

Fire at Bushy Lake

On June 6, 2021, a wildfire began at approximately 2pm, just one hour after Bushy Lake team members completed turtle catch-and-release research (*Figure 1*). Everyone was safe, however the fire spread to burn 60% of the entire site (*Figure 2*). All of the reference restoration plots, pre-existing turtle nests in the fire footprint, and critical turtle nesting habitat were burned. These initial impacts were devastating for Bushy Lake team members and CSU Sacramento students and faculty.

For the past five years, our hypothesis and guidance for conducting eco-cultural restoration is that culturally significant native plants have been adapted to fire through thousands of years of Traditional Fire Management by Nissenan, Mewuk, and Maidu native communities. The 2021 fire provides us the opportunity to test our hypothesis on fire resiliency, and to determine which species are coming back naturally after fire. The silver lining to the wildfire cloud is the gift of providing us many learning opportunities to develop a restoration plan for a fire-resilient and culturally important landscape.



Figure 1. Male Northwestern Pond Turtle (Actinemys marmorata marmorata) during catch-and-release studies on June 6, 2021 one hour prior to the fire beginning (pictured by Alexandra von Ehrenkrook)

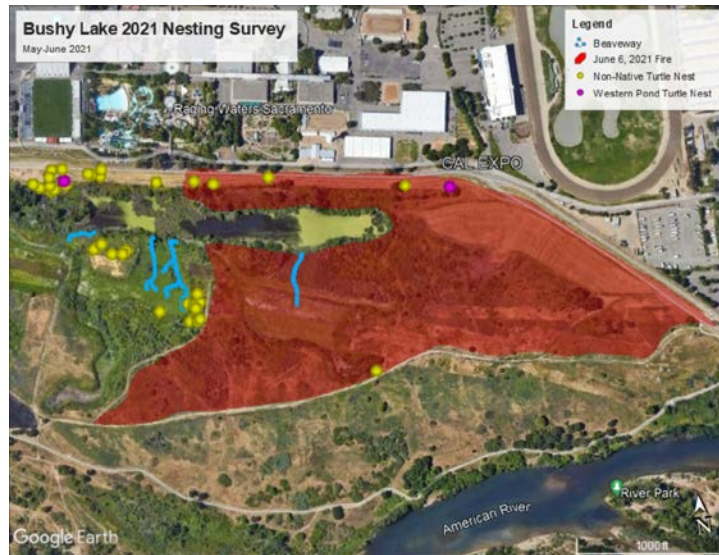


Figure 2. The June 6, 2021 fire footprint and non-native and native Western Pond Turtle nests observed during 2021 nesting surveys

Impacts on the In Situ Pilot Restoration

Sacramento State faculty and students have been conducting experimental plantings of fire resilient and culturally important native vegetation for the past five years. Over 600 students and community volunteers have been involved in planting, weeding, watering, and conducting experiments with the plants at the site. The wildfire destroyed the entire restoration effort. Previous fires occurred in 2014 and 2016. The 2014 fire destroyed the entire site, prompting the beginning of restoration efforts through the Earth Stewardship Initiative. The 2016 fire was stopped outside of the experimental area, preserving the previous restoration studies.

The June 6, 2021 fire burned the entire on-site reference restoration area, extending from the eastern access road complete to the wetted perimeter of Bushy Lake. The entire project area was burned (Figure 3). Fortunately, we have 5 years of data to inform the Conceptual Restoration Plan, from 2015 to 2021. We will use this data to inform the recruitment of native vegetation, redesign and implement native revegetation, and monitor natural revegetation.

We are happy to be observing culturally significant native species coming back naturally to the site within just three months of the June 6, 2021 fire. Plants we have observed include mugwort (*Artemisia douglasiana*), willow (*Salix species*), California grape (*Vitis californica*), elderberry (*Sambucus nigra subsp. caerulea*), gumweed (*Grindelia camporum*), and white root (*Carex barbarae*). This provides an opportunity to test the fire resiliency of this plant palette design, which has utilized native plants adapted to Native Californian Traditional Fire Management (Stevens 2020, Zedler and Stevens 2018). As we move forward in revegetation monitoring and replanting when winter rains begin, we intend to continue working with culturally significant plant species and request advice from local Native American tribes. One goal is to have a site available for gathering. Native American cultural knowledge and ethnobotany is foundational to the Bushy Lake restoration project.



Figure 3. Pilot restoration sites of culturally-significant vegetation on the east side of Bushy Lake planted by team members, California State University Sacramento students and faculty, and volunteers since 2014 (pictured by Kathleen Colima)

Impacts on Bushy Lake Turtles

In 2021, we began turtle nesting surveys. Turtles travel into the uplands for nesting in late May and throughout June (Alvarez, 2020). Nesting surveys at Bushy Lake were performed daily from May 20 through July 1 however, the fire impacted our sampling efforts and the nesting turtles. The fire occurred on June 6, at a time when we were observing considerable turtle nesting activity (*Figure 4*). Based on the literature and previous surveys, the fire occurred as turtle nesting activity began to peak. Nests within the fire footprint all burned (*Figure 5*), and large areas of prime nesting habitat were burned, leaving only a few unburned locations of habitat with the potential for viable new nests. Jeff Alvarez suggested that the ash covered areas may not be an appropriate nesting substrate, and if a turtle did nest, the hatchlings and post-emergent turtles may not survive.



Figure 4. Turtle nest covered with wire screen to keep out predators and protect hatchlings (pictured by Alexandra von Ehrenkrook)



Figure 5. Burned and predated turtle nest discovered post-fire (pictured by Michelle Stevens)

It was really disappointing; we were geared up to put screens over successful nests to protect eggs and hatchlings from predators. Our intention was to determine when hatchlings begin to leave the nest, and to attempt to create an in situ “nursery” to increase fitness for any Northwestern Pond Turtle nests. After the fire, there were no turtle nests in the burned area and the turtle nesting activity and observations decreased significantly. We will continue monthly trapping, visual encounter surveys, and nesting surveys after brumation in spring 2022 and throughout 2022.

The June 6, 2021 fire has provided an excellent opportunity to test fire resiliency and post-fire regeneration on turtle nesting and fitness. By burning the dense weedy material, turtles may have better nesting habitat in 2021. We are extending the data collection period through the next May-June nesting season to determine the impacts of fire on turtle habitat, survival, and nesting success.

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