Fallon Paiute Shoshone Tribe

Climate Change Adaptation Plan

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Table of Contents

DRAFT

List of Tables

DRAFT

List of Figures

DRAFT

I. Introduction

The Fallon Paiute-Shoshone Tribe (FPST) is a Federally-recognized Native American Tribe located in Churchill County, in West Central Nevada. The Tribe is traditionally known as the Toi-Ticutta (cattail eaters) band of Northern Paiute and is comprised of both Northern Paiute and Western Shoshone people. The Tribe has inhabited Western Nevada for over 11,000 years, subsisting along the shores of the Stillwater marshes until the late 1800s, when farmers moved into the Lahontan Valley and greatly restricted the Tribe's ability to hunt and harvest in traditional locations.

The Tribal community is located within the two Reservation and Colony land bases. These land bases amount to approximately 8,180 acres and they are the primary assessment areas for climate impacts, vulnerabilities and adaptation planning. The Reservation and Colony are located within the Carson Desert, a large intermountain basin, and the terminus of the Carson River. Adjacent to the colony is the city of Fallon to the southwest, and the Fallon Naval Air Station to the southeast. The Stillwater Wildlife Management Area (SWMA) is located east of the reservation. The current population of the FPST is approximately 1,200 people.

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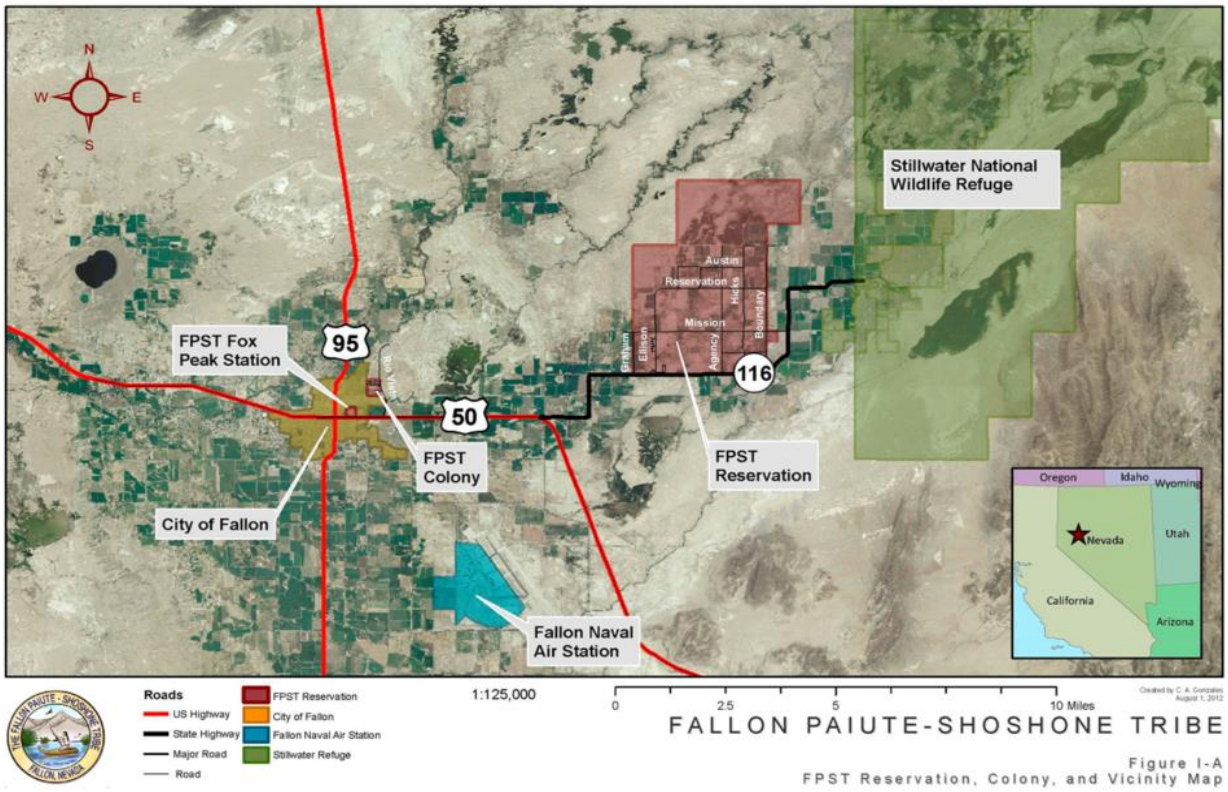

Figure I.1 FPST Reservation, Colony and vicinity map.

A. Climate Overview

The FPST lies within the Great Basin and its climate is characterized by extreme temperatures and low precipitation. From 2001 to 2021, the average temperature ranged from 50.8 to 54.4°F. Summer temperatures are high and reach an average maximum of about 90°F, while minimum temperature average reaches 18°F in the winter (data is from xmACIS2, Fallon Experiment Station). Evaporation potential is high throughout the region because of hot temperatures. Open-water evaporation is about 5 ft. /yr. (Bureau of Reclamation, 1987).

From 2001 to 2021, the area received an average annual precipitation of 4.17 inches. Most precipitation occurs during the winter, usually due to moist air masses moving eastward from the Pacific Ocean. The most intense precipitation from the eastward-moving storms falls on the Sierra Nevada Region. By triggering significant amounts of precipitation from the moist air masses, the Sierras create a rain shadow along the eastern slopes that contributes largely to the

aridity of the entire Great Basin. The winter snowfall on the Sierras is the source of most runoff that feeds the major eastward flowing rivers of the region including the Carson and Truckee River.

B. Future Climate

Future temperatures are predicted to increase in many parts of the world. In Nevada, the annual average temperature has increased by 2°F since the early 20th century, also 8 of the 10 warmest years have occurred since 2000. Future climate projections show that temperature will continue to increase throughout the state but that depends on the amount of greenhouse emissions. Locally, climate projections predict temperature will increase by 4.5° F to 6°F by mid-century.

Projected changes in precipitation are more uncertain than temperature because they are sensitive to local conditions and shifts in large-scale atmospheric circulations. Some models estimate that the precipitation will be either higher or lower than the historical average. Overall, the local precipitation is small and negligible and most of the surface and groundwater is connected to the Sierra snowpack.

The eastern Sierra Nevada is highly influenced by the dry nature of the Great Basin. It also lies in a rain shadow and thus receives less precipitation than western slopes (Dettinger et al., 2018). Historically, annual precipitation in the Sierras has fluctuated from about 50% to 200% from normal. Snowpack levels are expected to change due to climate change as a function of precipitation and temperature changes. For instance, precipitation variability will continue, leading to more extreme droughts. Snowpack levels will decline due to warmer winter conditions and shifts in precipitation from snow- to-rain-dominated (Fritze et al., 2011, Mote et al., 2018). Projections show a snowpack decrease of 60 percent by the end of the 21st century (Dettinger et al., 2018). As a result, the total snow-dominated area of the Sierra Nevada could be reduced by 19 percent, and the total rain-dominated area could increase by 26 percent by midcentury (Klos et al., 2014). Increasing precipitation in the form of rain will lower the snow-

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water equivalent (SWE) by 75 percent, reducing snowpack storage and altering the timing and magnitude of streamflow.

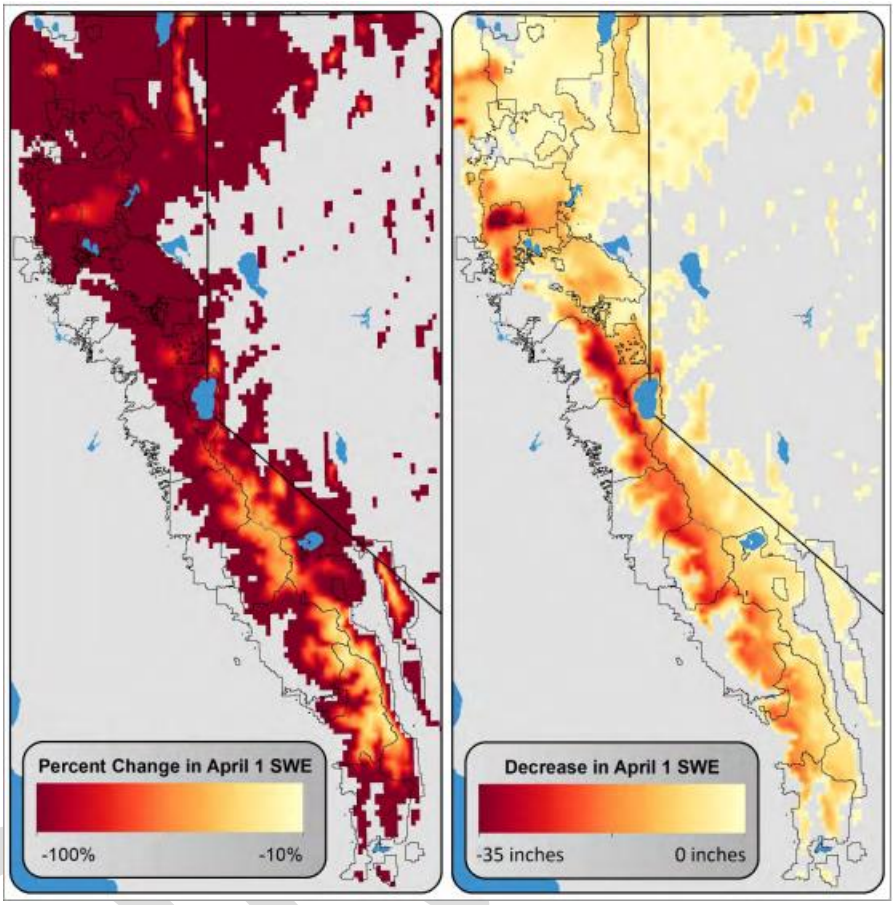

Figure I.2 Projected changes in April 1st snow water equivalent (SWE) across the Sierra Nevada from historical conditions (1975-2005) to (2071-2090).[1]

II. Adaptation Planning Process

A Climate Working Group was formed in 2021 and consists of Tribal department directors, managers and staff members. The Group's purpose is to provide input and department concerns related to climate change and climate adaptation planning. During the adaptation process, the Group built upon the data from the Climate Vulnerability and Risk Assessment conducted in 2021-2022. The Group researched and developed the assessment with a focus on

[1] Projections are based on 20 global climate models' means under RCP 8.5 (Figure by R. Norheim).

four climate related hazards: drought, wildfires, elevated temperature and storms/flooding. It determined that there is a high exposure to drought and increased temperature given frequent past patterns and projected increase in their occurrence due to climate change. The exposure to wildfire and flooding is medium, with wildfire smoke being the main concern to the community.

The Group then conducted an impact and risk assessment of different systems including: agriculture, drinking water resources, wetlands, public health, infrastructure and cultural resources to the four climate hazards. Figure II.2 below summarizes the vulnerability of different systems and resources to climate hazards.

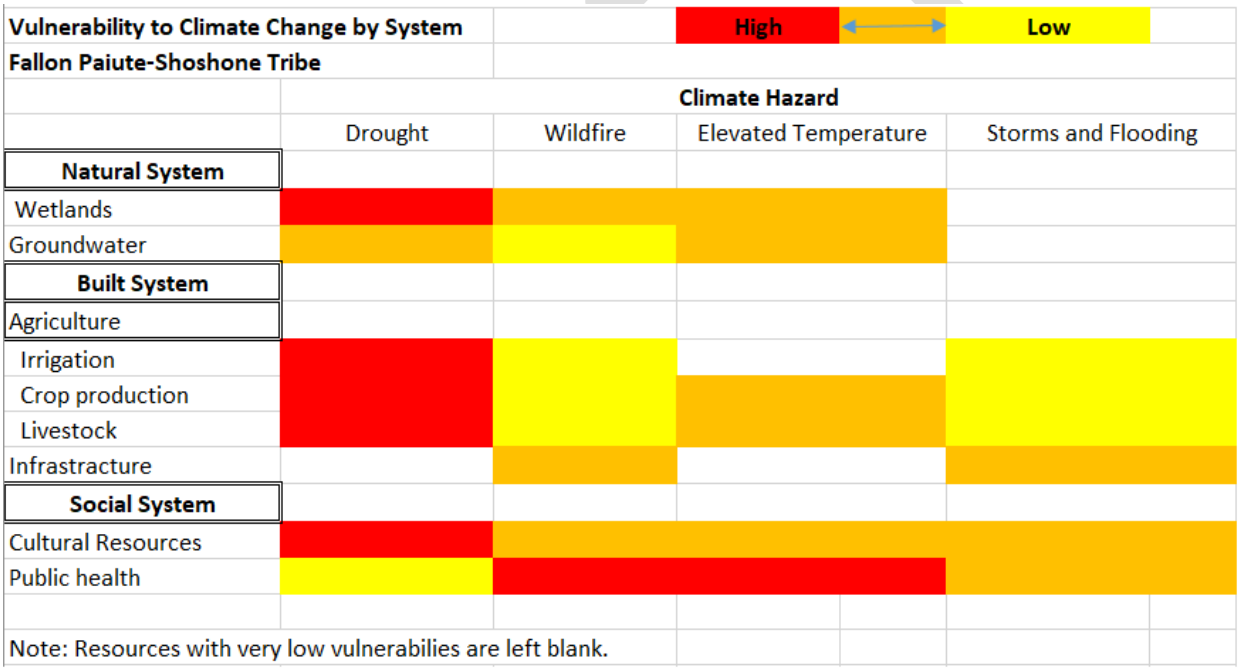

Figure II.1 Summary of the Climate Change Vulnerability Assessment.

Based on these findings, the Group found that agriculture, wetlands, public health and cultural resources are the most impacted resources. At the beginning of 2023, the Group held a meeting to discuss the findings of the Climate Vulnerability and Risk Assessment and selected the main concerns of different resources related to climate hazards.

Resource	Main Vulnerabilities
Agriculture	Water resources, lack of drought planning, crop health and production, livestock feed and water, native plant restoration, invasive plants.
Public health	Mosquito outbreaks, wildfire smoke, elevated heat, wildfire response, emergency planning (e.g. power outages).
Wetlands	Water resources, invasive plants, water quality, and wildlife habitat.
Cultural	Pinyon pine forests, wetland's health, native plants, burial and other cultural sites.

Table II.1 The main impacted resources by climate change and vulnerabilities of each resources.

The Environmental Protection Department conducted a community survey for input into climate change adaptation planning in October, 2023. Community responses and observations (Appendix A) align with climate impacts and vulnerabilities outlined in Table II.2. In addition, community members also suggested adaptation strategies that were incorporated into the adaptation strategies in the plan, as applicable.

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III. Climate Change Priorities

The main concerns within each resource were selected and compiled into the climate priority list below. The Climate Working Group researched and developed different adaptation strategies for each priority.

Climate Planning Priority List

- Wildfire
- Drought Planning
- Wetland's Health
- Elevated Temperatures
- Cultural Sites Protection
- Drinking Water resources

Implementation of these strategies is outlined in the partners/funding sources section. The list of partners and funding is not exhaustive and will need to be updated as new grants and partnership opportunities become available. Implementation will depend on the responsible department and coordination between multiple departments and partners. The climate change adaptation plan will be made available for public review and input.

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A. Wildfire

As the climate continues to change, wildfires are likely to increase in frequency and severity in the west. For instance, areas burned in the southwestern United States increased by 300 % relative to areas burned in the 1970s and mid 1980s (Fleishman et al., 2013). This increase is associated with elevated temperatures, earlier spring snowmelt and past land use and management of forests (Wrestling et al., 2006; Schoennagel et al., 2004; Allen et al., 2002).

Future projections show that if temperatures increase by 1.8 F°, there will be a 312% increase in areas burned in the Sierra Nevada, Southern Cascades, and Coast Ranges of California (Fleishman et al 2013). These regions contribute to smoke production and air quality issues in the Fallon area. Projections for the state of Nevada show 20 more days of high wildfire potential by 2050 (Climate Central, 2016).

Wildfire smoke from large fires brings many pollutants to the Fallon area. During the 2021 fire season, the area experienced 21 days of days of unhealthy or very unhealthy days due to large concentration of particulate matter. Particulate matter (PM) is the most abundant pollutant from wildfires and causes coughing, lung inflammation, discomfort, and shortness of breath. It also aggravates pre-existing illnesses, including asthma and heart conditions. For most of these unhealthy air days, residents are advised to stay indoors, however, PM can infiltrate indoors. It's estimated that 50% of outdoor PM comes indoors. It's also estimated that people spend 90% of their time indoors. These factors show that indoor air quality is as important as outdoors during wildfire smoke season.

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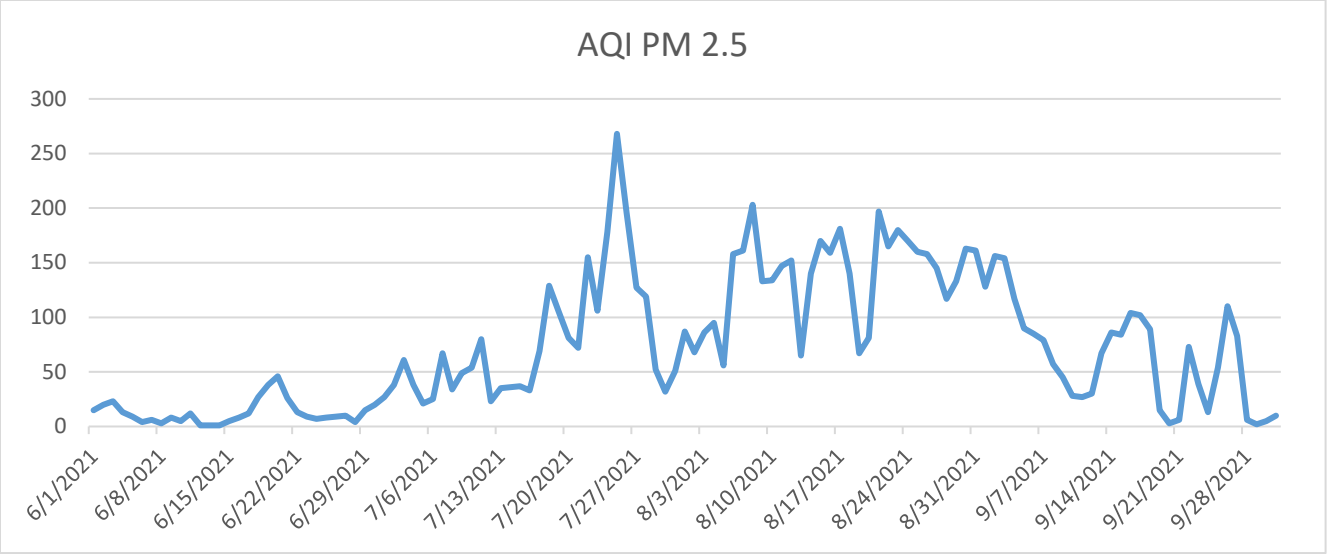

Figure III.1 Average daily PM 2.5 recorded by purpleAir sensors at Oasis station from August to October 2021. [2]

Although the potential for local wildfires is currently low, changes in temperature and precipitation coupled with human influences and interference can lead to a high risk of fires. Fire risk is high in densely vegetated areas and areas where continuous fire fuel from invasive and flammable plants, such as cheat grass, is abundant. The risk of fire increases when wet years are followed by dry years, where dense vegetation accumulated in wet periods dries up in the dry periods and becomes more flammable. Overall, the wetlands are at high risk due to dense vegetation and alternating water years.

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[2] Readings above 151 are considered unhealthy by AQI scale for PM2.5.

Proposed Adaptation Actions	• Conduct daily air assessments using Air Quality Index and provide warnings of "unhealthy" days when outdoor activities should be limited. This action is currently conducted by the Environmental Protection Department. • Provide HEPA air filters for community buildings including the Community Learning Center and Senior Center during wildfire season. • Provide HEPA air filters to seniors and low income families. • Assist residents in maintaining proper air filtration in homes (e.g. changing and upgrading air filters). • Provide air quality and wildfire outreach and education to residents. • Establish building codes to tighten the building envelope and prevent pollutants infiltration into homes. • Establish building codes to install fire resistant building and landscape features, such as defensible space and home hardening. • Get assistance from the Bureau of Indian Affairs, Branch of Wildland Fire Management, to develop wetland management plans that include wildfire mitigation efforts and wildland fire management. • Reduce hazardous fuel and fuel continuity through mechanical manipulation and prescribed burning where applicable.

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	• Implement fire prevention measures including red flag warnings, no smoking, camp fire building, or overnight camping in the wildland. • Monitor PM air pollution on Tribal lands. The Tribe is currently using non-regulatory low cost air PurpleAir sensors to monitor PM 2.5 and has received a grant to further monitor air PM pollution. In general, there is gap in air data to effectively track and record air pollution trends over the years.
Potential Partners/Funding Sources	• Indian Health Service. • EPA Tribal Health Program. • EPA Air Grants: CAA103/105 or other EPA Tribal Programs. • Bureau of Indian Affairs Branch of Wildland Fire Management. • Nevada Department of Forestry: Western States Fire Managers and Hazardous Fuel Grants.

Table III.1 Proposed adaptation actions for wildfires and potential partners/funding sources for implementation.

B. Drought

High temperatures and variable precipitation have intensified droughts in many parts of the southwest region. For instance, the Tribe was in exceptional drought from 2014 to 2016, this drought brought immense loss especially to agricultural practices.

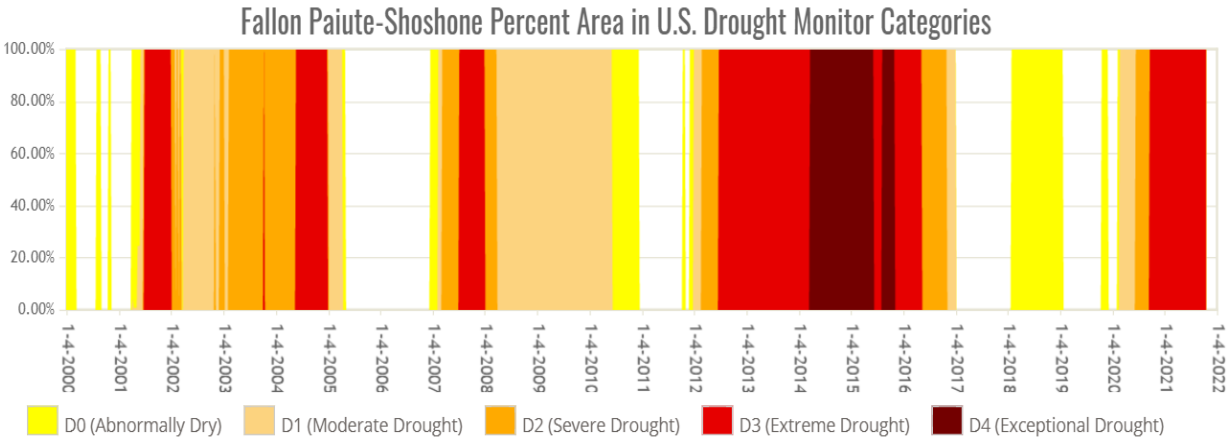

Figure III.2 The percent of area in the FPST in U.S drought monitor categories from 2000 to 2022.

Agriculture is the primary land use on the reservation and prolonged droughts over the last 20 years brought substantial income loss to the Tribe and its members. Water deliveries were cut off substantially to as low as 21% in 2015, with deliveries ending prior to September. Rangeland conditions and water availability for livestock had also diminished during drought years, which lead to farmers selling livestock and losing income. Overall, the consequences of drought are substantial for tribal members, who rely on agriculture, as their main source of income.

Most of the agricultural land is irrigated by the Truckee Carson Irrigation District (TCID), which derives its water from diversions in the Truckee Canals and Carson River. Both the Carson River and the Truckee River Basin are influenced by the winter snowpack in the Sierra Nevada. In return, the eastern Sierra Nevada is highly influenced by the dry nature of the Great Basin and also lies in a rain shadow and thus receives less precipitation (Dettinger et al, 2018). Historically, annual precipitation in the Sierra Nevada has varied by 50 to 200 percent of average, whereas

most of the rest of the United States varies between 10 to 20 percent (Dettinger et al, 2011). The Sierra Nevada is already experiencing changes in precipitation, both as a function of precipitation variability and increased temperature.

Drought also impacts cultural and medicinal plants, which are important to the Paiute and Shoshone people. For instance, drought impacts Pinyon pine trees, which leads to low or no harvesting of pine nuts. Tribal members notice a constant decline in Pinyon pine tree crop over the years, and also note that commercial pickers overharvest on traditional lands, which further lowers pine nuts availability. Other cultural plants such wild berries, wild onions, cottonwoods, cattails and bulrush are also impacted by drought. Most of these plants rely on natural rainfall, which is lower and more variable than irrigation water. Therefore, the protection of the traditional plants is challenging and highly needed.

Future projections for precipitation are uncertain with some projections expecting a decrease by 5 percent, while other projections show an increase by 10 percent depending on location. However, precipitation extremes are projected to increase. Specific to drought, the number of days between storms is expected to increase, which will increase drought stress. Warmer temperatures reduce snow levels by both decreasing the fraction of precipitation falling as snow relative to rain, increasing melt rates and reducing snow residence time. Warmer temperatures also increase the evaporative rate of surface water, which lead to further loss of water resources. The changes in precipitation patterns will increase the aridity of the land.

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Proposed Adaptation Actions	• Develop a drought plan for agricultural land and ranges. • Model agricultural and irrigation water demand. • Promote sustainable agriculture by encouraging low water crops and water conservation. • Maintain healthy soils through the application of regenerative agriculture and minimizing soil disturbance caused by tillage. • Provide support to farmers through educational and informational material regarding drought support, regenerative and sustainable agricultural and water conservation. • Expand and improve irrigation water systems such as reservoirs and canals. Improve water systems by installing a geomembrane at the Rattlesnake reservoir and concrete lining water canals to prevent water loss. • Range Improvements – Including livestock water pipelines, water troughs and rotating range location. This effort is presently implemented by the Tribal Land and Water Department.

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Potential Partners/Funding Sources	• National Drought Mitigation Center. • BOR: Drought Resiliency Program Grants, Water and Energy Efficiency Grant, Small-Scale Water Efficiency Projects, Emergency Drought Relief for Tribes. • Intertribal Agricultural Council. • Natural Resources Conservation Service: Environmental Quality Incentives Program (EQIP), Conservation Technical Assistance. • Carson River Subconservancy District.

Table III.2 Proposed adaptation actions for drought and potential partners/funding sources for implementation.

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C. Wetlands

The Tribal wetlands natural features are of significant historical and cultural importance to the Tribe. The Tribe is called Toi-Ticutta (cattail eaters) and Marsh people of the Fox Peak Mountains. Therefore, the health and maintenance of the wetlands is of paramount importance to the Tribe. The wetlands occupy approximately 1,440 acres, which is 17% percent of Tribal Land. The wetlands are managed for wetland resources including cultural uses, recreation, hunting, and aquatic habitat and ranching operations. There were three main concerns identified in the Climate Change Vulnerability Assessment regarding wetlands health: decline in water quality and quantity, encroachment of invasive plants, and wildfires.

The wetlands are located on a non-carbonate geology, which means that they rely on irrigation water rather than deep aquifers for water supply. However, climate change is changing the watershed hydrology through changes in temperature and precipitation regimes. Warmer temperatures cause earlier snowmelt and peak streamflow, which can alter the timing of water delivered to the wetlands and low flows in the summer months. Precipitation variability can increase the intensity of precipitation or reduce precipitation events, which can lead to droughts and flooding. Although the latter is less prominent in the wetlands, due to their capacity to buffer flood impacts. During drought years, wetlands' water rights are curtailed or reduced. Furthermore, water masters deliver to upper streams users first, and since the wetlands are at the end of the watershed, they receive water last. According to the Nevada Wildlife Action Plan, the fluctuation in water delivery to managed wetlands poses the most significant threat from climate change. Reduction in water adversely impacts wetlands vegetation including cattail and bulrush, willow and other native plants. These plants are tolerant to drought but prolonged drought causes substantial loss in vegetation. Vegetation is an important part of the wetlands' landscape, as it provides shelter and habitat to wildlife including fish, amphibians and migratory birds. Reduction in water delivery also impacts aquatic life including invertebrates, fish and amphibians. This in turn reduces the abundance and diversity of wildlife that rely on aquatic life for food, such as American Avocets, Great Blue Herons, Snowy Egrets and other migratory and breeding shorebirds.

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Water quality in the wetlands has been altered through the contamination of fertilizers and heavy metals used in crop production. In addition, historic gold mining activities discharged massive amounts of mercury into the Carson River Watershed. Reduction in water deliveries would increase the concentration of these contaminants. High temperatures also expand algae blooms that are caused by nutrients runoff. Even if algae blooms are not toxic, they can impact aquatic life by blocking out sunlight and clogging fish gills. Harmful algal blooms can also create "dead zones"; areas in water with little or no oxygen where aquatic life cannot survive

Invasive plants can challenge native vegetation, as they compete for water resources. For instance, tamarisk consumes large amounts of water in one year and chokes out native plant species. Tamarisk removal efforts took place in 2006 and recently in 2021, in which more than 100 acres of tamarisk were removed. Besides tamarisk, many invasive plants, such as cheat grass, knapweed, Scotch thistle and Russian thistle inhabit the wetlands. Wetlands' favorable conditions, including a high water table and abundance of nutrients, make the wetlands more susceptible to invasion. Climate change also facilitates non-native invasion through changes in the growing season and decrease in cold days in some years (Abatzoglou et al., 2011). Shifts in precipitation from rain to snow, also extend the growing season for invasive plants, such as cheat grass in the absence of frozen soils and snow cover (Mack et al., 1983). Invasive plants are also associated with the high risk of wildfires. Overall, the wetlands are at high risk of wildfire due to high flammability and fuel availability, especially during dry years.

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Proposed Adaptation Actions	• Continue monitoring water quality and levels in the wetlands. • Monitor, locate and remove invasive plant coverage in the wetlands. • Monitor, locate and treat algae blooms in the wetlands. • Protect and re-establish perennial native plants, such as Indian rice grass, blue bunch wheatgrass, greasewood and sagebrush. Native plants reduce the risk of wildfires and invasive species and improve livestock forage and wildlife habitat. • Identify and monitor at-risk plant and animal species and develop recovery efforts. • Develop, maintain, and support outreach programs regarding the critical importance of wetland conservation for proper hydrologic function of ecosystems, as well as for wildlife conservation. • Inform agricultural users of best fertilizing practices to reduce harmful runoff. • Oppose and/or negotiate new proposals to divert water upstream from critical wetland sites. • Request assistance from the BIA, NDF and other available resources to develop a wetland management plan that includes fire mitigation and invasive plant management. • Develop or update adaptive fire management plans, including periodic wetlands and landscape assessments and traditional management practices to prevent high

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	intensity wildfires (e.g. prescribed burning, introduction of resilient and native vegetation).
Potential Partners/Funding Sources	• Nevada Department of Agriculture: Noxious Weed. Program, Cooperative Weed Management Grants • BIA Division of Natural Resources: Noxious Weed Eradication Program. • Nevada Division of Forestry: Western States Fire Managers & Hazardous Fuel Grants. • EPA Wetland Program Development Grants. • Nature Conservancy. • National Association of Wetland Managers.

Table III.3 Proposed adaptation actions for the wetlands and potential partners/funding sources for implementation.

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D. Elevated Temperatures

The Southwest is known for having some of the hottest temperatures. According to Climate Central, California and Nevada have warmed up by 2.6 degrees since 1970.

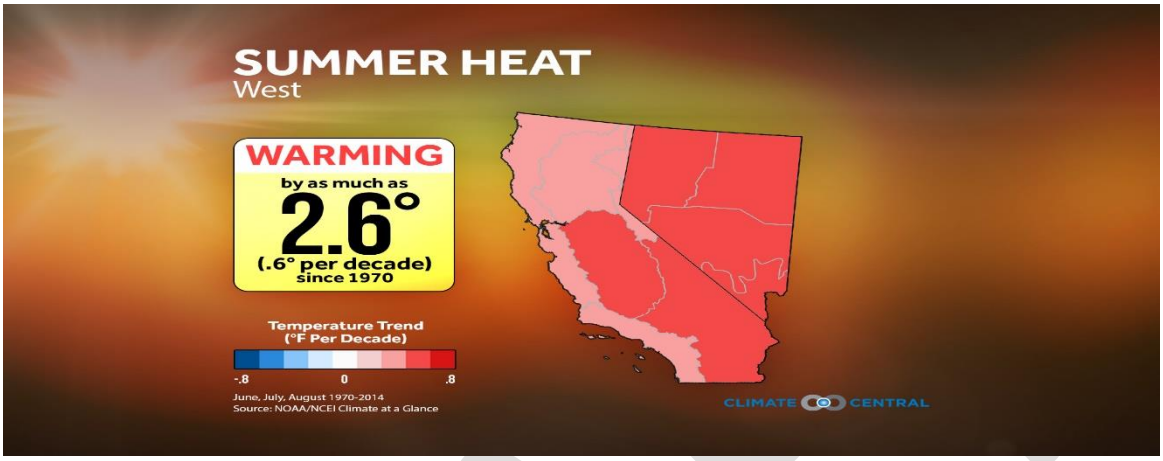

Figure III.3 Warming trends during summer months in California and Nevada.

Similarly, Nevada's annual average temperature has been steadily increasing since the early 2000s. In fact, 8 of the 10 warmest years occurred in the last two decades (2000 to 2020). Local temperatures in the Fallon area have been warming steadily since the start of the century. Temperatures have increased by 1.8 °F from 2000 to 2021. Also some of the warmest years have occurred recently, similar to the state's patterns.

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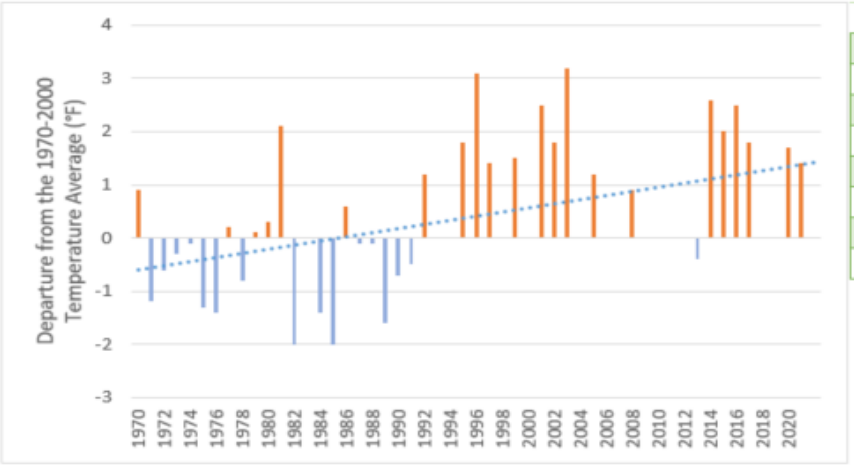
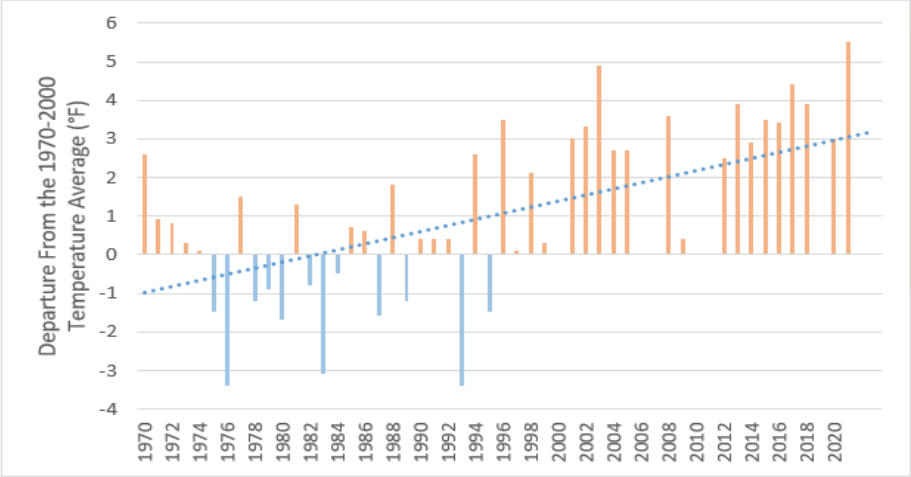


10 warmest years	
1	2003
2	1996
3	2014
4-tie	2016 &2001
6	1981
7	2015
8	2017
9-tie	2002& 1995

Figure III.4 Fallon annual average temperature departure from the 1970-2000 average.[3]

Summer temperatures show a higher warming trend than the annual average temperature. Since 2000, summer temperatures have increased by 3.3 °F, and 90% of the warmest summers have occurred since 2000.



10 Warmest summers	
1	2021
2	2003
3	2017
4-tie	2018 & 2013
6	2008
7-tie	2015 & 1996
9	2016
10	2002

[3] Years with ≥ 15 days of missing data are not graphed. (Data is from the Fallon Experiment station through xmacis2.)

Figure III.5 Fallon summer average temperature (Jun-Aug) departure from the 1970-2000 average.[4]

Warming trends are expected to continue because of climate change. Locally, climate models unanimously predict further warming, but the warming will depend on future greenhouse gas emissions (i.e. carbon dioxide, methane and nitrous oxide gases which trap heat).

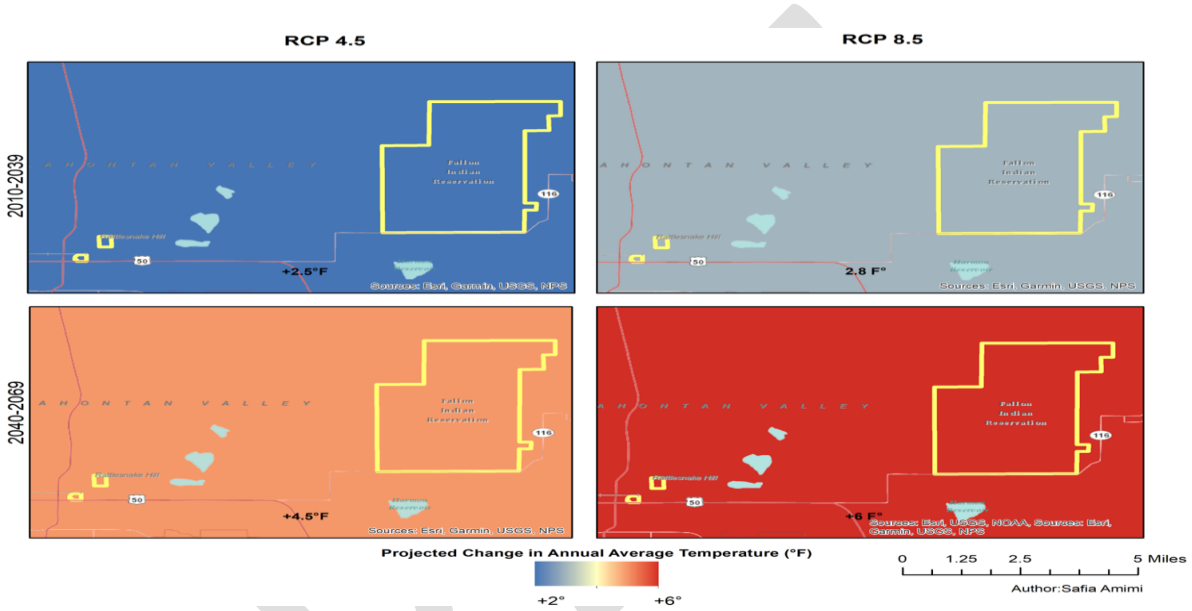


Figure III.6 Projected change in annual average temperature from historical values of 1971 to 2000.

Annual average temperatures are projected to increase under all warming scenarios (RCP 4.5 and 8.5) and across all periods. Both scenarios show a similar change in temperatures in the near future. However, the changes projected for 2040-2069 show a large difference between the two warming scenarios.

Local climate scenarios do not determine the number of days of extreme temperature. However, state projections show that by 2050, the typical number of heat wave days in Nevada is projected to increase from 15 to nearly 55 days a year, which is a 27% increase.

[4] Years with ≥ 15 days of missing data are not graphed. (Data is from the Fallon Experiment station through xmacis2.)

The main concern of heat is public health. In fact, heat is the leading weather-related killer in the United States. Heat-related fatalities have the highest 10-year average and 30-year average of fatalities compared to other weather extremes.

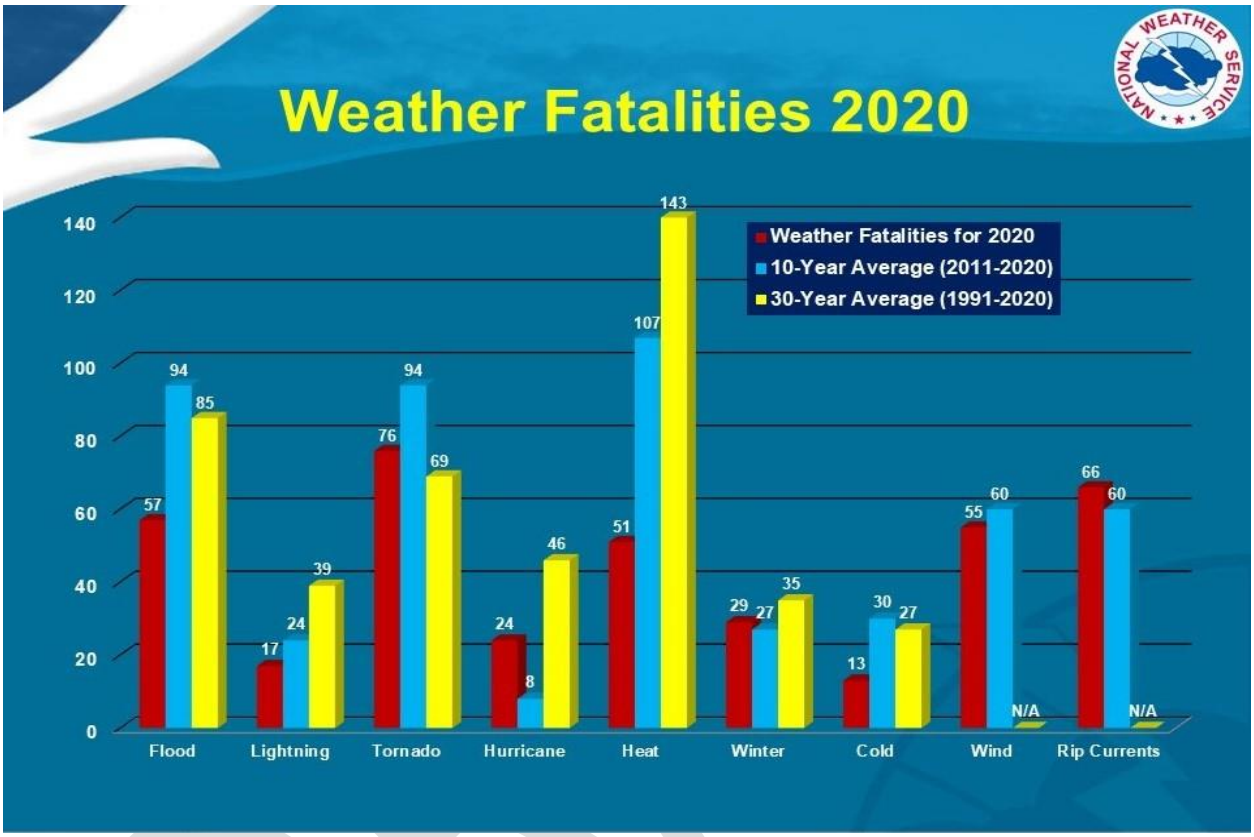


Figure III.7 Weather-caused fatalities for the year 2020.

On average, the Fallon area experiences approximately 23 days at or above 95 °F, which has increased by 52 percent in 2000-2021 (the average days => 95 °F from 1970-1999 was 17 days, the average from 2000-2021 was 35 days). Nighttime temperature data is not available. However, records show that rarely minimum temperatures are at or above 65° F, indicating that cooling probably occurs below this point. At nights when temperatures stay above 65 °F, cooling is limited. Heat is of special concern in the desert because of sparse vegetation that would otherwise absorb heat and the lack of shade. Also, many homes lack proper cooling systems to alleviate the heat.

Increased heat compromises the body's ability to regulate internal temperatures which can lead to a host of illnesses including heat cramps, heat exhaustion, heatstroke, and hyperthermia. Extreme temperatures can also worsen chronic conditions such as cardiovascular disease, respiratory disease, cerebrovascular disease and diabetes related conditions. Prolonged exposure to high temperatures is associated with increased hospital admissions for cardiovascular, kidney, and respiratory disorders (Sarofim et al., 2016).

Large portions of the population are vulnerable to heat extremes. For instance, children have insufficient ability to regulate internal temperature (Xu et al., 2012). Respiratory and cardiovascular illnesses among the elderly population were most commonly reported during extreme heat (Berko et al., 2014, Astrom et al., 2015). In addition, outdoor workers such as construction crews and farmers have a higher exposure potential due to the nature of their professions.

Elevated temperatures can mean a longer mosquito season. Tribal members notice more mosquitoes than in the past and also note that the mosquito season is getting longer. Overall, the area is prone to mosquito outbreak due to large nearby water bodies and nutrients overload in those areas. High temperatures also expand algae blooms that are caused by nutrients runoff. Algae blooms lower water quality and biodiversity in the wetlands.

Extreme heat also has consequential effects on wildlife, plants and ecosystems. For instance, small birds such as American Robin, Finch, Goldfinch, and Song Sparrow become dehydrated in hot conditions, which can lead to die-off risks. Plants become water stressed due to increase temperatures, which impact their distribution and abundance. High temperatures are unfavorable to plant growth because the rate of photosynthesis declines rapidly after a critical high temperature is reached. The critical high temperature for plant species varies, however temperatures in the 90’s and 100’s slow down photosynthesis for most plant species.

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Proposed Adaptation Actions	• Establish building codes to cool homes such as cooling roofs and improved AC units. • Create a cooling center or designate an area for cooling to assist homeowners with inadequate cooling systems. • Provide AC unit assistance to homeowners. • Provide community outreach and education on heatwaves, their health impacts and actions to take when heatwaves occur. • Create a database for temperature and precipitation records to monitor and track weather variables. • Create an early warning system to inform the public of heatwave occurrences. • Create a year round mosquito and invasive plant staff position due to high potential of these issues because of climate change. • Provide adequate water in the wetlands for plants and wildlife.
Potential Partners/Funding Sources	• Housing and Urban Development: Indian Housing Block Grant, Single Family Housing Repair Loans and Grants • EPA Tribal Health Research • Churchill County Mosquito Vector and Weed Abatement District

Table III.4 Proposed adaptation actions for elevated temperatures and potential partners/funding sources for implementation.

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E. Cultural Resources

Cultural resources and sites are important to the Tribe's identity, subsistence, history and for future generations. Changes in the climate negatively impacts these resources through recurring drought, wildfires, excessive heat and other climate hazards. For instance, the Tribal wetlands experience frequent droughts, which impact plant productivity and wildlife biodiversity. Bulrush and cattails, which are used in cultural objects such as baskets and decoys, are impacted by drought, which lowers their abundance. Wildfires are also a threat to these plants communities. Overall, wildfire risk is high in the wetlands due to dry vegetation and invasive species, including cheat grass, knapweed and tamarisk. Tribal members report that they harvest cultural plant materials outside of Tribal lands because of pollution and low water quality. These gathering sites need to be monitored for climate concerns and disturbances such as droughts and wildfires. Restoration of these sites should include cultivating and replanting native plants following disturbance events.

Tribal members also harvest Pinyon pine nuts in areas outside of Tribal boundaries. Pinyon pine trees are susceptible to drought, wildfires, elevated temperatures and insect diseases. Frequent droughts weaken Pinyon pine trees and make them susceptible to bark beetle infestation. Dying trees then become fuel for fires in addition to other plant material in the forest understory. Burned sites are susceptible to invasive plant establishment, if native plants are not re-established or planted. Other cultural plants such wild onions and berries are also impacted by drought and wildfire.

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Potential Adaptation Actions	• Continue to locate and monitor cultural sites. This task is conducted by the Tribal Historical Preservation Office. • Develop co-stewardship management of culturally-important public land with BLM and other responsible federal/state entities. • Create a resilience garden greenhouse to grow culturally-important plants, develop pine seedlings and educate Tribal members and youth on the importance and uses of cultural plants. • Re-plant Pinyon seedlings after wildfire using seedlings from the resilience garden greenhouse. • Assess and monitor the health of Pinyon pine forests and important pine nut gathering locations.
Potential Partners/ Funding Sources	• Bureau of Land Management and Department of Interior to co-manage public land of cultural importance

Table III.5 Proposed adaptation action for cultural resources and potential partners/funding sources for implementation.

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F. Drinking Water Resources

The Fallon basalt aquifer is the sole source of drinking water in the Lahontan Valley. It is used by the Fallon Paiute-Shoshone Tribe, the City of Fallon, and the Naval Air Station Fallon. Since the 1970s, groundwater pumping from the basalt aquifer has increased substantially due to increases in population and water demand. By the mid 80's, the pumping rate had exceeded the perennial yield for the Carson Desert Basin set by the Nevada state engineer in 1995 (order 1116). The perennial yield is the amount of water that can be withdrawn that does not exceed the sum of the natural and artificial recharge. The perennial yield of the Carson Desert Basin, which includes the Fallon Basalt aquifer is 2,500 acre-feet annually. The basalt aquifer receives most of its recharge from the Carson River and irrigation canals. However, due to frequent droughts these sources of recharge have been declining which would potentially lower groundwater levels. In addition, groundwater rights in the basin exceed the estimated annual recharge.

Despite the over-allocation of the Carson Desert groundwater basin and the variability of surface waters that recharge the Fallon aquifer, water depth analyses at the Tribal water treatment plant show that the aquifer water levels are stable. However, further monitoring and characterization of groundwater is recommended. Currently, the Tribe has 10 monitoring wells that are not being utilized. Monitoring of wells is important to document changes to water levels, monitor recharge rates, inform water planning and predict future supply. Water conservation is also an issue that needs to be addressed. Tribal members are currently charged a flat rate for water, which limits water conservation incentive and motivation. Metered water rates would better motivate the community to use less water and enhance conservation.

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Potential Adaptation Actions	• Locate and monitor groundwater wells for water levels and quality. • Model future water demands and groundwater supply to enhance management and planning of water resources. • Implement the Tribe's Drought Contingency Plan during periods of severe drought. • Implement water metering to provide water usage information. • Work with customers to adjust usage, conserve water, and detect leaks early. More data sharing educates customers and increases transparency in billing. • Promote water-efficient landscape and practices for homeowners. Most of tribal homes seem to have minimal landscaping. Other conservation practices would be to detect early leaks and prevent water use for livestock drinking.
Possible Partners and funding sources	• Indian Health Services • United States Geological Survey to assess aquifer conditions such as recharge sources and rate • EPA'S Creating Resilient Water Utilities Initiative • Climate Resilience Evaluation and Awareness Tool (CREAT) for risk assessment application

Table III.6 Proposed adaptation actions for drinking water and potential partners/funding sources for implementation.

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IV. Next Steps

Building climate resilience and adaptation capacity is critical to the conservation and protection of natural and cultural resources, stewardship of Tribal lands and the protection of public health. Strategies outlined in this plan need to be mainstreamed and incorporated into future work of responsible tribal departments and funding opportunities. Many of the actions and work outlined in this document are currently ongoing and need to be continued to ensure climate resilience and adaptation. New adaptation actions should be implemented by partnering with tribal departments and external agencies, and seeking grants that outline with the proposed actions. The BIA Tribal Resilience Grant, which funded the development of the FPST's Vulnerability Assessment and the Climate Change Adaptation Plan, also funds implementation projects related to climate change. The Environmental Protection Department will pursue this funding and other climate related grants as they become available. The Department recently received EPA'S Climate Pollution Reduction Grant, which will address greenhouse gas emissions responsible for climate change.

The Environmental Protection Department will continue to lead climate resilient efforts by seeking and applying for grant opportunities that align with the proposed adaptation actions. The Department will continue to provide community outreach and engagement related to climate change. The FPST Climate Change Adaptation Plan is a living document that be reviewed annually and updated as needed, to reflect tribal adaptation planning efforts.

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V. Acronyms

BIA: Bureau of Indian Affairs

BLM: Bureau of Land Management

BOR: Bureau of Reclamation

CREAT: Climate Resilience Evaluation and Awareness Tool

CWSD: Carson Water Subconservancy District

DOI: Department of Interior

EPA: Environmental Protection Agency

FPST: Fallon Paiute-Shoshone Tribe

HEPA: High efficiency particulate air (filter)

HUD: Housing and Urban Development

IAC: Intertribal Agricultural Council

NAWMS: National Association of Wetlands Managers

NDF: Nevada Department of Forestry

NDOA: Nevada Department of Agriculture

PM: Particulate Matter

SWE: Snow Water Equivalent

SWMA: Stillwater Wildlife Management Area

TCID: Truckee Carson Irrigation District

TNC: The Nature Conservancy

USGS: United States Geological Survey

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Appendix A: Community Adaptation Survey

The Environmental Protection Department in coordination with the EFC West conducted a community survey to get public input on climate adaptation on October, 2023. Community members were asked two questions: what changes have you been noticing and what should the Tribe do about the changes. The table below shows community responses to the questions.

What Changes have been noticing?	What should the Tribe do about it?
• Getting hotter	• Drive less, Bike More. • Go green by using less plastic bottles, paper mail and more. • Improve recycling.
• Weather is changing such as pine nuts are not as plentiful	• Plant more trees. • BLM should not let commercial companies take over.
• Winter was long last year	
• No Farming; we have water but nothings is being done	• Advertise non-Indian leasing for farming. • Use water to ensure water rights are not lost. • Increase Tribal council support for agriculture and community gardens • Use land for ranching. • Coordinate with other Tribes on agriculture such Washoe and Pyramid Tribes.
• Drought-Unable to grow crops	• Apply for more assistance to help with droughts.
• After the rains, a 2nd crop of weeds grows around homes.	• Housing removes weeds in subdivisions, and need to improve its operations especially during wet years.
• Winter is a month late	• The tribe should investigate and do research on changing season.
• Getting hotter	• The Tribe should plant more trees.
• It's colder sooner, we never used to have heatwaves	• Monitor and research changing temperatures.
• More fires and smoke	• Improve air quality for homes and provide air filters.
• Snowfall is higher in some years and causes floods	• Continue flood preparedness community events.
• Hot summers	• Be eco-friendlier; reduce paper use, go digital for more forms and Tribal information.

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• It's getting colder sooner	• Check on elders and provide more wood for heating
• Not as many clouds, less snow, less rabbits and wildlife	• Rain dances
• Seasons seemed to have flipped	• Consider Mother Earth; Recycle.
• Jets flying too low and often over the reservation	• Say no to NAS expansion
• Not enough water for plants	
• NAS expansion and flying over the reservation	
• Accepting land that we cannot develop	• Starting developing land.
• No more pheasants and horney toads	• Restore habitat for wildlife
• Seasons have changed	
• More chemical trails in the sky	• Stop NAS expansion
• My grandmother noticed sage and brush replaced lush meadow lands that were near her house in Yomba. Also Reese River used to have more flow.	• Save native plants and seeds • plant native plants
• Dirtier environment, the air isn't as clear	• Stop expanding • Look after elders and people as a whole
• Too many people move in; we are losing our beautiful desert.	
• More drought.	• Find and improve water resources and restore the environment.
• Unpredictable weather; more rain and snow this year.	• Food assistance for tribal members. • Build a shelter for women, children and elders.
• the dodder plant is taking over	• Remove dodder plant and other invasive plants

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Appendix B: Adaptation Actions List

Adaptation Action	Adaptation Action Type	Status	Responsible Department
Daily air assessments using air flags and air quality index	Community engagement and education	Ongoing, need to expand	Environmental Protection Department
Provide HEPA air filters to community buildings including the Community Learning Center and Senior Center	Mitigation	New	Emergency Management,
Provide HEPA air filters to seniors and low income families	Mitigation	New	Emergency Management,
Assist residents in maintaining proper air filtration in homes	Mitigation, infrastructure improvement	Ongoing, need to expand	Housing Department
Provide air quality and wildfire outreach and education to residents	Community engagement and education	Ongoing, need to expand	Environmental Protection Department
Establish building codes to tighten the building envelope and prevent pollutants infiltration into homes	Mitigation	New	Housing Department
Seek assistance from the BIA, Branch of Wildland Fire Management to develop a wetland management plan that includes fire prevention and management	Policy planning and land use	New	Land & Water Department, Environmental Protection Department

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Reduce hazardous fuel and fuel continuity through mechanical manipulation and prescribed fires where applicable	Operations and management	Ongoing, need to expand	Land and Water Department
Implement fire prevention measures such as no smoking, camp fire building and overnight camping in the wildland	Policy planning and land use	New	Land and Water Department
Monitor PM air pollution on Tribal land	Data information technology	Ongoing, need to expand	Environmental Protection Department
Develop a drought plan for agriculture land and ranges	Policy planning and land use	New	Land and Water Department
Model current and future agriculture and wetland water demand	Data information technology	New	Land and Water Department
Promote sustainable agriculture by researching the viability of low water crops and efficient agriculture and irrigation techniques	Operations and management, Community engagement and education	New	Land and Water Department, Environmental Protection Department
Maintain healthy soils through the application of regenerative agriculture, possible coordination with Intertribal Agricultural Council (IAC)	Operations and management, Community engagement and education	New	Land and Water Department
Provide support to farmers through informational material regarding drought support, regenerative and sustainable agriculture and water conservation	Community engagement and education	New	Land and Water Department

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Expand and improve water systems including reservoirs, canals and runoff ditches	Infrastructure improvement	Ongoing, need to expand	Land and Water Department
Range Improvements – Including Livestock Water Pipelines, water troughs and rotating range location	Infrastructure improvement	Ongoing	Land and Water Department
Continue monitoring water levels and quality in the wetlands	Management and operations, Data information	Ongoing	Environmental Protection Department, Land and Water Department
Creating a monitoring dashboard for water quality and levels to better manage and track water resources	Data information technology	New	Environmental Protection Department, Land and Water Department
Locate, remove and monitor invasive plant coverage in the wetlands	Operations and management	New	Land and Water Department, Environmental Protection Department
Locate, treat and monitor algae blooms in the wetlands	Management and operations	New	Environmental Protection Department, Land and Water Department
Protect and reestablish perennial plants including Indian rice grass, blue bunch wheatgrass, greasewood and sagebrush to reduce the risk of wildfires and invasive plants , and improve livestock forage and wildlife habitat	Management and operations	New	Land and Water Department, Environmental Protection Department

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Identify and monitor at-risk wildlife and plant species and develop recovery efforts	Management and operations	New	Land and Water Department, Environmental Protection Department
Develop, maintain, and support outreach programs regarding the critical importance of wetland conservation for proper hydrologic function of ecosystems as well as for wildlife conservation	Community engagement and outreach	Ongoing	Land and Water Department, Environmental Protection Department
Inform agricultural users of best fertilizing practices to reduce harmful runoff	Community engagement and outreach	New	Land and Water Department, Environmental Protection Department
Oppose and negotiate new proposals to divert water upstream from critical wetland sites	Management and operations	Ongoing	Land and Water Department
Seek assistance from the BIA and other available resources to develop a wetland management plan that includes fire mitigation and invasive plant management	Policy planning and land use	New	Land and Water Department, Environmental Department
Develop and update adaptive fire management plans, including periodic wetlands and landscape assessments and traditional landscape management practices to prevent high intensity wildfires (e.g. prescribed burning, introduction of resilient/native vegetation).	Policy planning and land use	New	Land and Water Department, Environmental Protection Department

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Establish building codes to cool homes such as cooling roofs and improved AC units	Infrastructure improvement	Ongoing, need to expand	Housing Department
Create a cooling center or designate an area for cooling to assist homeowners with inadequate cooling systems	Infrastructure improvement	Currently the Tribal gym is used as cooling center, need to expand	Emergency Management
Provide AC units assistance to homeowners	Mitigation	New	Housing Department
Provide outreach on heatwaves, their health impacts and actions to take when heatwaves occur	Community engagement and outreach	Ongoing	Tribal Health Clinic, Emergency Management, Environmental Protection Department
Create an early warning system to inform the community of heatwaves occurrence	Community engagement and outreach	Ongoing	Emergency Management, Tribal Health Clinic
Create a year-round mosquito and invasive plant control staff position	Management and Operations	New	Environmental Protection Department, Land and Water Department
Provide adequate water in the wetlands for plants and wildlife	Management and operations	Ongoing	Land and Water Department
Locate and monitor cultural sites	Management and operations	Ongoing	Tribal Historical Preservation Office
Develop co-stewardship management of culturally important public land with	Management and operations	New	Tribal Historical Preservation Office

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BLM and DOI and other responsible federal/state agencies			
Create a resilience garden greenhouse to grow culturally important plants, pine seedlings and educate the community and youth on the importance and uses of cultural plants	Management and operations, Community engagement and outreach	New	Tribal Historical Preservation Office, Environmental Protection Department
Re-plant Pinyon pine seedlings after wildfires using seedlings from the resilience garden greenhouse	Mitigation, Management and Operations	New	Tribal Historical Preservation Office, Environmental Protection Department
Assess and monitor the health of Pinyon pine forests including important pine gathering locations	Management and operations	New	Tribal Historical Preservation Office, Environmental Protection Department
Locate and monitor groundwater wells for water levels and quality	Management and operations	Ongoing, need to expand	Public Works Department, Environmental Protection Department
Model future water demands and groundwater supply to inform planning and management of water resources	Data information	New	Public Works
Implement the Tribal Drought Contingency Plan	Policy planning and land use	Completed	Public Works
Implement water metering to provide water usage information, work with customers to adjust usage, conserve water and detect leaks	Infrastructure improvement, Policy planning	New	Public Works Department

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Promote water-efficient landscapes and practices for homeowners	Community engagement and outreach	Ongoing	Public Works Department, Housing Department

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