



## IMPACTS OF CLIMATE CHANGE ON THE NORTH FORK RANCHERIA OF MONO INDIANS OF CALIFORNIA

*Elevated day and nighttime temperatures, drought, wildfire, and flooding due to increasingly variable precipitation patterns are threatening the physical, cultural, and spiritual health of the Tribe, its habitats and ecosystems, and its built environment.*

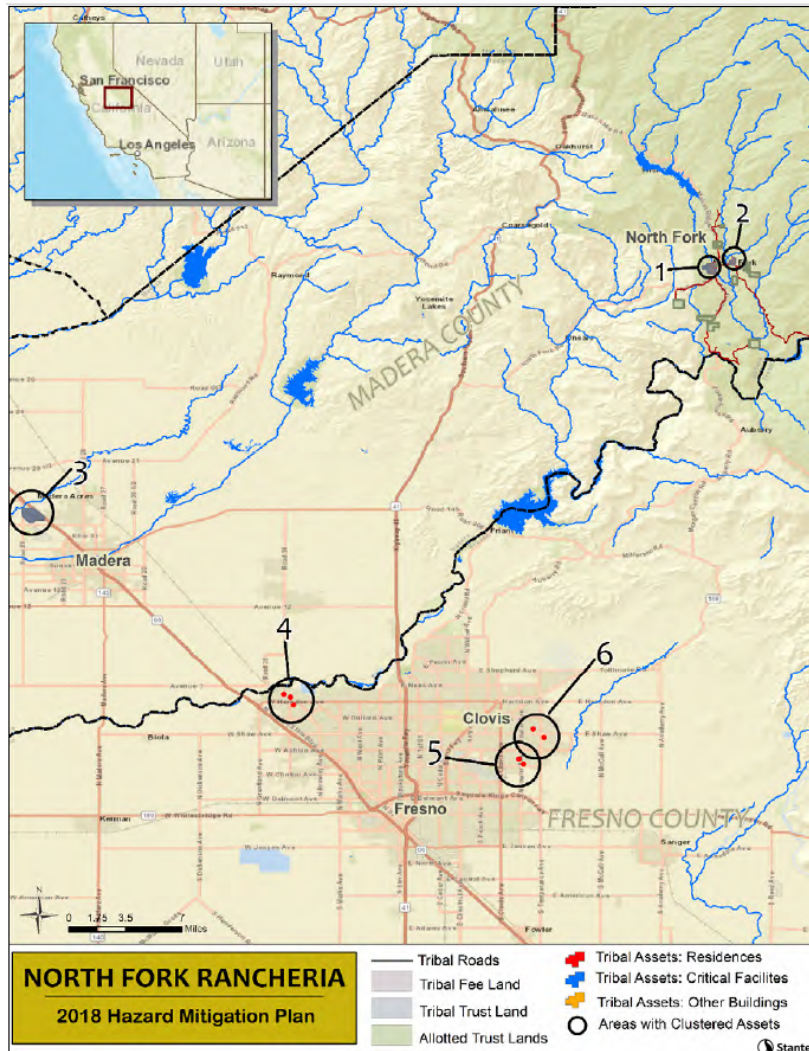
### Background

The North Fork Rancheria of Mono Indians of California (NFR) is a federally recognized Tribe currently located in Madera County, California. The North Fork Rancheria lies in the foothills of the Sierra Nevada Mountains, along the Sierra Vista National Scenic Byway. The Rancheria lies less than 40 miles from Fresno, California. The Western Mono have resided in the San Joaquin Valley for thousands of years (NFRMIC, 2018).

However, after non-native encroachment of historical lands, the Tribe's ancestors concentrated around the town of North Fork, from which the Tribe's name was derived (Tatum, 2006). Inter-marriage with other local Tribes occurred and sharing of the land and its resources was important for all the Tribes. Western Mono language is part of the Uto-Aztecan language family and is most similar to the Paiute-Shoshone languages.

The Tribe has 2,310 citizens nationwide, with the majority residing in Fresno and Madera Counties, making them one of California's largest native Tribes (NFRMIC, 2018).

**Figure 1. Current North Fork Rancheria Lands and assets**

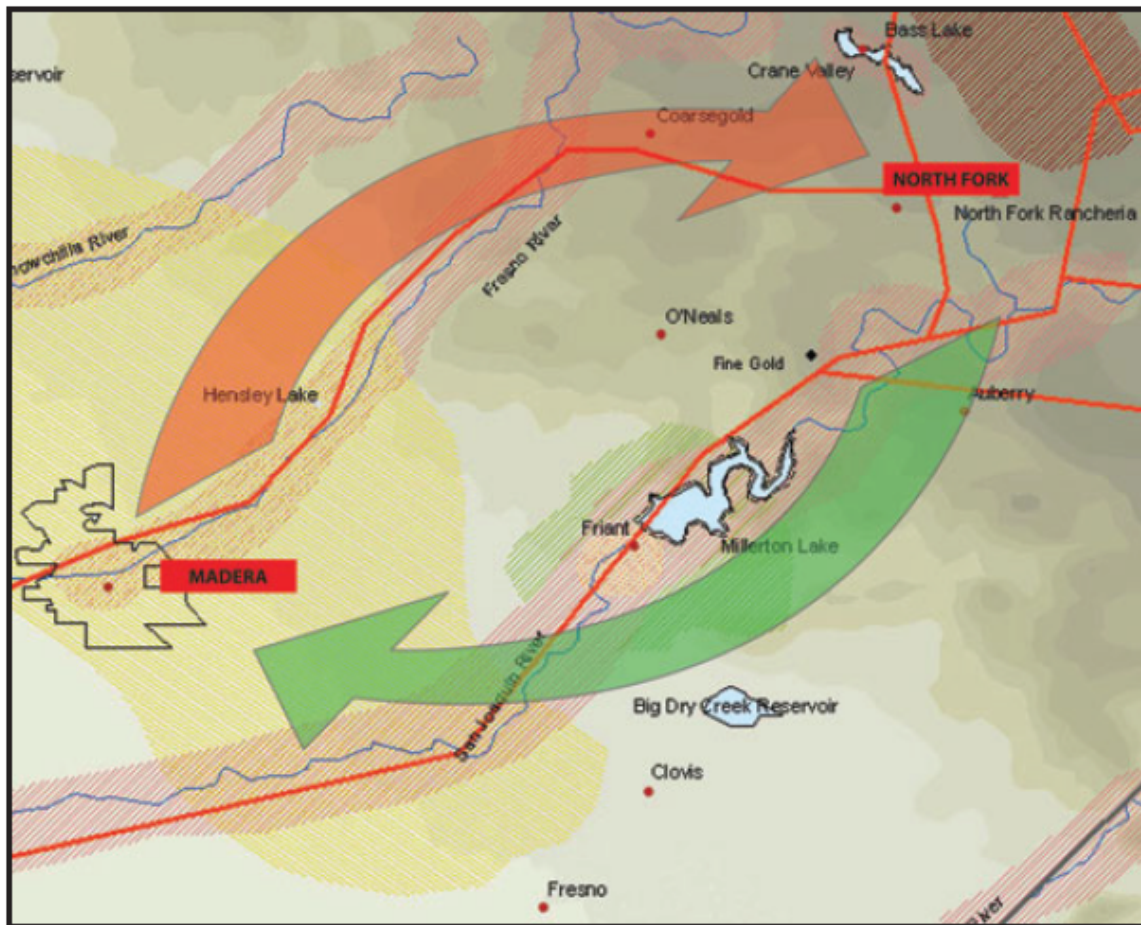


Source: NFRMIC, 2018



The first reservation lands were allotted in 1851 but failed treaty ratifications resulted in the closure of the reservation in 1860 (NFRMIC, 2006). Traditionally, the North Fork Mono travelled between the foothills of the Sierra Nevada and the San Joaquin Valley (Figure 2).

**Figure 2. The North Fork Tribe migrated from the foothills down to the Valley for hunting and fishing and worked with other Tribes along the way.**



Source: Tatum, 2006

The Tribe also traded throughout the Eastern side of the Sierras and have trail systems that go to Bishop, Yosemite, Mono Lake and through the Pacheco pass. Travel was vital for traditional hunting and gathering, ceremonies, and for trade with other Tribes creating a complex interdependent system of social, political, and economic ties between groups (NFRMIC, 2006). Historically, the weather in the foothills was more hospitable for permanent residence due to the severe heat, drought, and flooding in the Valley. In the Valley, the Mono hunted for large game like elk and antelope, fished for salmon, and gathered roots of the sedge plant found along the riverbanks on the Valley floor (Tatum, 2006). In contrast, in the foothills the Tribe had access to acorns from Black Oak trees, a staple for the North Fork Mono as their acorns made better flour than



those from oak trees found closer to the Valley. Federal recognition as an Indian Tribe was restored in 1983 under a court-approved settlement, and the Tribe subsequently elected a governing body and adopted a Tribal Constitution in 1996. Today, tribal leadership consists of five elected members of the Tribe's citizenry who serve four-year terms elected on a two-year staggered basis. The 80-acre Rancheria is held in trust for descendants of one Mono family; therefore, the Tribe is considered 'landless' and has had to purchase land for its people.

### ***Cultural and Spiritual Health***

The wellness of the tribal people is tied to the lands from which the Tribe is from. The water, plants, soil, air, minerals, and other resources provide a connection to the landscape that is not easy to convey in written form. An example would be when a weaver gathers material for a baby basket, they must know where to go for materials, that material must grow in the right conditions, have plenty of water, and once cleaned and ready to use the weaver can be overcome with a feeling of reflection and relaxation as they weave the basket for a child.

### ***Climate Change and Its Impacts***

Unless otherwise stated, the *North Fork Rancheria Tribal Multi-Hazard Mitigation Plan* (NFRMIC, 2018) is the basis for the information below.

#### Elevated Temperatures

The North Fork have experienced warming temperatures across both the winter and summer months. In general, the area experiences both cold winters with temperatures below freezing as well as hot summers where temperatures exceed 100°F. However, accelerated warming over the last decade has contributed to warmer winters and hotter summers, which has impacted both the health of tribal citizens and the plant and animal resources on which they rely.

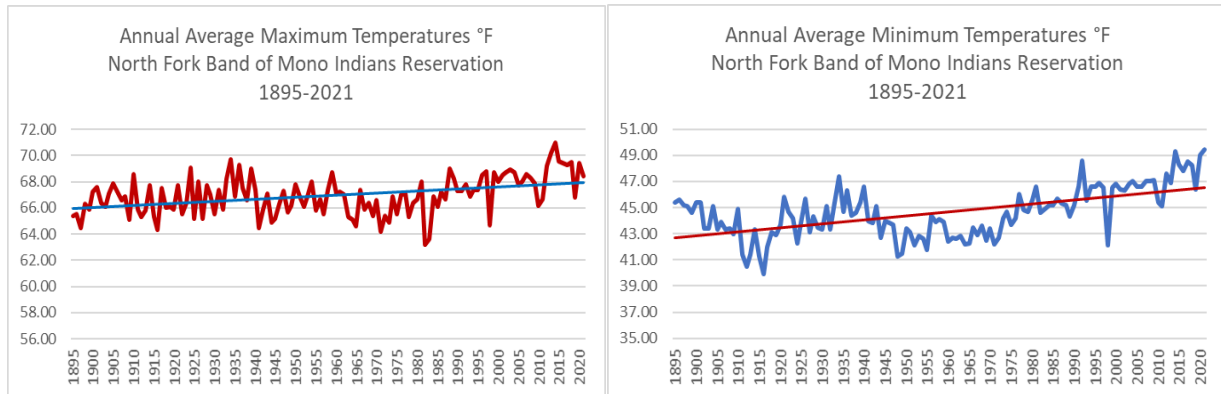
#### ***What does this indicator show?***

At North Fork, both the nighttime temperatures and daytime temperatures have risen steadily since 1895. Looking first to daytime temperatures (Figure 3) we can see that temperatures have remained within 8°F but that the average temperature currently sits at around 68°F. However, in more recent years the temperature has varied more extremely with sharp increases and decreases from 1995 to 2021 (PRISM, 2022). Looking next to nighttime temperatures (Figure 4), we can see that temperatures cover a range of about 10°F, with temperatures remaining consistently above 45°F since 2001. Currently, the annual average minimum temperature is around 48°F. Overall, nighttime temperatures have increased at a much faster rate when compared to daytime temperatures over the last century, at 5°F compared to 2°F.





**Figures 3 and 4. Annual Average Minimum and Maximum temperatures at North Fork Rancheria 1895-2020**



Source: PRISM, 2022

Why is this indicator important?

Changing temperatures have cascading effects on other climatic variables, like precipitation, drought, and wildfires, further impacting the Tribe. Particularly important to the Tribe has been the decrease in acorn availability. The Tribe on the western side of the Sierra Mountains has depended heavily on acorn as a staple food for thousands of years. However, warming temperatures have decreased acorn availability especially during the drought between 2014 and 2016. During seasons when acorns are plentiful, the health of wildlife in the area benefits as well (McDonald, 2020).

As the climate has changed, the North Fork Rancheria has had to contend with a wide range of pests, disease, and non-native species (NFRMIC, 2018). Warming temperatures and extreme heat events contribute to drought stress on trees. The Tribe has observed instances of tree mortality over the last six to seven years, due to the combined effects of drought and bark beetles (McDonald, 2020). As water competition increases, trees become weakened, thus contributing to susceptibility to bark beetles (Preisler *et al.*, 2017). The Tribe is concerned that Sudden Oak Death will become a problem in the area as the climate continues to change.

Warmer temperatures also negatively impact the health of Tribal Citizens. Ground ozone needs heat and sunlight to form, so hot temperatures have worsened air quality by exacerbating ground ozone levels. Data from CalEnviroScreen, California’s Environmental Justice Screening Tool, shows that ozone levels in North Fork are ranked in the 67<sup>th</sup> percentile compared to other areas across the state, meaning that North Fork has higher ozone levels than most of the communities in California (OEHHA, 2021). Vulnerable populations, especially children, the elderly, and the disabled are at the greatest risk of exposure to extreme heat. Those without air conditioning may be at higher risk (NFRMIC, 2018)

Drought

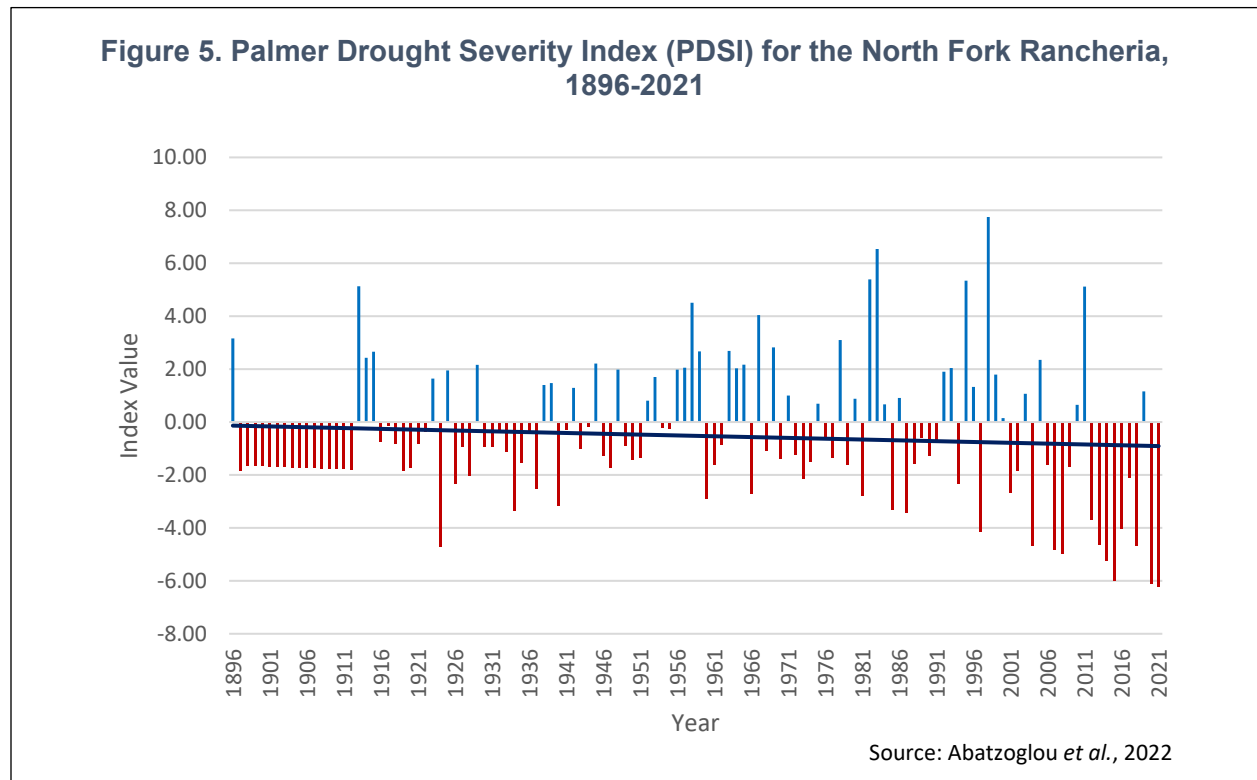
North Fork experiences clear wet and dry seasons, with the dry season lasting from mid-spring to late fall. Historically, the North Fork people have experienced multiple



instances of the destructive effects of drought including failed crops and changes to land-use patterns. Local hazard identification efforts have determined that drought conditions are to be expected across 10 to 50 percent of the North Fork area, with critical severity in terms of property damage, facility shut down, and injuries expected in the next year-ten years (Madera County, 2016).

**What does this indicator show?**

Using the Palmer Drought Severity Index (PDSI), a value of 0 indicates normal conditions while negative numbers represent drought conditions and positive numbers correspond to wet spells. Looking specifically the North Fork Rancheria, PDSI values show that the Tribe has experienced many instances of extreme drought since 2000 (Figure 5). Over those 21 years, there were nine years of extreme drought (PDSI values below -4) and three years of moderate to severe drought (values between -2 and -3). While the Tribe did experience moderate drought in the 100 years prior, those droughts were milder. The Tribe is seeing a trend of increasingly severe droughts.



**Why is this indicator important?**

The increase in frequency and severity of drought conditions for the North Fork have important implications for surrounding wildlife and traditional cultural practices. Drought has reduced the availability of materials needed for basket-making, disrupting cultural traditions, and impacting the ability to pass on practices to younger generations (BPT, 2020; McDonald, 2020).



Drought conditions in the area have had significant impacts on tree mortality in the Sierra National Forest, causing large-scale die offs that are fueling other effects such as disease, pests, and wildfire events (Madera County, 2016). As mentioned in the *Elevated Temperatures* section, drought conditions and resulting water competition have made trees susceptible to bark beetle populations, contributing to the mortality observed. Fallen trees in the area have reduced the availability of mushrooms, an important food resource to the Tribe, which grow when forest soil is exposed to air. Along with a reduction in mushroom availability, tribal members also note that access to prime resource areas has been impacted by the abundance of fallen trees, which are blocking paths and access routes (McDonald, 2020).

Drought also impacts other native plants such as the sourberry, used both medicinally and for basketry, which require an ecosystem that is disappearing. Manzanita and Black Oak acorns, other species heavily utilized by Tribal Citizens, have also been negatively impacted by drought. Lack of water reduces the availability of berries and dries out the branches of plants, making them difficult to use for basketry. This can trigger negatively re-enforcing feedback loops where surrounding plants and animals relying on threatened species are unable to survive themselves. Deer herds in the area have been in decline for decades due to forest conditions and forest health. Deer are indicators of forest health; resources that the Tribe uses are also utilized by the deer. Dry conditions additionally facilitate the occurrence of wildfire events further impacting the health of populations and lands.

### Precipitation

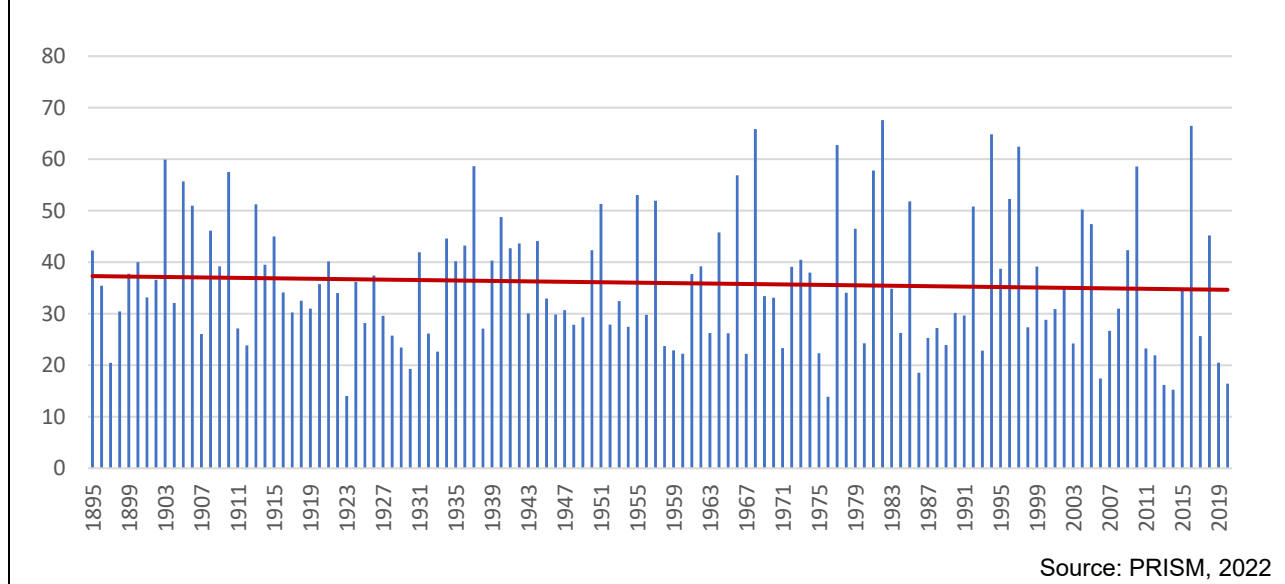
In addition to changing temperatures and instances of drought, the North Fork Rancheria has also experienced changes in precipitation patterns. Extreme precipitation events are expected to continue to impact the Tribe and the ensuing flooding can result in damages to property, roadways, and plant and animal species.

### **What does this indicator show?**

Precipitation in North Fork has become more variable over time (Figure 6). Since 2010, the Tribe has seen large-scale differences from year to year, differences which are expected to continue as the climate continues to warm overall. Additionally, not specifically highlighted in annual rainfall summaries are instances of intense rainfall, which can lead to flooding, as well as periods of prolonged dryness (i.e., drought).



**Figure 6 Annual precipitation by water year, North Fork Band of Mono Indians Reservation, 1895-2021**



**Why is this indicator important?**

Changing precipitation patterns have the potential to significantly increase flooding at North Fork. Further, warming temperatures lead to precipitation falling as rain rather than snow, which in turn impacts the volume and timing of snowmelt in the Sierra Nevada mountains, and the sudden onset of early springtime warm temperatures and subsequent snowmelt have the potential to increase flooding (NFRMIC, 2018). Past flooding events have led to mandatory evacuations and have closed roadways – impacting the health and safety of tribal members.

Decreases in precipitation have contributed to lower-than-normal creek flows (BPT, 2020). Tribal members are dependent on water systems, and a reduction in creek flows has limited tribal access to additional clean water. According to CalEnviroScreen, North Fork is ranked in the 97<sup>th</sup> percentile compared to other areas across the state for drinking water contamination (OEHHA, 2021). This means only 3 percent of communities in the state evaluated by CalEnviroScreen have worse drinking water contamination issues. Aquatic ecosystems have also been affected by changes in precipitation patterns. Reduced creek flows have triggered large scale fish die-offs. This is concerning not only for the health of the aquatic ecosystem, but also for the diet of tribal populations. Central California roach, hardhead, Sacramento pikeminnow, Sacramento hitch, Sacramento perch, and Sacramento tule perch are all culturally important species to the North Fork Mono and the Tribe has seen reductions in numbers due to the diminished quality of aquatic ecosystems (SWRCB, 2014).

Flooding has impacted the gathering of materials for the Tribe. Basketry material such as sedge can be inaccessible during periods of high water and can also be impacted by large flood events, as increased flows can dislodge the root systems. The roots of the



sedge are used for the basket material. Sedge is typically found in sandy areas, which tend to be prone to wash out in high flows.

### Wildfire

Wildfires are expected to increase in frequency and severity as the climate warms. Across the entire state, fire season has started earlier in the year and has expanded across more areas. For the Tribe, more frequent and intense fires have enormous consequences on both physical and cultural health and well-being.

### What does this indicator show?

Wildfires have had a significant impact of the North Fork Rancheria. Of the five largest fires (in terms of area), three have occurred in the last 20 years (Figure 7, Table 1). These fires, along with many smaller fires, have burned significant portions of North Fork lands and lands surrounding the Rancheria.

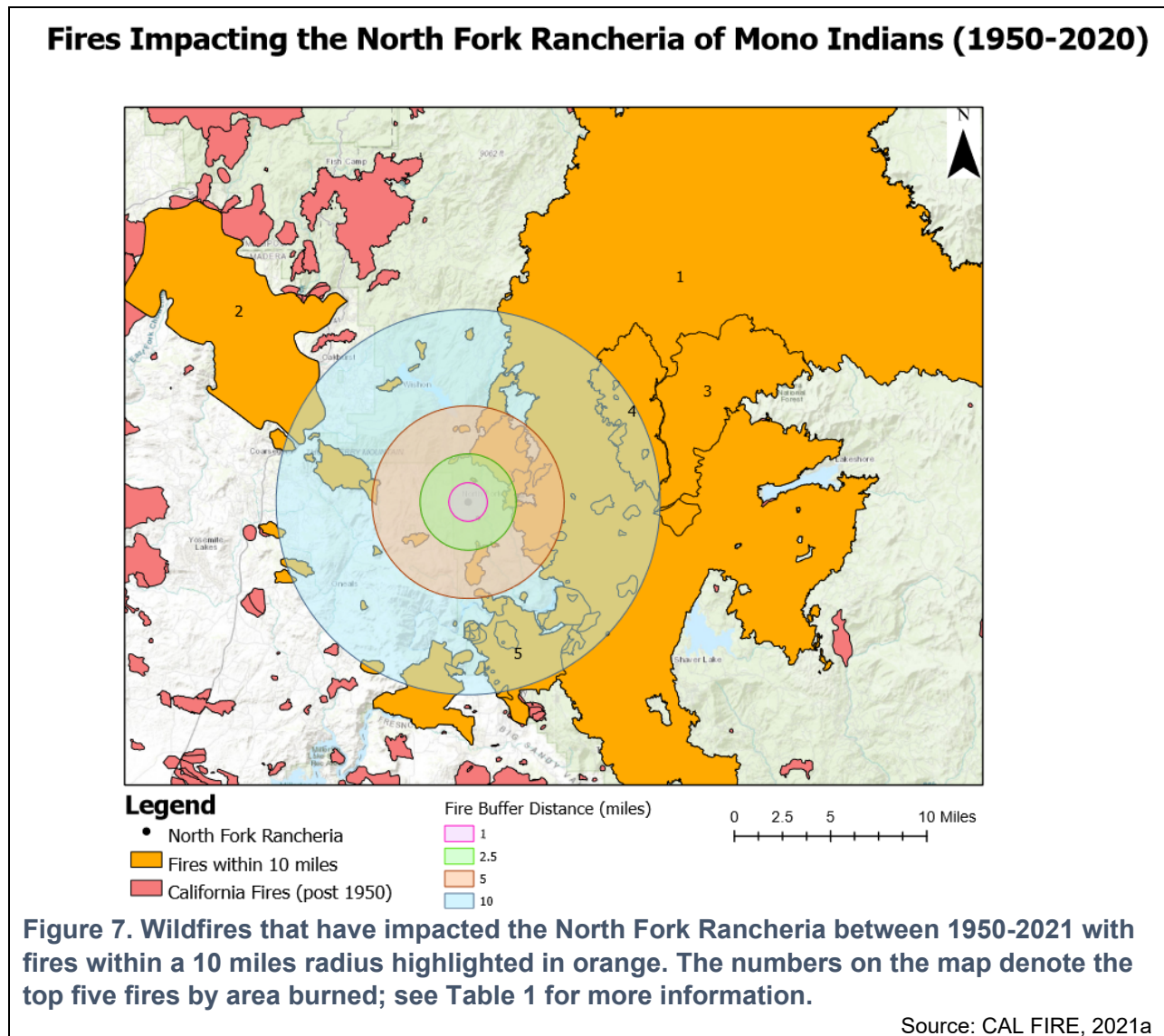




Table 1. Top 20 fires impacting the North Fork Rancheria of Mono Indians between 1961 and 2021, with the top 5 largest fires highlighted in blue.

RANK	YEAR	FIRE NAME	AREA (ACRES)
1	2020	CREEK	379,882
2	1961	HARLOW	43,331
3	2013	ASPEN	22,938
4	2014	FRENCH	13,832
5	1989	POWDERHOUSE	11,800
6	1982	TEMPERANCE FLAT	7,802
7	2015	WILLOW	5,701
8	2001	NORTH FORK	4,131
9	1968	THORNBERRY #2	3,131
10	1992	ITALIAN	2,157
11	1987	CHAWANAKEE	1,487
12	2017	MISSION	988
13	2015	CORRINE	922
14	1973	HORSESHOE	835
15	1985	MAMMOTH	764
16	1995	POWERHOUSE #2/#3	624
17	1970	LONG RIDGE	598
18	1961	MCALISTER FIRE	590
19	2005	QUARTZ	547
20	2003	NORTHFORK	472

Source: CAL FIRE, 2021b

In 2020 the Creek Fire – ranked the fifth largest wildfire in the state (CAL FIRE 2021a) -- devastated North Fork aboriginal territory. Of concern is the repeated burning of certain areas, as seen with the Creek Fire in 2020, the Aspen Fire in 2013 and French Fire in



2014 (Fires #1, #3 and #4 in Figure 7, Table 1). While it is uncommon for previously burned areas to re-burn, climatic changes are altering fire patterns that could influence the length of time between re-burns (Buma *et al.*, 2020). In total, there have been 73 fires within 10 miles of the North Fork Rancheria between 1950 and 2021. The loss of resources is severe, and it will take generations for the oak, pine, fir, and cedar to regrow.

### **Why is this indicator important?**

Surrounding wildfires have contributed to both poor air and water quality in the North Fork Rancheria. Air pollution from wildfire smoke can lead to negative health outcomes like asthma, cardiovascular disease, and premature mortality. Soil erosion and sediment runoff from areas that have lost vegetation due to fires can degrade local surface water quality. This deposition of sediment, along with soot, can impact aquatic life in local waterways (BPT, 2020). Culturally important sites like the Mono Hot Springs have also been impacted. The alkaline runoff from wildfire soot increases the pH of water and the smoke from the wildfires lowers the temperatures (De Graff *et al.*, 2018). On the North Fork Rancheria, fires have the potential to impact anywhere from 50-100 percent of the Tribe. Wildfires are likely to cause severe property damages, facility shutdowns, and injuries and illness (Madera County, 2016). Heavy rain, especially on wildfire-scarred land where the ground is unstable due to vegetation loss, can catalyze landslide events and severely threaten the health and safety of the surrounding community (NFRMIC, 2018).

The combined effects of multiple environmental stressors have been shown to directly impact wildfire events. Warming temperatures and drought conditions have exacerbated potential for wildfire (CAL FIRE, 2017). Drought and decreased snowpack have weakened trees, making them susceptible to disease and pest infestations; tree mortality in the Sierra National Forest has increased fuel loads, and thus the risk of wildfires (Madera County, 2016).

Another important consequence of increased frequency and intensity of fires across the state is the reduction in the number of days the Tribe can conduct cultural burning and fire ceremonies (BPT, 2020). For the North Fork Mono, regular burning encourages new growth of many species such as deer grass, sourberry and chapparal which are materials needed for basket-weaving. Since these plants are adapted to fire, after burning, the root stock remains intact and can resprout after spring rains. Due to long periods or dryness without regular prescribed burning, forests have become overgrown, causing conditions that could give rise to more extreme and dangerous fires. Additionally, vegetation management by Pacific Gas and Electric to remove brush and protect power lines has resulted in a loss of resources for the Tribe.

### **Summary**

Warming temperatures, drought, wildfires, increasingly variable rainfall – and ensuing floods and erosion – have impacted the people of the North Fork Band of Mono Indians and their environment. In addition to exposures to temperatures much warmer than they are acclimated to, these changes have altered and disrupted the ecosystems within and



around North Fork, impacting many species of cultural importance to the Tribe. The community is actively working to understand, adapt to, and mitigate the effects of climate change. With the Tribe's goal of being consistent, transparent, and honorable, the North Fork Band of Mono Indians continue to manage and protect their lands and limit the impact of climate change on the North Fork Tribe's right to hunt, fish, gather, and continue their cultural practices –activities that are integral to their cultural and psychosocial health, well-being, and livelihood.

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***Suggested citation:*** North Fork Rancheria of Mono Indians of California (2022). Impacts of Climate Change on the North Fork Rancheria of Mono Indians of California. In: OEHHA 2022 Indicators of Climate Change in California

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