

TOWN OF TRUCKEE

Community Primer



This document provides background information for participants in a series of workshops to identify climate change vulnerabilities and develop robust adaptation strategies.

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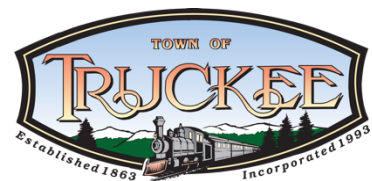


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EXECUTIVE SUMMARY

Residents of the Town of Truckee are closely linked to nature. Climate change threatens people, resources, and overall quality of life. As the Town of Truckee works to develop a Climate Change Adaptation Plan that will ensure long term resilience, it is important to identify the features and values that create Truckee's vibrant quality of life.

This overview of Truckee's basic community systems provides a snapshot of how the community and its surrounding area function. It is intended to support the climate change vulnerability assessment workshop process, and lead to robust strategies.

People and the Economy

- *Truckee's population of 16,561 is growing 0.4%/year*
- *78% of Truckee residents identify as non-Hispanic white and 18% identify as Hispanic or Latinx*
- *The largest employment sector is the food and service sector*
- *52% of housing is seasonal use*
- *Disadvantaged populations in Truckee include low-income neighborhoods, non-English speakers, people with disabilities, people without health care, and others*

Land, Air, and Nature

- *Climate change impacts ecosystem services, such as water filtration, fire protection, flood abatement, and others*
- *Climate change is increasing flood risk in the community*
- *Most of the community is at "Very High Risk" for wildfire*
- *Wildfire is an important natural part of the forested systems in which Truckee is located*
- *Air quality will worsen from heat, ozone and particulate matter*

Water and Energy

- *Truckee's groundwater is sustainably managed and expected to withstand more severe droughts*
- *Stormwater systems may not be sufficient with larger storms and rain-on-snow events*
- *Truckee's energy systems may be disrupted by more extreme storms and heat*

Cultural Resources

- *The Washoe (Wāšiw) are the original inhabitants of the Truckee area and Tahoe Basin*
- *Wāšiw people are working to revive their language/culture*
- *A primary goal of Wāšiw is presence and protection of traditional properties and resources in the region*

INTRODUCTION

The **Town of Truckee** is a highly desirable place to live. Tucked up high (5,817 ft.) in the Sierra Nevada mountains, Truckee has a strong sense of community, spectacular views, and diverse outdoor opportunities. This could change, however, as our world changes with climate change, population growth, development, and other stressors. As the Town of Truckee works to develop a Climate Change Adaptation Plan that will ensure long term resilience, it is important to identify the features and values that create Truckee's vibrant quality of life.

This primer provides an overview of some major characteristics of how Truckee currently functions. This information will help local community members to assess which people and resources are expected to be most vulnerable to climate change impacts. The next step after the Vulnerability Assessment will be to develop robust strategies to protect people and nature from climate change.

Whole Community Resilience – Climate change affects all people and natural resources throughout each community. Thus, it is important to develop strategies that work across different sectors, creating co-benefits and building new partnerships. Whole Community Resilience is a framework that ensures collaborative and cohesive solutions to climate impacts. Without Whole Community Resilience, many impacts are simply shifted from one population or sector to another, with under-represented populations often bearing the brunt of the impacts.

Whole Community solutions to climate change work collaboratively across five major systems: **Built** (buildings, roads, bridges, etc.), **Natural** (forests, rivers, wildlife, etc.), **Cultural** (Tribes, immigrant communities, local customs and historical practices), **Economic** (tourism, business, industry, etc.), and **Human** (mental and physical health, emergency response and preparedness, safety, education, etc.).

PEOPLE AND THE ECONOMY

POPULATION TRENDS

Truckee has a population of 16,561 (in 2018) and is the largest city in Nevada County. From 2010-2018, Truckee grew by 0.4% per year, on average. Truckee's population is projected to grow to 18,000-21,000 people by 2040.¹

About 78% of the population identifies as Non-Hispanic white. About 18% of the population is Hispanic or Latinx.

Other race or ethnic identities between 1-2% include Asian, black or African American, and mixed race.²



LABOR AND HOUSING

The largest employment sector in Truckee is the accommodation and food service sector, which provides about 22% of employment in town. Second is education, health care, and social assistance, at 21%. Also important is the construction and mining sector, which employs about 17% of the local labor force.²

Housing growth rates have kept up with population growth rates from 2010-2018. However, about 52% of the housing in Truckee is used for seasonal, recreational, or occasional use. Of the remaining housing, 3.5% is vacant (available for rent) which indicates a tight housing market, but still close to normal levels.¹

¹ Town of Truckee. 2019. Existing Conditions Report. Town of Truckee 2040 General Plan.

² U.S. Census Data - <https://www.census.gov/quickfacts/truckeetowncalifornia>

DISADVANTAGED POPULATIONS

Some populations are more likely to be exposed to environmental contaminants, experience serious impacts during natural disasters, and/or experience discrimination or a lack of opportunity that other groups have. These are considered disadvantaged populations, and these same groups are, unfortunately, likely to experience an inordinate share of impacts associated with climate change.

One neighborhood in Truckee qualifies as a low-income neighborhood, based on a median income that is 80% of the state median household level (Fig. 1). Other potentially disadvantaged populations include non-English speaking communities, people of color, people with disabilities, people without insurance, and many others. Among Truckee residents under the age of 65, 7.5% have a disability and 11.1% do not have health insurance.

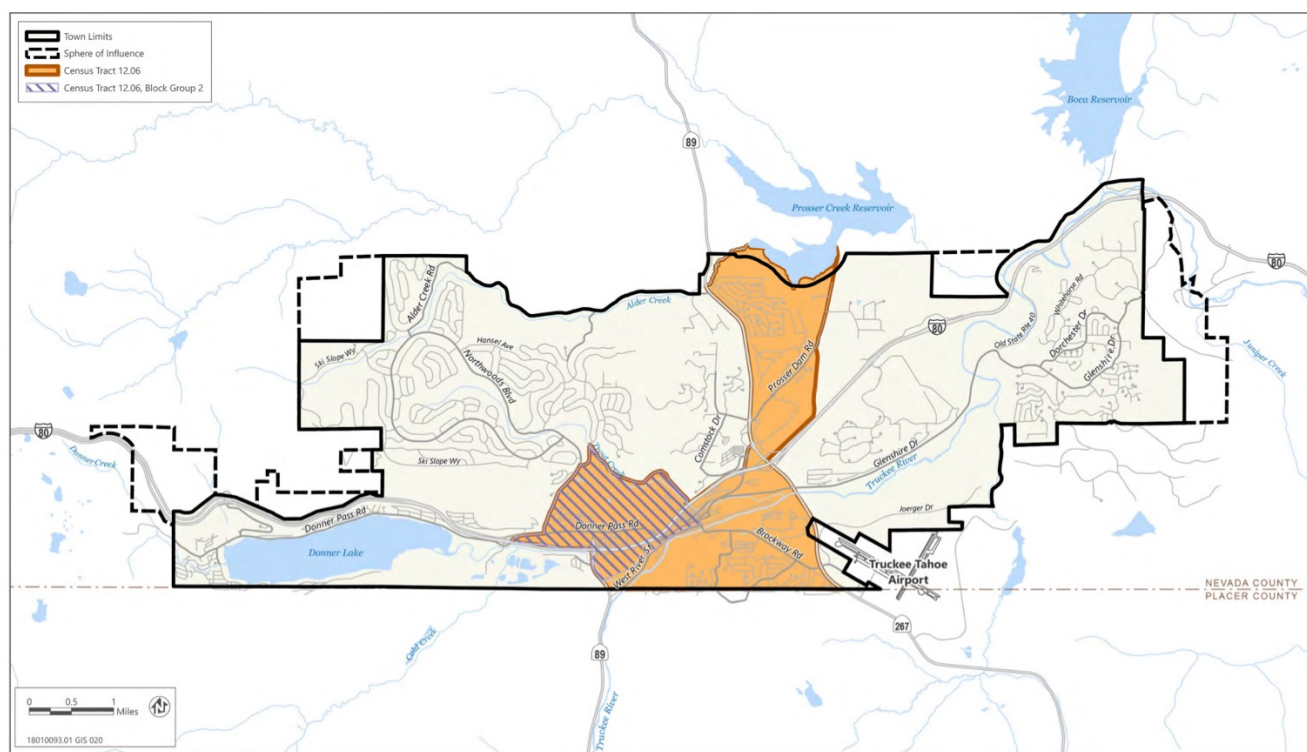


Figure 1. The area in Truckee (cross-hatched) where the median income falls below 80% of the statewide median household income. Graphic from the Town of Truckee 2019 Existing Conditions Report , created by Ascent Environmental.

LAND, AIR, AND NATURE

NATURAL SYSTEMS

The natural environment is incredibly important for Truckee. People choose to live, work, and travel to Truckee because of the spectacular surroundings and opportunities associated with the landscape, waterways, forests, fish, and wildlife.

Forests – Much of the mountainous landscape surrounding Truckee is forested public land, primarily the Tahoe National Forest. Common tree species include

ponderosa pine, Jeffrey pine, sugar pine, incense cedar, white fir, red fir,

Douglas fir, big leaf maple, and quaking aspen. Higher elevations are characterized by steep rocky slopes and granite peaks.

Forest management and health in the areas surrounding Truckee greatly affect the city and its residents. Forest pests, extreme wildfire, logging, erosion, and forests encroaching into meadows affect people's access to, safety, and

enjoyment of these public lands. As climate change progresses, these stressors are expected to worsen.

Waterways – The region is characterized by beautiful lakes and rivers that drain the melting snowpack from high peaks and mountains. The Truckee River originates at Lake Tahoe and flows more than 100 miles north and east into Nevada. Numerous other rivers and creeks act as tributaries.

These waterways are lined with wetlands, meadows, and riparian areas, which are vital

habitats for extremely high numbers of birds, insects, mammals, plants, and other species. Wetlands and riparian areas provide feeding grounds, nurseries, and refuges.

Rivers are expected to experience substantial change in the coming decades. Warmer conditions are leading to higher streamflow during some years, and significantly lower summer

One of the most important functions of natural systems is that they act as a buffer against the impacts of climate change

streamflow conditions as well. Both drought and flooding are becoming more common. Stream hydrographs are expected to shift as snowmelt occurs earlier and summers become drier.

Ecosystem Services – Natural systems provide services that protect us and provide resources. Some of the services that intact natural systems provide for Truckee include:

- *timber production*
- *water filtration*
- *water supply*
- *flood abatement*
- *pollinators*
- *lower fire risk*

Intact meadows and riparian areas act as sponges as the snowpack melts, holding water at higher elevations rather than allowing it to cause flooding downstream. Beaver dams also lead to flood abatement.

Increasingly, one of the most important functions of natural systems is that they buffer us against the impacts of climate change. Intact natural systems can reduce the impacts of extreme events, like floods, fire, and drought, on local communities. Forest and ecosystem management to maximize natural function is increasingly becoming a priority.



LAND USE

The Town of Truckee is situated in the river valley along the Truckee River, which flows through the middle of town. At lower elevations, forests are replaced by sagebrush and rolling hills and valleys. Donner Lake, which is within city limits, is a central feature to town.

Open space – Open space is a valued resource in Truckee, providing a visual and physical connection to the natural environment.³ Almost a quarter (24.4%) of Truckee’s land has been designated for open space, resource conservation, or recreation.

Similar to natural lands outside the city, natural lands and open space within city limits are increasingly being affected by climate change and will need to be managed for continued natural function. Some of the climate-related threats to parks and open spaces include pests that can affect tree canopy species, drought that weakens vegetation, floods and large storms that knock down trees and destroy landscaping, and overall climate shifts

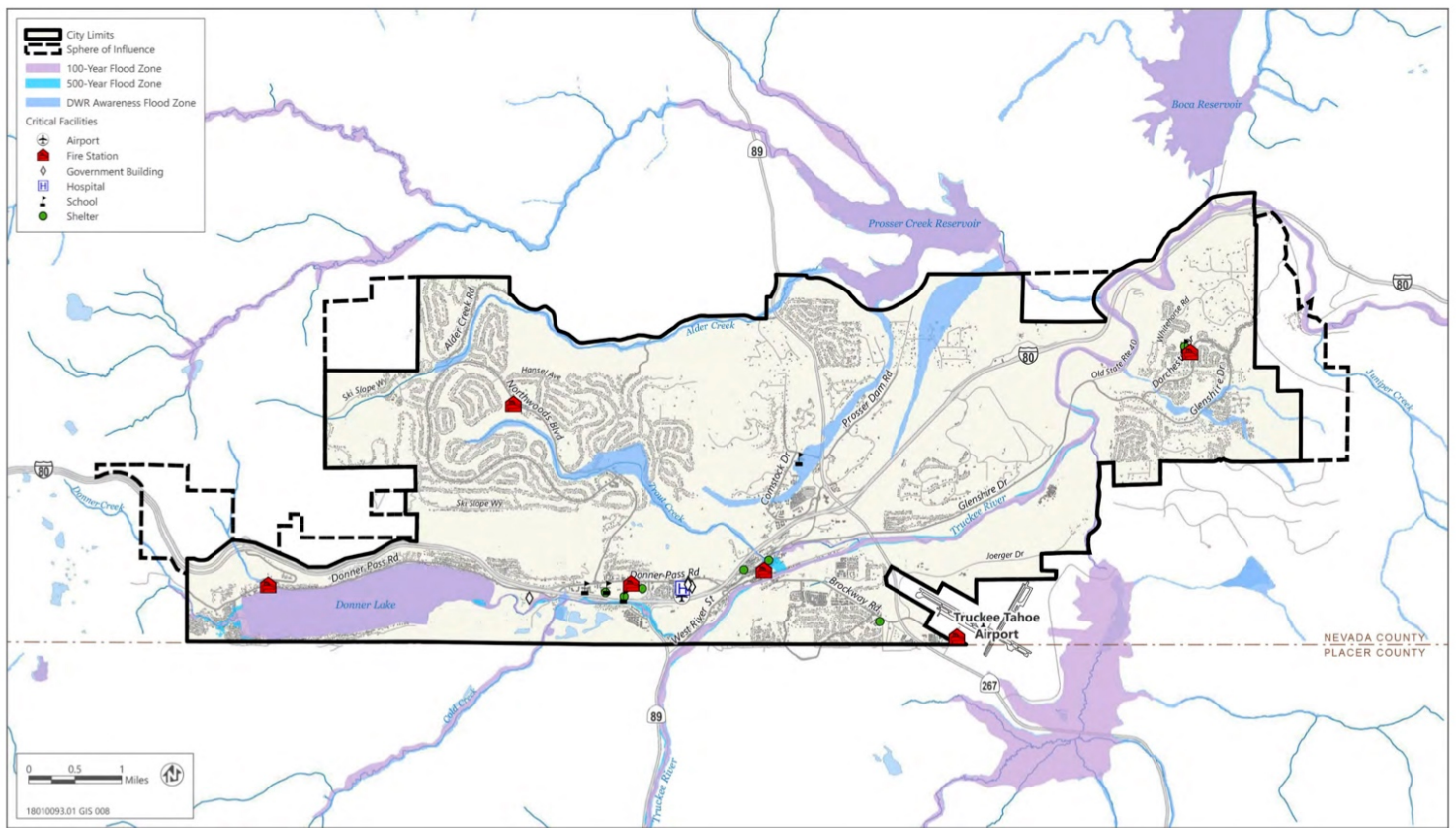
that make existing vegetation incompatible with the new climate conditions.

Flood risk – Approximately 193 acres within Truckee city boundaries are within the 100-year and 500-year flood plains. This includes 235 parcels and 549 people residing in these zones (Fig. 2).³

As climate change progresses, storms are expected to become larger, and rain-on-snow events more common, potentially increasing the likelihood of flooding. 100-year floods and 500-year floods could become 25-30 year floods, with even larger events to come. Flood risk is highest around Donner Lake Shore, Donner Creek, Lower Trout Creek, and Cold Creek.³

Additional flood risk comes from the Martis dam, one of the top six at-risk dams owned by the Army Corps of Engineers. Dam failure would inundate the town’s sewage treatment plant and cut off Glenshire subdivision.³ The risk of dam failure is increased post-fire, with increased runoff, erosion, and debris flow.

³ Town of Truckee. 2019. Existing Conditions Report. Town of Truckee 2040 General Plan.



Source: Data downloaded from Town of Truckee in 2018, FEMA in 2018, DWR in 2018

Figure 2. The areas in Truckee in the 100-year flood zone (purple) and 500-year flood zone (turquoise), as designated by FEMA. Graphic from the Town of Truckee 2019 Existing Conditions Report, created by Ascent Environmental.

WILDFIRE

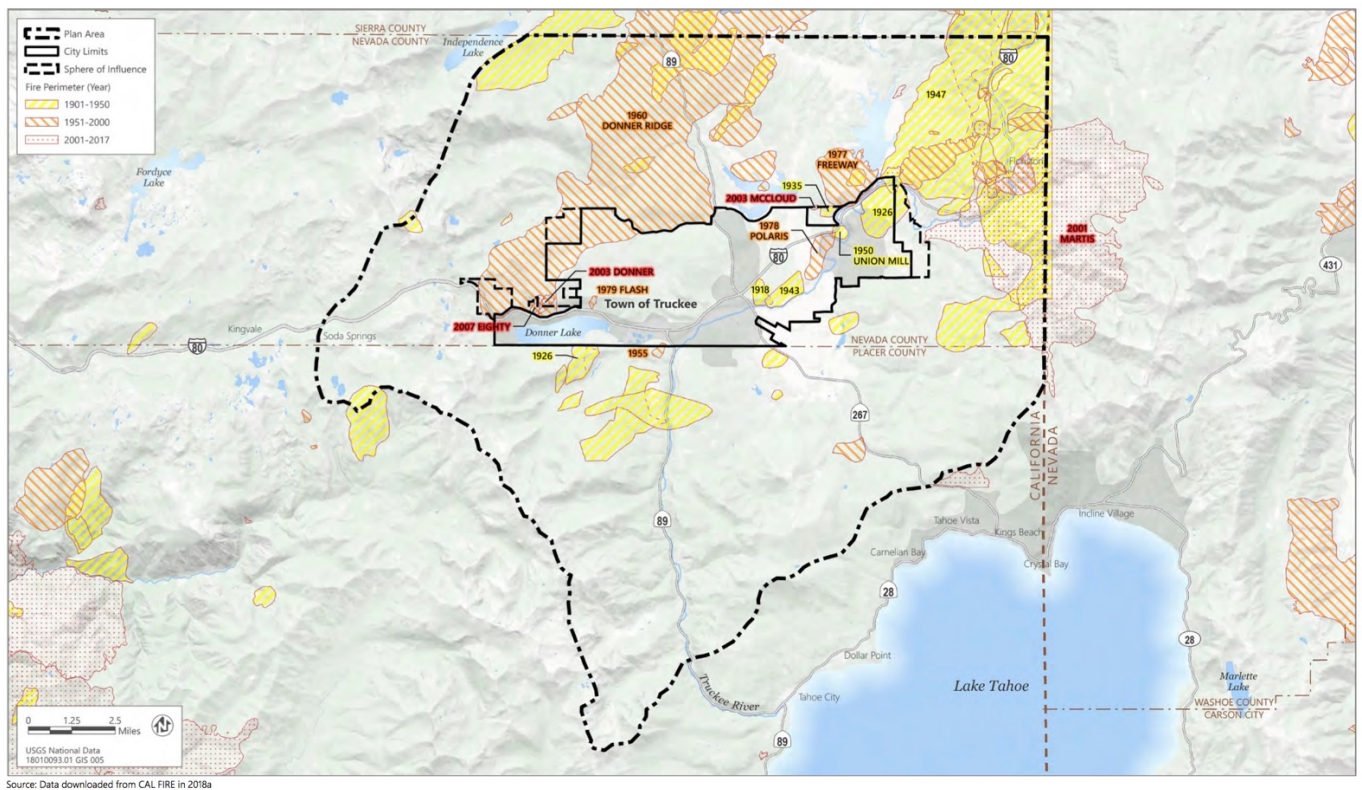
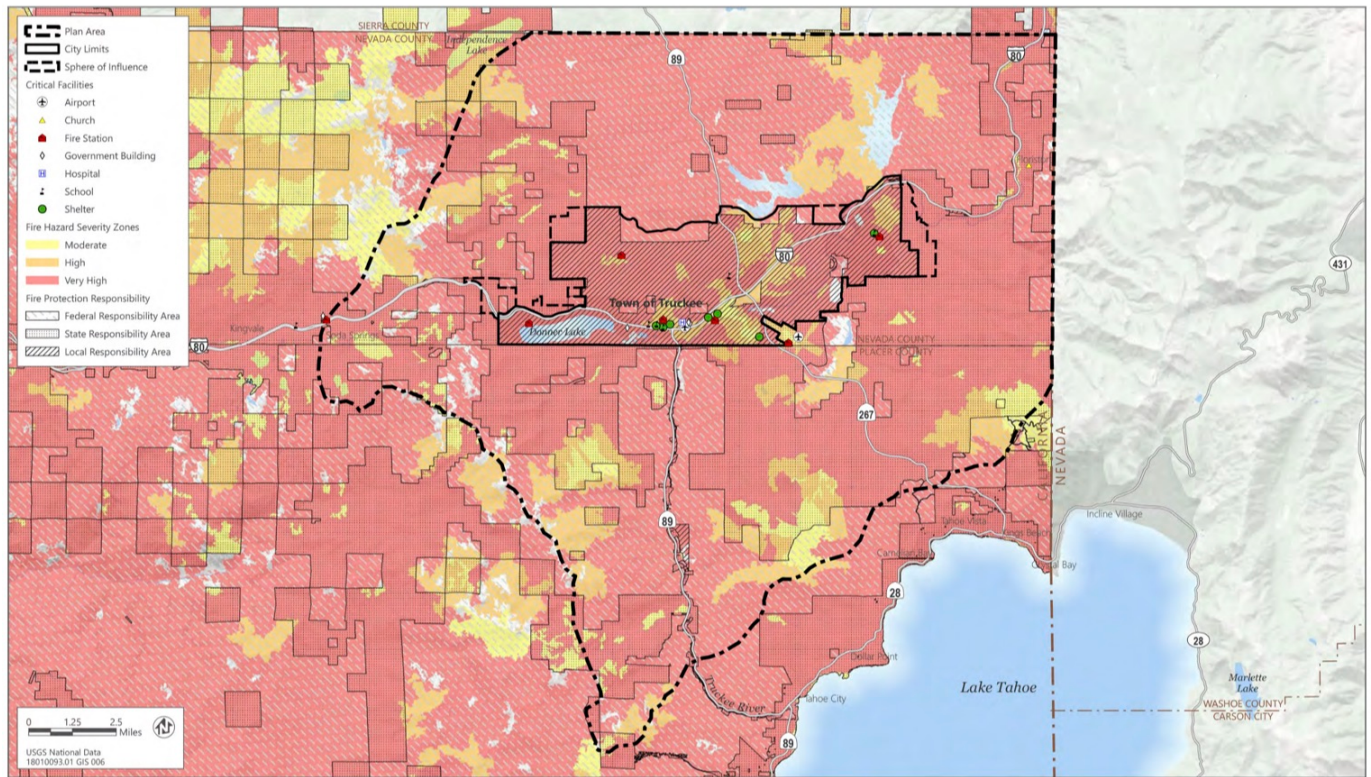
Wildfire is a landscape-level natural process that is integral to healthy forests of the Western U.S. And yet, when it crosses into local communities, it becomes a hazard. Thus, this discussion of wildfire is presented in two parts. The first is focused on wildfire as a hazard to the Town of Truckee. The second is focused on its changing role in western forests as climate change progresses.

Wildfire hazard in Truckee – The majority of Truckee parcels and infrastructure are located in a Very High Fire Hazard Severity Zone (Fig. 3), including emergency response infrastructure, schools, bridges,

government buildings, and other critical infrastructure. Major fires have been documented in Truckee throughout history, at least as early as 1940 (Fig. 4).

Within the Very High Fire Severity Zone, fire risk is increased by homeowners and renters who do not manage their vegetation. Because of the high proportion of renters, vacation homes, and second homes, many residences do not actively manage their vegetation. Continued development of the wildland-urban interface (WUI) will continue to increase this risk to infrastructure and peoples’ lives, including those of firefighters.

	PERCENT OF TOWN	ACRES
Very High Fire Hazard Severity Zone	80%	12,256
High Fire Hazard Severity Zone	18%	3,571
Moderate Fire Hazard Severity Zone	2%	495



Figures 3 and 4. Wildfire risk zones (top) and perimeters of historical fires (bottom) in Truckee and the surrounding area. Map from the Town of Truckee 2019 Existing Conditions Report, created by Ascent Environmental.

Wildfire as a natural process – Wildfire activity in the West has increased significantly, with longer fire seasons, more wildfire, and increased risk to homes and lives. Many factors influence fire risk, including a warming and drying climate, build-up of fuels, and expansion of the area where homes are embedded in wildland vegetation and landscapes.

To date, most of the efforts to reduce fire risk have focused on controlling (or suppressing) fires and controlling (or thinning) vegetation. However, more than 50% of the increase in fire risk has been attributed to climate change.⁴ In addition, a large percentage of wildfire occurs within the WUI, rather than across the forested landscape where thinning often takes place.⁵ In fact, only 3% of treated areas experience wildfire in the following decade.⁶

A paradigm shift is needed in order to effectively address the complexity of the risk associated with increasing wildfire

Often times, the thinning of forests is conducted in an attempt to return to a historical forest condition. However, as climate change continues to progress, returning to a historical state is unlikely to succeed, and is associated with continually increasing costs as the changing climate, more than fuels, increasingly drives fire activity.

As people continue to build and expand into the Wildland-Urban Interface

(WUI), fire risk will increase and compound the risk from climate change. Attempts to suppress fires, which have only had limited utility in the past, are likely to prove increasingly inadequate in protecting people and ecosystems.

A paradigm shift is needed in order to effectively address the complexity of the risk associated with increasing wildfire.

⁴ Abatzoglou, J. T. and A. P. Williams. 2016. Impact of anthropogenic climate change on wildfire across western U.S. forests. *Proceedings of the National Academy of Sciences* 113:11770-11775.

⁵ Martinuzzi, S. et al. 2015. The 2010 Wildland-Urban Interface of the

Conterminous US. U.S. Dept. of Agriculture, Forest Service. Northern Research Station, Newtown Square, PA.

⁶ Schoennagel, T. et al. 2017. Adapt to more wildfire in Western North American forests as climate changes. *PNAS* 114:4582-4590.

Adaptive resilience is a newly emerging concept in wildfire management.⁷

Adaptive resilience to wildfire means:

- *Recognizing the limited impact of past fuels management*
- *Acknowledging the important role of wildfire in Western forests*
- *Embracing new strategies to help human communities live with fire*

Actions associated with adaptive resilience would include:

- *Less fire suppression and more prescribed burns*
- *Targeting fuels treatments for previously logged lands*
- *Creating fire-adapted communities*
- *Fostering and embracing shifts in ecosystems*



Jim Bartlett BLM for USFS

⁷ Schoennagel, T. et al. 2017. Adapt to more wildfire in Western North

American forests as climate changes. PNAs 114:4582-4590.

AIR QUALITY

Truckee has moderate to good air quality overall. Emissions of many pollutants are declining throughout Nevada County, continuing the County's progress towards meeting state and federal air quality standards for ground level ozone.⁸

Cars and trucks are the largest contributors to emissions that lead to ozone

formation. Nevada County is designated a "non-attainment area" for air quality, and Truckee was threatened with non-attainment in the early 1990s. As population and vehicles increase throughout Nevada County and surrounding counties, it is likely that more smog and ozone will form.

One known effect of a warming climate is an increased rate of ozone formation with higher temperatures.⁹ This will make it more difficult to meet state and

federal standards, thereby requiring even more stringent cuts to emissions.

Increased levels of ground level ozone lead to respiratory and heart disease. They are also linked to asthma. Many people are more sensitive to poor air

quality, including infants, elders, and people with already compromised health.

By 2050, changes in wildfire could lead to a 40-50% increase in particulate matter, which can affect people far from its source

An additional risk to air quality comes from particulate matter released during wildfire. The area burned by wildfire is expected to increase dramatically in the 21st century. By 2050, changes in wildfire could lead to a 40%-50% increase in particulate matter, which can affect people far from its source.

Particulate pollution is linked to premature death, respiratory illnesses, and increased hospital visits.¹⁰

⁸ Town of Truckee. 2019. Existing Conditions Report. Town of Truckee 2040 General Plan.

⁹ Fann, N. et al. 2016. Chpt. 3. Air Quality Impacts. The Impacts of Climate Change on Human Health in the U.S.: A Scientific Assessment. U.S. Global Change Research Program. Wash. D.C.

¹⁰ Spraklen et al. 2009. Impacts of climate change from 2000-2050 on wildfire activity and carbonaceous aerosol concentrations in the Western US. Journal of Geophysical Research: Atmospheres 114:d20301.

ENERGY AND WATER

WATER

Truckee residents mostly receive water through the Truckee Donner Public Utility District, which provides service to town and adjacent unincorporated areas within Nevada and Placer Counties. The water comes from the Martis Valley Groundwater Basin, which encompasses 57 sq. miles within the Middle Truckee River Watershed. Recharge of the groundwater basin occurs during the winter, from snowmelt.

Sustainable yield of the aquifer has been estimated at 24,000 acre feet per year. In 2015, approximately 2,411 million gallons was pumped.¹¹ Total demand by 2035 is estimated at 4,217 million gallons per year, requiring additional production capacity. Even during several periods of drought, the utility has operated within sustainable yield for more than 25 years.

¹¹ Truckee Donner Public Utility District. 2015. Truckee Water System Urban Water Management Plan.

STORMWATER

The Town of Truckee Public Works Department maintains approximately 100 miles of drainage ditches and 15 miles of culverts. Ongoing maintenance and replacements allow for upgrades and improvements over time.¹⁰

As storms become larger with climate change, and rain-on-snow events become more likely, adjustments to stormwater infrastructure will need to be made.



ENERGY

Truckee Donner Public Utility District (TDPUD) Electric Department and Liberty Utilities deliver electricity to the Town of Truckee. Throughout the greater Truckee area, TDPUD serves about 13,000 customers. Liberty Utility serves another 49,000 customers in seven counties. TDPUD manages 133 miles of overhead and 82 miles of underground electrical distribution infrastructure. They receive their power from Utah Associated Municipal Power Systems, Western Area Power Administration, and Northern California Power Agency. Southwest Gas Corporation supplies natural gas to Truckee customers.

Climate change can affect energy systems in numerous ways, including affecting distribution, demand, and sourcing. Heat waves and severe storms can disrupt electrical transmission lines. Disruptions can be deadly, especially for elderly residents and people who cannot afford alternatives for heating or cooling.

As winters continue to warm and heating technology becomes more efficient, demand for natural gas for heating homes and buildings could to decline over time. Alternatively,

electrical use for air conditioning is expected to increase.

Truckee is dedicated to reducing greenhouse gas emissions and is exploring potential strategies for doing so. Because of the urgency for emissions reductions on an international scale, this will require both energy conservation (reducing demand) and substantial shifts in energy sources over the next few decades. Shifts from fossil fuels to renewable energy could occur at the local level, or at the utility level, which would have different impacts on the community as a whole.

One concern is that any disruptions to electrical production that affects pricing could impact lower income residents and other vulnerable populations.



CULTURAL RESOURCES

The Washoe (Wašiw) were original inhabitants of the land where Truckee is located. Truckee and the surrounding sub-basin falls within the center of Wašiw territory (Fig. 5), with primary use by the northern Wašiw.

Historically, small groups traveled through high mountain valleys collecting edible and medicinal roots, seeds and marsh plants. In the higher elevations, men hunted large game (mountain sheep, deer) and trapped smaller mammals. Cutthroat trout were an important staple. Semi-permanent Wašiw settlements were documented along the Truckee River between Donner and Martis creeks.

Declines in Wašiw population and traditional resource use were caused by incoming Euroamerican groups. Gold and silver explorers descended on the area, and quickly upended the lives of the Wašiw and led to many deaths. Logging and mining scarred the lands, while fish and wildlife disappeared from traditional hunting grounds.

For many decades, Wašiw language was outlawed. In the mid-1990s, a language

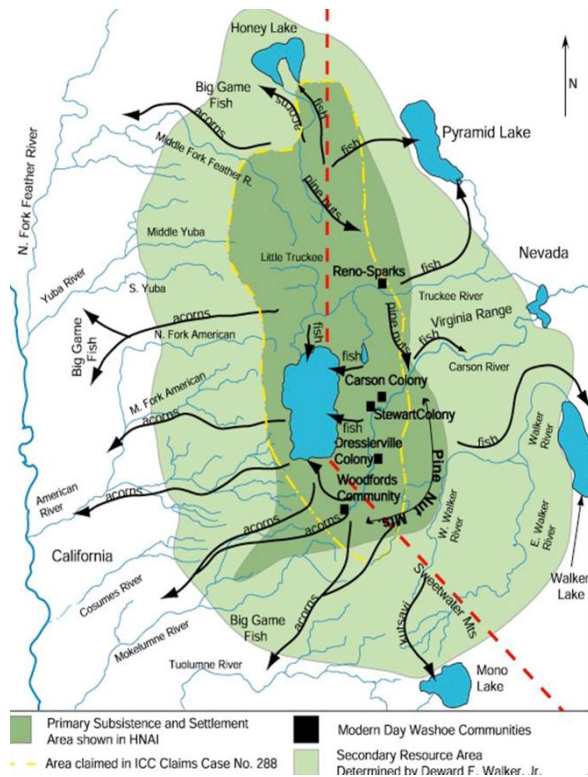


Figure 5. Primary and secondary resource areas used by the Washoe. (from Washoe Tribe website - www.washoetribe.us)

immersion school was opened to revive the language and culture.

In 1994 the Wašiw Tribal Council developed a Comprehensive Land Use Plan that includes goals of reestablishing a presence within the Tahoe Sierra and revitalizing Wašiw heritage and cultural knowledge, including the harvest and care of traditional plant resources and the protection of traditional properties within the cultural landscape.

CONCLUSIONS

Communities around the U.S. and world are working to develop strategies to address the impacts associated with climate change. Due to greenhouse gas emissions already released, current trends associated with larger and more extreme storms, droughts, and wildfires are expected to continue for many decades. If emissions are quickly reduced, however, many of the more extreme impacts can be avoided.

As Truckee prepares for significant changes to its surroundings and way-of-life, it will be important to increase protections of disadvantaged populations. Those who are on the front

lines for climate impacts have contributed the least to the problem.

Protecting natural systems is also vitally important. Not only do they create the character of Truckee, but they buffer us from direct climate change impacts.

Luckily, the solutions to climate change, which include renewable energy, more sustainable building and development practices, and increased environmental protections, have numerous benefits to both people and the natural environment we rely on. Robust climate change solutions are win-win strategies for the whole community.

