Palisades, part of the Big Pine traditional territory.**



Source: L'eaux Stewart

In the Big Pine (Tunigawitü or Fish Springs Band) *Creation Story of the World*, Coyote and Wolf created the Owens Valley region and by proxy the surrounding lands that other tribes live on; it is originally described as a great flood that covered the world, higher than the mountain tops and by having Mud Hen retrieve soil from the bottom of the flood, Coyote was able to rebuild mountains and cover up the water. In the *Creation of the Big Pine Peoples*, actual landmarks within the Big Pine Region are mentioned: a sub-alpine lake above Big Pine in the Eastern Sierras was the location of The Most Beautiful Woman's Mother's house; a fresh spring about a mile north of Big Pine at the base of the Eastern Sierras was The Most Beautiful Woman's home; and there are big boulders on the north end of Big Pine where Coyote hunted game for The Most Beautiful Woman.



Figure 4. Volcanic fields at Fish Springs

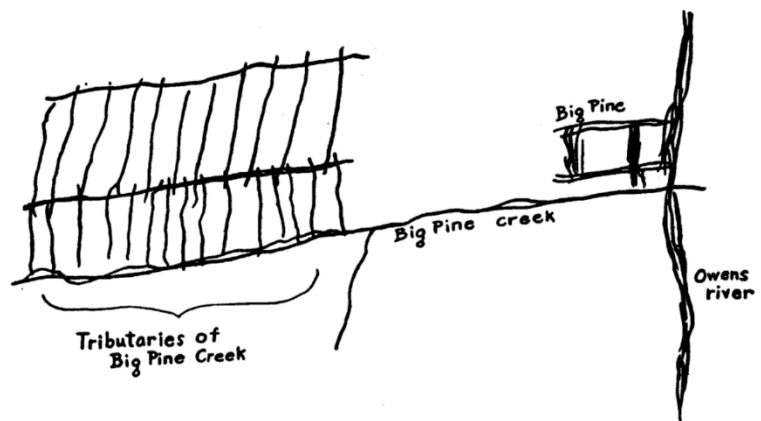


Source: L'eau Stewart

Hunting was performed with bows and arrows, snares, rabbit drives, sheep drives, deer drives, atlats and points, and clubs. (Drives are a hunting activity.) Rabbits, chuckwallas, birds, deer, elk, big horn sheep, and pack rats were hunted for meat. Fishing was

performed with special baskets and woven traps to catch fish that lived in creeks and streams. Pole fishing, spears, and nets were also used to catch fish. In addition, fish were collected from the streams and rivers of the area by diverting water out of the body of water into shallow ditches so that the fish might be stranded on the ground to be picked up. As shown in Figure 5, the Big Pine Paiute Nümü would create a

Figure 5. Drawing of Paiute irrigation



Source: Drawing by Big Pine Paiute member Jack Stewart in Lawton, 1976



drain off the side of the small creek or stream with fish; the drain would lead down rows scraped out of the ground by sticks. The water would flow down the rows and the fish would be left behind. These ditches would also irrigate the surrounding areas, bringing water to wild seeds and plants that would nourish the people. There were also stories about golden trout in lakes at the top of the mountains that were fished; settlers believed these stories to be myths until the forties when aerial photography showed alpine lakes that later were found to have the golden trout.

The food of the Big Pine Nümü was bland for the most part, as only limited salts and sugars were available, but they were high in protein and nutrients. Rabbits were the most constant source of protein; both Jackrabbits and Cottontails were eaten. Rabbit meat would be added to acorn mush to create a protein and vitamin-rich meal that was very filling. Due to diseases, any rabbit that had been hunted would be checked fastidiously for signs of lumps on the body and discarded if found with any irregularities. Deer were hunted and often divided up amongst two or three family groups. Big horn sheep were a prized catch and hunted in drives in the mountains. Smaller game such as ground squirrels, porcupines, and wildcats were caught in snares. Birds were often hunted; quail, doves, and waterfowl were shot with arrows or snared. Swans and birds of prey were not eaten. There were taboos on eating bear meat as a skinned bear's body resembles a human's body.

Chia seeds were also a regular staple in the diet; they were often ground and kept in small buckskin pouches, where the ground chia could be snacked on while walking. Other seeds from plants in the valley were eaten frequently and provided both fiber and folic acids.

The Big Pine Nümü ate cicadas as they emerged from the ground and beetle larvae; these insects would have their heads pinched off and would be toasted in a basket and salted. Acorns and pine nuts were vital to year-round survival. Both were harvested in the fall in large quantities by entire communities. The acorns were buried next to the riverbed so that the water could leach the tannins out of the nuts and pine nuts were cooked in baskets. The buried acorns were removed from the ground up to a year later to be shelled and ground into a fine flour. Both the pine nuts and acorns were made into mushes which were seasoned with chunks of meat and fat, or bitter salt. Sweetened acorn mush was created by adding a large amount of harvested sugar to a bowl of acorn mush, which was then placed outside in the snow, where it would freeze. The mix was then scraped to create a pseudo-ice cream style treat.

Cattail and tule shoots were eaten, especially when they were young and tender. Clovers, cresses, and small greens were harvested and eaten fresh. Berries that grew in the hills were harvested and eaten fresh.





There was a “coyote potato,” an unknown fungus (likely the *Calvatia booniana*, “Western Giant Puffball”), which grew in the sand around the roots of plants, particularly sagebrush. It could be dug up and cooked.

Teas were made from many of the leaves and barks of the plants; ephedra was the most common tea consumed, though pine needles and sagebrush bark were brewed and seeped as well. Wild rosehips were a quite common ingredient in teas due to the vitamin C they provided and the abundance in which they could be gathered.

In modern times, when money was scarce, a family member would go out to hunt rabbits or deer (sometimes out of season), or wild plants would be harvested. Grinding stones, metates, baskets, and pottery bowls were used in food preparation and storage.

### Gatherings

Fandango, the fall gathering, was a practice shared by many of the tribes in the Owens Valley as a gathering of all peoples. It was hosted by a different group each year and provided an opportunity for everyone to see each other. Traditional activities included dancing, gambling, and a communal rabbit drive. Big Pine is the only community in the Owens Valley who has continued this gathering annually. The modern version of the Fandango involves a parade on the Reservation roads to the “Fandango Grounds” and tribal members participate in the parade with floats, horses, cars, and by foot. There have also been games such as bed races, early morning walks, and volleyball tournaments. There are also competitions for traditional and non-traditional food cooking. It is held in October each year, usually during the first weekend.

Figure 6. Photograph of a Paiute gathering circa 1906-1913, taken by Forbes



Source: Paiute Shoshone Cultural Center



### Places

The burial sites of the Big Pine Nümü located throughout the territory have often been desecrated and their locations are no longer shared with outsiders. Burial was not done by water and usually in locations that were not common to visit, so as not to disrupt them.

Figure 7. Paiute men dressed and performing war dance



Source: Paiute Shoshone Cultural Center

### Agriculture

While the Big Pine Paiute Nümü did not have developed agricultural processes such as row crops, they developed the practices of plant grooming, which creates ideal materials and seed collections for later usage. The creeks and streams were expanded to improve irrigation of plants and to strand fish to make them easier to catch. Basket makers would often tend to willows and maintain spacing so that in two to three seasons the willows growing would be ideal for basket making. Those who produced bows and arrows did the same with saplings, grooming them to grow the best materials for later harvest. Oak trees and pine trees had their habitats tended to so that harvests the following year were bountiful.





**Climate Change Impacts:**

Changes in climate

The spring and early summer seasons have become more temperate; during the 1990s, it was common for the month of May to be extraordinarily hot, with temperatures reaching the 110s+ degrees Fahrenheit. The Memorial Day Weekend has been an especially good marker for this as now it is common to bring a jacket along while watching the parade in the neighboring town of Bishop due to the slight chill in shade. It still reaches the 90s during the day, but we do not experience the heatwaves that were once so common in May. In the past, it wasn't unusual to have at least a dozen cases involving tourists being treated for heat exhaustion or heat stroke. Heatwaves still exist in Big Pine but now occur later in the summer.

Drought conditions have become commonplace over the past twenty years; the region is a Great Basin High Desert climate, so there is not an abundance of water during the year, but over the past ten years it has become more noticeable that the amount of rainfall and snowfall has significantly decreased.

**Figure 8. "Dust Devil" as seen from Route 168, heading east towards the White Mountains and Westgard (east of Big Pine)**



Source: L'eau Stewart

High winds have always been a part of the weather in the Owens Valley, but the frequency at which these winds occur is increasing; this has led to soil erosion around the community, the uprooting of rabbitbrush and sage brush, and complications in native plants establishing root systems when the seeds try to grow. Paired with the drought conditions, this has led to areas that once had established root systems becoming barren spaces.

Winters often lack snow on the valley floor, though it will snow in the mountains. "White Christmas" was fairly common until the early 2000s. Now winters are typically milder in temperatures and drier. Any rain begins in January and then there is typically no rain again until the start of Spring. The milder temperatures have resulted in certain insects



such as mosquitos and wasps coming out of hibernation earlier in the year. These insects would normally die off during the cold winter but now they persist.

**Figure 9. Alpine Lake within the Eastern Sierras, at the Palisades (west of Big Pine and part of the Big Pine watershed)**



Source: L'eaux Stewart

### ***Impacts on physical systems***

Petroglyphs and pictographs in the area have been affected by climate change due to erosion of the rock faces due to the increased frequencies of dust storms, and moisture from rain and dew accumulating under the surface of rock panels which causes them to fall and damage other panels below them. The pigments in the pictographs are becoming lost due to the wind erosion.

Areas north of the town of Big Pine and to the east accumulate water during the wet seasons, forming temporary lakes; the water leaches alkaline soil to the surface which causes a thin crust to form when the water eventually evaporates. The alkaline dust then gets caught in wind and blows south into the town, affecting everyone's breathing. Due to less and less precipitation each year, the alkaline dust caught in the air becomes greater overtime. Currently the tribe tracks air particulate matter through their Air Quality program to document the increase in particles trapped in the air that is causing breathing issues. The Tribe has seen an increase in dust and is working with outside officials to mitigate the problem.

Wetland areas have nearly disappeared due to the water table dropping and the lack of sustained rainy seasons. The Big Pine People's ancestral territories included many freshwater springs that have now disappeared or remain mostly dormant; these areas



were the sites of traditional stories and often were markers of certain family boundaries. The loss of these areas is due to a drop in the water table, likely a combination of LADWP pumping activities and the lack of rainfall to replenish the aquifers.

Snowpack has been reduced for years and has impacted the amount of water runoff into the valley, which leads to further issues such as reduction of native plants in the spring and summer, causing animals to have to move to different areas in order to find resources.

Access to traditional pine nut harvesting areas has been greatly impacted by soil erosion; root networks in the soil have disappeared in many areas due to a lack of water and as a result, many roads and paths have been washed out due to rainstorms that cannot be absorbed into the soil and create mini mud/rock slides. This requires hiking into areas, which can be perilous as the disturbed roads and trails might not be stable and the hiker risks the possibility that the rocks they're walking on might slide out from under them.

### ***Impacts on vegetation***

The abundance of plant species has reduced by a significant amount in the Big Pine area: plants typically associated with basket making such as willow and devil's claw are often so difficult to source that they must be found outside of the traditional land boundaries (often by Bishop or Mono Lake). Food such as Taboose (*Cyperus esculentus*), a plant that grows a small nut-like tuber, was once so prevalent that a person could walk through miles of plants within arms distance; Taboose is now only found in spaces in the backcountry around Big Pine and can no longer serve as a supplementary food to an adult's diet without depleting the plant population severely. Acorns were another primary source of protein for the Big Pine peoples. Now to harvest acorns, one would have to travel south to Fort Independence, which does not produce acorns regularly enough to support an adult through the winter season. Previously, acorns could be gathered in such large quantities that it was common to bury a large cache in a riverbank over the year so that the running water could leach the tannins out of the nut meat. The taste of the local acorns has purportedly changed so that the tannins are stronger and require more time being leached.

Pine nut harvests are commonly less successful. This is not due to an overharvest or loss of land, but due to climate change. Pine nuts grow on a seven-year cycle and it is common to rotate traditional pine nut harvesting sites every year. Families select their own harvesting site and often keep the information private; it is not an easy task, and most people aren't knowledgeable about pine nuts. There is little evidence that the lack of pine nuts from year to year has to do with interference by anything but the climate changes our area experiences. Pine nuts are no longer the primary source of winter foods due to convenience of modern foods, but they are still a very welcomed food in the Paiute and non-Native community of the Owens Valley. We have also noticed that the size of the pine nuts has gotten smaller.





Tule and cattail are no longer harvested in abundance for food or housing material due to the development of the lands that they grew on. Wetlands have dried up and houses or other development have replaced the tule beds. There is also high concern about the quality and safety of eating them due to chemicals that are sprayed on them for mosquito control and in the water that they grow around.

Wildfires in the area have become increasingly dangerous due to the drier plants in the wildland areas around Big Pine; certain plants have a difficult time regrowing after the area has been burned such as blackbrush, while others invade the area, such as foxtails and cheatgrass.

The coyote potato has been difficult to find, and it is unknown if this is due to the destruction of the land by development that would have typically served as its habitat or due to loss of water in the area overall.

Wild tobacco grows in recently burned areas, so there has been an increase in wild tobacco growth around the town of Big Pine in areas where wildfires burned; however, there is a lack of native plant growth in those same areas afterwards. Instead, those places have become covered by cheatgrass and tumbleweeds, which do nothing to save the soil during windstorms, or create a root network to help establish soil stability. This also means that looking for traditional plants that might grow after the tobacco has repaired the soil is becoming difficult.

### ***Impacts on wildlife***

There has been a noticeable decrease of Jackrabbits and Cottontail Rabbits in the valley due to a combination of predators moving down into the areas where we would hunt for rabbits and due to a lack of vegetation for the rabbits to eat. Our area was known for the rabbit drives (a hunting activity) that occurred the fall, where it was common to kill between 70 and 100 rabbits in a day. That is no longer a sustainable activity and tribal members no longer rely on rabbits as a main source of food.

The insects that were once harvested for food are now no longer easily found; the landscapes where insects such as cicadas once lived have changed so drastically due to lack of water and vegetation in the past thirty years that the insects have either migrated or died out.

Larger predatory animals such as mountain lions and bears, as well as smaller predatory animals such as coyotes and bobcats have begun to appear more frequently on the reservation lands; there have been numerous incidents of pets and livestock being killed or maimed, trashcans being disturbed, or prowling on Tribal Member assignments (plots of land held by the Tribe but assigned to Tribal members) in the past fifteen years. Some of the animals have been captured and relocated by California Fish and Wildlife, while other animals have been killed by cars or shot by townsfolk within Big Pine for the danger



they pose. This is likely because their typical hunting areas have been deeply affected by their prey migrating to different areas closer to town to access water and vegetation.

Birds of prey are slowly returning to the area due to conservation efforts, however many lack the areas they would typically use for nesting and hunting. The food upon which these avian predators rely, such as rabbits and mice, are impacted by a lack of vegetation. The trees in which the birds of prey would typically live are dying due to lack of water. Owls have been able to adapt by living in abandoned or isolated human-built structures such as silos. They are now seen often in residential areas; owls are considered an omen of bad luck, so many Tribal Members are uncomfortable with their frequent presence.

Native fish species are on the endangered species list due to introduction of other fish species, destruction of habitat, and lack of water, the impacts of which are exacerbated by climate change. Fish can be very delicate to care for, as even small fluctuations in temperature and sunlight can negatively affect their health. Reestablishing the native fish populations has been a struggle due to the change in the landscape and the lowering of the water table throughout the valley. If more is not done to protect them, there is a likelihood that species such as the Tui Chub and Owens Valley Pupfish will go extinct in the next decade. The Big Pine Peoples have focused all their attention to preserving the native fish and no longer fish for them.

**Figure 10. Bighorn Sheep**



Source CDFW, 2021

Bighorn Sheep have been impacted by drought and are no longer in the area, though are slowly returning with the assistance of the California Fish and Wildlife Bighorn Sheep Reintroduction Program. They were once a staple of the Owens Valley Paiute life, but can no longer be hunted even for cultural purposes; to hunt Bighorn Sheep in the White Mountains, one must acquire one of the six hunt tags through a lottery offered by the state. The Big Pine Peoples have been incredibly supportive of areawide conservation efforts to restore the original herd sizes to the valley.

### ***Impacts on human health and well-being***

While the spring is becoming milder. Summers are hotter. As our people no longer travel to the mountains to live during the hotter summer months, they are routinely exposed to higher temperatures in the summer; summer is typically dry and windy, with exposure to smog from tourist vehicles and smoke from California wildfires. During the 2020 fire



season, residents of the Owens Valley were forced to remain indoors for many months straight. It should be noted that during this time there was little wind, which allowed the smoke to settle over the town of Big Pine; many people commented about how unusual it was. Not all households own air conditioners or swamp coolers, so many people are left in houses that are too hot to safely occupy.

Droughts have become commonplace in the area. The dry soil leads to dust, which often affects the breathing of all community members; there are a number of elders with lung issues and a growing number of cases of children with asthma and other breathing issues. The soil is alkaline and causes dust clouds that are very irritating to the eyes and throat/lungs.

Hunting isn't as readily accessible due to game having left the immediate area. Smaller game such as doves and quail are easy to find around the south and eastern border of the reservation, but rabbits and deer must be sought out. The death and/or lack of plants has also led to a huge change in diet for the people and has spanned over multiple generations.

### **Summary**

Overall, climate change and the lack of water within the Big Pine area have become of great concern. Climate change has led to soil erosion, loss of wetlands and springs, loss of plants, animal migration, changes in traditional trail systems, and changes in diets and cultural practices; these impacts are tied to water, heat, wind, and fire hazards. Without a return of water to the area, the Tribe is looking at scenarios where the land will not recover and thusly lose out on many of the practices that make up our culture. As a result, the Big Pine Paiute Tribe has become involved in water rights, and activism surrounding the politics and usage of water in our community. It has led to the Tribe working hard to manage water and educate our Tribal Members how to best use the water we are able to obtain.

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