Impacts of Climate Change on the Karuk Tribe

Self-described as "fix the world people," the Karuk Tribe has relied on fire and ceremony to manage their lands since time immemorial. The threats of climate change, acting alongside non-climate factors, are an opportunity for the Tribe to return to traditional management, which includes the use of 22 key cultural indicator species to gauge ecosystem health and to guide appropriate action.

The Karuk Tribe is a federally recognized Tribe comprised of Karuk araráhih (upriver people) located along the Klamath River in the northwestern corner of the state, in what is known today as Humboldt and Siskiyou Counties. The Karuk Tribe is one of the largest tribes in California with 3,744 members and 5,271 descendants. With an aboriginal territory of over a million acres, the Karuk have lived in the mid-Klamath River region of northern California since time immemorial, co-evolving with the ecosystem. A rich and diverse cultural landscape was made possible through the Karuk Tribe's use of fire and ceremony (**Figure 1**).

Figure 1. Prescribed Burn in Orleans, CA.



Aja Conrad of the Karuk Tribe Environmental Workforce Development & Internships Division Coordinator uses a drip torch to light a prescribed burn in Orleans, CA.

Source: Photo by Jenny Staats

Against a backdrop of stresses created by non-native land management policies and ways of understanding the world – including water diversions, dams and fire suppression – the Tribe has been experiencing the effects of climate change:

Warming temperatures

Air temperatures in Orleans, in the western part of the Tribe's territory, have shown a warming trend. Minimum temperatures, which occur at night, have risen at more than twice the rate of maximum temperatures.

Changing precipitation patterns

With warmer winter temperatures, precipitation falls as rain instead of snow. In the North Coast, the greatest loss of snow is occurring in the Klamath-Siskiyou Mountains.

Warming stream temperatures and decreasing flows

Declining flows in the Salmon and Klamath River, along with increasing stream temperatures adversely affect the habitat of aquatic species like salmon. Low summer base flows also favor conditions for toxic algal bloom conditions, increasing the risk of exposures to the liver toxin microcystin through contact with contaminated water, or consumption of food and water.

Increasing wildfires

The Klamath Basin has experienced more frequent, large-scale, high-severity intense fires in recent years as a result of climate change and increased fuel loads resulting from federal land management practices and the cessation of indigenous burning. While it is a historically fire-adapted system, large high-severity wildfires threaten many species, alter the habitat, and disrupt ecosystem dynamics. Large high-severity fires pose immediate health risks, and more pervasive physical and mental health impacts, while also impacting critical tribal infrastructure.

Pests, pathogens, and invasive species

Species invasions, pest and pathogen outbreaks and threats to forest health. Scotch broom, star thistle, Himalayan blackberry, and non-native grasses exacerbate fire

behavior. The fir engraver beetles associated with Shasta Red Fir mortality and the pathogen *Phytophthora ramorum,* which causes Sudden Oak Death, (not yet present in Karuk territory) are threatening forest health.

The Karuk Tribe has identified 22 focal species as “cultural indicators” to guide human responsibilities and necessary management actions in seven habitat zones that face distinct yet interconnected threats from climate change. Many are also used as food and medicine and serve spiritual roles. Examples include the púfpuuf (Pacific Giant Salamander), the yellow-breasted chat, and xáyviish (tanoak mushroom) (**Figure 2**).

Figure 2. Cultural Indicator Species.



Photos left to right: Púfpuuf, or Pacific Giant Salamander, camouflaging with its environment; the yellow-breasted chat; and xáyviish (tanoak mushroom).

Source: Karuk Climate Adaptation Plan

Púfpuuf (**Figure 2**) is recognized as a spiritual being who transformed into a salamander to monitor spring and creek water quality and quantity. The presence of púfpuuf is a sign of a healthy freshwater ecosystem. However, if púfpuuf is in peril, the system is on the verge of collapse, and fire is recommended to lower acutely high air and water temperatures.

Nesting and breeding behavior of certain migratory birds as well as the setting of the constellation Pleiades are cultural indicators that it is time to stop burning in the Karuk Aboriginal Territory. Xáyviish (tanoak mushroom, right) is prized as a traditional food and medicine and its abundant presence indicates treatment success from the standpoint of soil impacts and host tree retention.

Access to an intact natural environment and participation in one's culture are widely recognized by Karuk as vital for psychological well-being. Cultivating, harvesting, processing, preserving and consuming traditional foods and medicines provide the framework for the Karuk eco-cultural socialization process and religious beliefs. Climate change poses a threat to that framework and subsequently, risk to tribal members' health and well-being.

Self-described as "fix the world people," the Karuk continue ceremonies that restore balance and renew the world. The climate crisis presents an opportunity for the Tribe to return traditional management practices to the landscape management centered on Karuk culture, identity, spirituality, and mental and physical health. These practices will provide tools for collective ecosystem survival and return humans to their vital role as its caretakers. For more information, visit: https://karuktribeclimatechangeprojects.wordpress.com/climate-adaptation-plan/ or www.karuk.us

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