Back to the Future: Tule Marsh Restoration at Shin Kee for the Giant Garter Snake (*Thamnophis gigis*)

Emily Mathews, Zentner and Zentner, emilym@zentner.com
Nancy Banh-Boudreau, Zentner and Zentner, nancyb@zentner.com
John Zentner, Zentner and Zentner, johnz@zentner.com

The Shin Kee restoration project was created from 144 acres of farmland to provide habitat for wetlands and listed species, primarily the state- and federally-listed Giant Garter Snake (GGS). The project was initially designed to host more than 30 acres of tule marsh and with other elements known to benefit GGS such as wide, shallow ecotones and upland refugia. The initial hydrologic calculations did not take into account Delta-specific issues, however, and implementation of the original plan resulted in the creation of what was essentially a large unvegetated pond with little suitable habitat for GGS. Zentner and Zentner was asked to address the site issues and, with assistance from US Fish and Wildlife Service staff, completed a series of hydrologic and vegetation analyses to determine the ideal water elevations for tule growth and tule marsh establishment. We modified the tidal regime, lowered the tidal elevations and planted several thousand tule "super-plugs", an experimental container stock developed with a local grower. Four years later, Shin Kee now hosts more than 33 acres of thriving tule marsh and provides important lessons for future Delta restoration projects.

Keywords: Delta wetland restoration, Giant Garter Snake, tule marsh, endangered species

Poster Topic: Habitat Restoration: Wetland and Riparian

Riparian Understory Restoration of White Root (*Carex barbarae*) and Creeping Wild Rye (*Elymus triticoides*) in Post-Burn Areas at Bushy Lake, Sacramento, CA USA

Mary Xiong*, CSU Sacramento Environmental Studies Department, mxiong9686@gmail.com
Michelle Stevens, CSU Sacramento Environmental Studies Department, stevensm@csus.edu

CSU Sacramento and Sacramento County Department of Regional Parks are collaborating on the Bushy Lake Restoration Project as part of an Earth Stewardship Initiative. Riparian habitats along the American River remain essential for regional flora and fauna; however, the areas are fire prone due to homeless populations, drought, and invasive species with biomass production stimulated by prolonged spring rains. The primary goal of this experiment is to test cost-effective, resilient restoration and adaptive management strategies for depressional wetland restoration by creating habitat islands of native species to recruit and expand spatially and temporally in the area. Two dominant riparian understory species in the Sacramento-San Joaquin Delta with drought tolerant and fire resilient characteristics are tested to restore riparian understory in post-burn areas on the American River Parkway, Sacramento, CA. Under experimental field conditions, we compared the survival, biomass, productivity, and relative cover between white root (*Carex barbarae*) and creeping wild rye (*Elymus triticoides*) treatments, using two different planting densities and three different species compositions to find the most efficient treatment for restoration. The interaction between plant and plant densities was also observed, although preliminary findings show no significant difference, meaning that the species and densities treatments do not affect one another in the short term. The pilot study shows that monotypic *Elymus triticoides* has the highest cover, followed by mixed Elymus-Carex, with *Carex barbarae* monotypic stands having significantly less cover. Long-term monitoring of the experiment needs to be employed to obtain conclusive results about which treatment would be most suitable for an effective restoration. Encroachment of weeds in the study area restricts the recruitment of native species, and experimental plots will also need to be hand watered during dry, warm months. Adaptive management will allow for the control of weeds and water to sustain the experimental native plants.

Keywords: riparian understory, depressional wetland, CRAM, restoration, fire resiliency

Poster Topic: Habitat Restoration: Wetland and Riparian

Monitoring Post-fire Resiliency in a Depressional Wetland using California Rapid Assessment Methodology (CRAM), Intensive Vegetation, and Avian Species Richness to Establish Long-term Monitoring using Citizen Science

Kayla Henry*, CSU Sacramento Environmental Studies Department, kayla.r.henry@gmail.com
Tom Henry, CSU Sacramento Environmental Studies Department, tom.henry.421@gmail.com
Michelle Stevens, CSU Sacramento Environmental Studies Department, stevensm@csus.edu

This project entails monitoring of depressional wetlands at Bushy Lake after a fire on the American River Parkway, a joint project between CSU Sacramento and Sacramento County Parks Department. The primary goal of this study is to collect baseline data for the Bushy Lake Restoration Project, which will be used to establish long-term monitoring using citizen science. We used the California Rapid Assessment Method (CRAM) to assess the quality of the ecosystem and validated our data by collecting intensive L3 vegetation data and conducting bird counts. CRAM data was compared to avian species richness to illustrate the significance that this project will have for birds native to the Sacramento region as well as species who utilize the American River Parkway during migrations. Intensive vegetation data was used to verify that the CRAM scores were representative of dominant vegetation and invasive species at Bushy Lake. CRAM data was found to be representative of on-site vegetation, and was found to be more efficient and less time consuming to collect monitoring data. This is an important finding for long term monitoring projects, where funding is limited and data collection efforts are often sporadic or non-existent. We hypothesize that Bushy Lake restoration and post-fire resiliency will increase the number of plant layers and plant biodiversity, which will increase overall potential avian habitat. Validating the CRAM with intensive vegetation and bird count data provides further insight into monitoring habitat conditions, effective adaptive management practices, and the overall health of the ecosystem. Birds are often used as ecological indicators and are relatively easy to observe in comparison to other wildlife, making it possible to use citizen science as a cost effective tool in monitoring the success of this restoration project.

Keywords: CRAM, depressional wetland, intensive vegetation, avian species richness, citizen science

Poster Topic: Habitat Restoration: Wetland and Riparian