

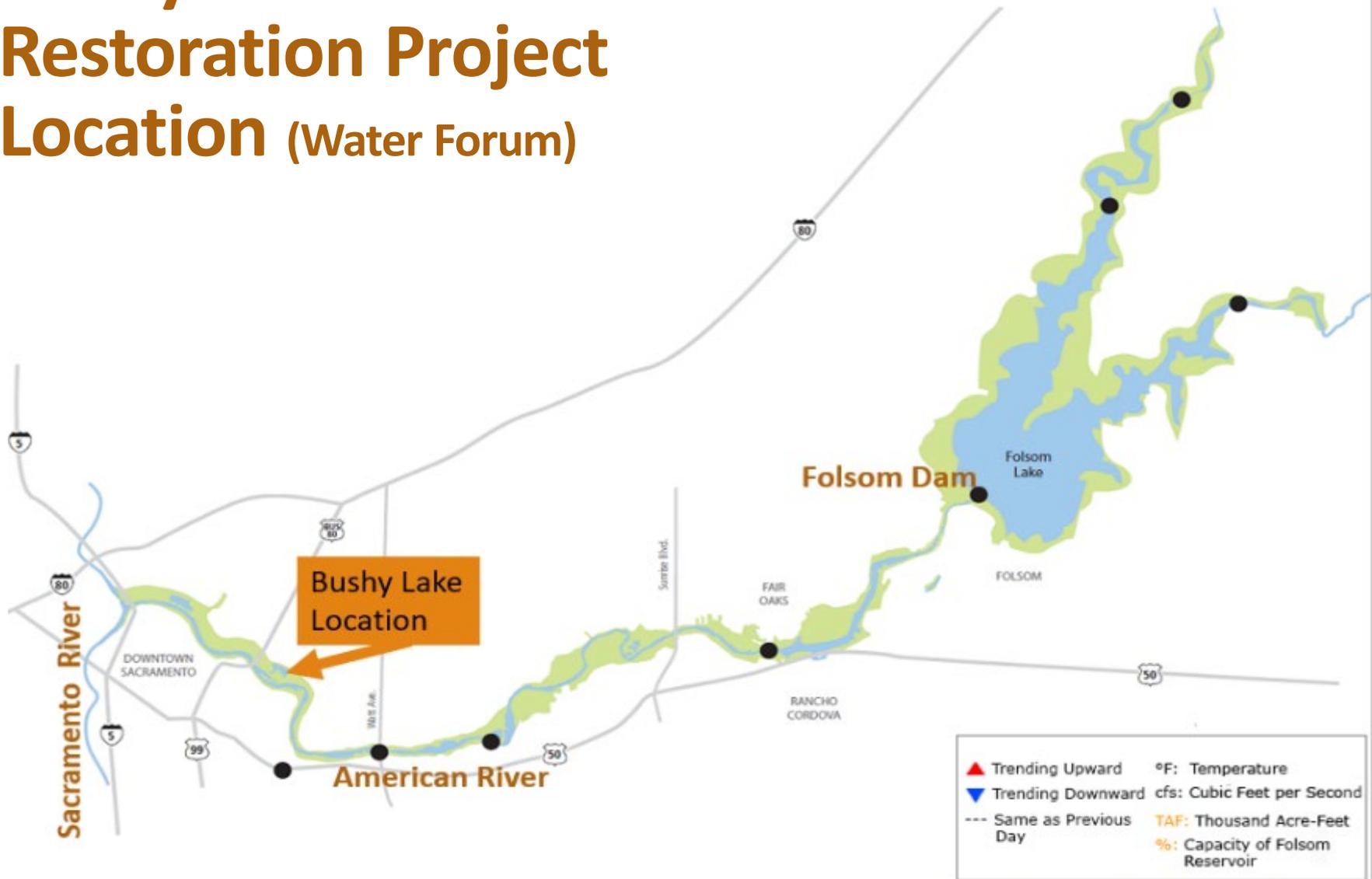
Rising from the Ashes: Culturally significant plants and fire resilience at Bushy Lake, Sacramento, CA

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California State University Sacramento



Indian hemp/ Dogbane (*Apocynum cannabinum*)

Bushy Lake Eco-Cultural Restoration Project Location (Water Forum)



Data displayed on this map is preliminary and subject to revision.

Bushy Lake Eco-Cultural Restoration Project Location (Initiated in 2015)

lower American River Parkway, Sacramento, CA – near Cal Expo



BUSHY LAKE CONCEPTUAL RESTORATION PLAN

Levee detail

- Parking Lot Z + ARPP Limited Recreation Area
- Conceptual Restoration Planning Area

Bushy Lake RESTORATION PROJECT

SACRAMENTO STATE

AREA WEST ENVIRONMENTAL, INC.

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Data prepared: March 27, 2020

Sources:
- ARPP 2008
- Cal Expo Lot Z Parking Map
- Sacramento County Reconnel
- 2016

0 500 1,000 Feet

\\AWF-Serve\proj\Marketing\01\19\031 Bushy Lake\2. Library\Bushy Lake Map 3-27-20

Land Acknowledgement – CSU Sacramento

I acknowledge that the land our campus and Bushy Lake is and continues to be occupied by the Indigenous people of this area, the Miwok, Maidu, and Nisenan. Recognizing their culture that is rich with spiritual ties, to the land and waters that resonate with their traditions. I thank and honor those California Native people of the Sacramento Valley and respect their sovereignty. This is for you.

May I introduce myself -



Tribal descendant of Nez Perce/
Nimiipuu Colville Confederated Tribes

Began introducing TEK/ TRM in the 1980s into restoration and wetlands ecology as Senior Wetlands Scientist for WA Dept of Ecology

Conducted doctoral research on white root (*Carex barbarae*), ethnoecology – learning from Miwok elders

Personal relationship with plants and California tribal members

Professor, CSU Sacramento,
Environmental Studies

Basis of Eco-Cultural Restoration Project

Culturally Significant plant species are fire resilient after being managed and tended by Native Californians (Nissenan, Maidu, Miwok) people for thousands of years

Theory: Culturally significant plants will thrive in a highly degraded landscape, or “Novel Ecosystem.” The past does inform the future.



Elderberry (*Sambucus Mexicana*)

Restoration Goals

1. Restore and enhance culturally significant native plant and wildlife species in a highly disturbed and urbanized landscape (stressors: random wildfires, invasive plant species; unhoused populations);

Hypothesis: culturally significant plants, tended for thousands of years, are adapted to traditional fire management and are fire resilient;

2. Provide high-impact student research and community service.

2015 – Beginning of Bushy Lake Eco-Cultural Restoration

Founded eco-cultural restoration project at Bushy Lake after a big fire in 2014.

Our vision centers on restoring the relationship between culture and the land and honoring First Nation People.

“Reciprocal restoration is the mutually reinforcing restoration of land and culture such that repair of ecosystem services contributes to cultural revitalization, and renewal of culture promotes ecological integrity” (Kimmerer 2011).

Restore Cultural Keystone Species that serve WEK & TEK goals

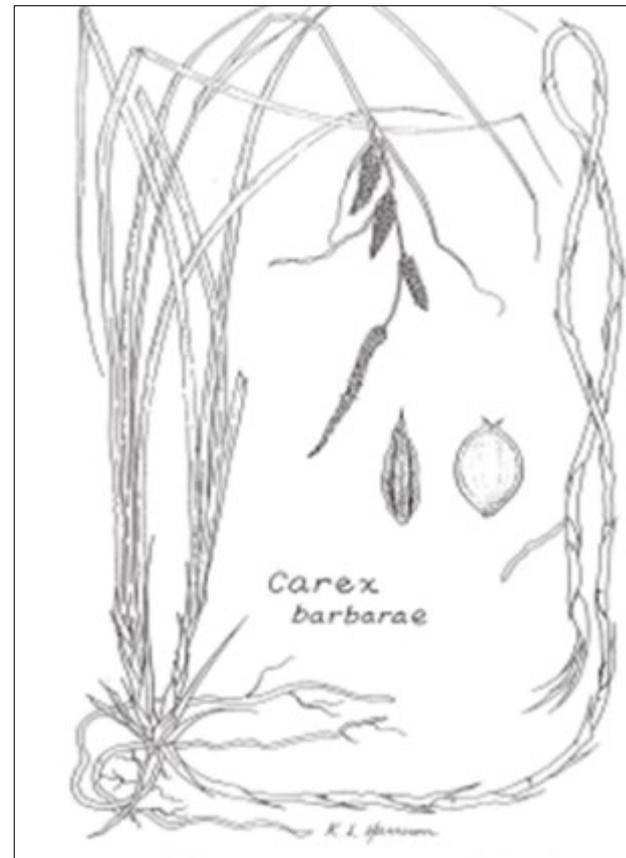


Example - White root (*Carex barbarae*)

A major source of rhizomes for Native Californian basket weaving

A riparian understory dominant

Engineering/ streambank stabilizer dream plant



Applying WEK and ITEK Complementary

WESTERN SCIENTIFIC KNOWLEDGE

- Synchronic data, at one time, from many sites and many attributes
- Often lack long-term view
- Academic culture – projects can be experimental; data are objective, “value-free”

TRADITIONAL ECOLOGICAL KNOWLEDGE

- Diachronic database over a long period of time (chronosequence)
- Observers tend to be the resource users
- Harvests of resources depend on the quality and reliability of ecological observations

Wildfire burned to waters edge June 6, 2021



Burned entire restoration project;
130 acres on the lower American
River Parkway



Extent of June 6, 2021. Beaveways caused fire to lie down in wetted area, habitat refuge.



In Situ Restoration Site Planted in 2015, Burned in 2021

Before and After



Culturally Significant Species



Traditional Herbalist and
Knowledge Holder –
Sage LaPena



Kachinu – Mugwort
(*Artemisia douglasiana*)



White Root
(*Carex barbarae*)



Elderberry (*Sambucus*)



^ Carex barbarae:

- June 2021
- Feb 2022
- April 2022



> Mugwort:

- June 2021
- Nov 15, 2021
- April 2022

Carex barbarae Cultural Keystone Species and Fire Resiliency

OCT 11, 2021



JAN 16, 2022



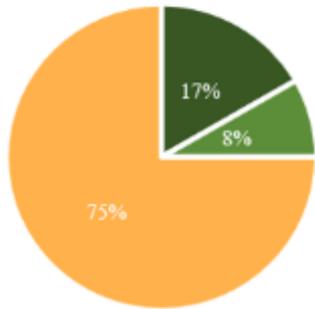
JUNE 14, 2023



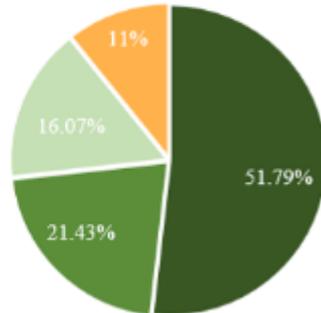
Fire Resiliency: 2021 to 2023

Carex Barbarae Plot Aug 31 2021 to June 14 2023

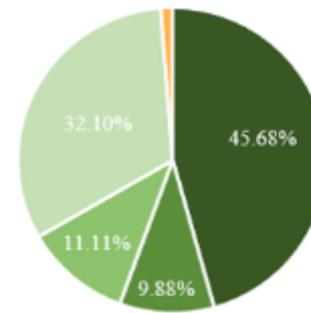
Aug 30 2021 (75% Bare)



Jan 16 2022 (20% Bare)



April 27 2022 (5% Bare)



June 14 2023 (0% Bare)



- *Carex Barbarae* (White Root)
- *Artemisia douglasiana* (California Mugwort)
- *Leymus triticoides* (Creeping Wild Rye)

- Other 6 Species: *Vicia villosa*, *Geranium dissectum*, *Bromus rigidus*, *Medicago polymorpha*, *Tragopogon dubius*, *Centaurea solstitialis*
- Relative Bare Percent

2023 *Carex barbarae* – culture keystone species, fire resilient



Diana Almendariz (Wintun-Maidu Elder and Traditional Knowledge holder)

Mugwort (*Artemisia douglasiana*) Fire Resiliency

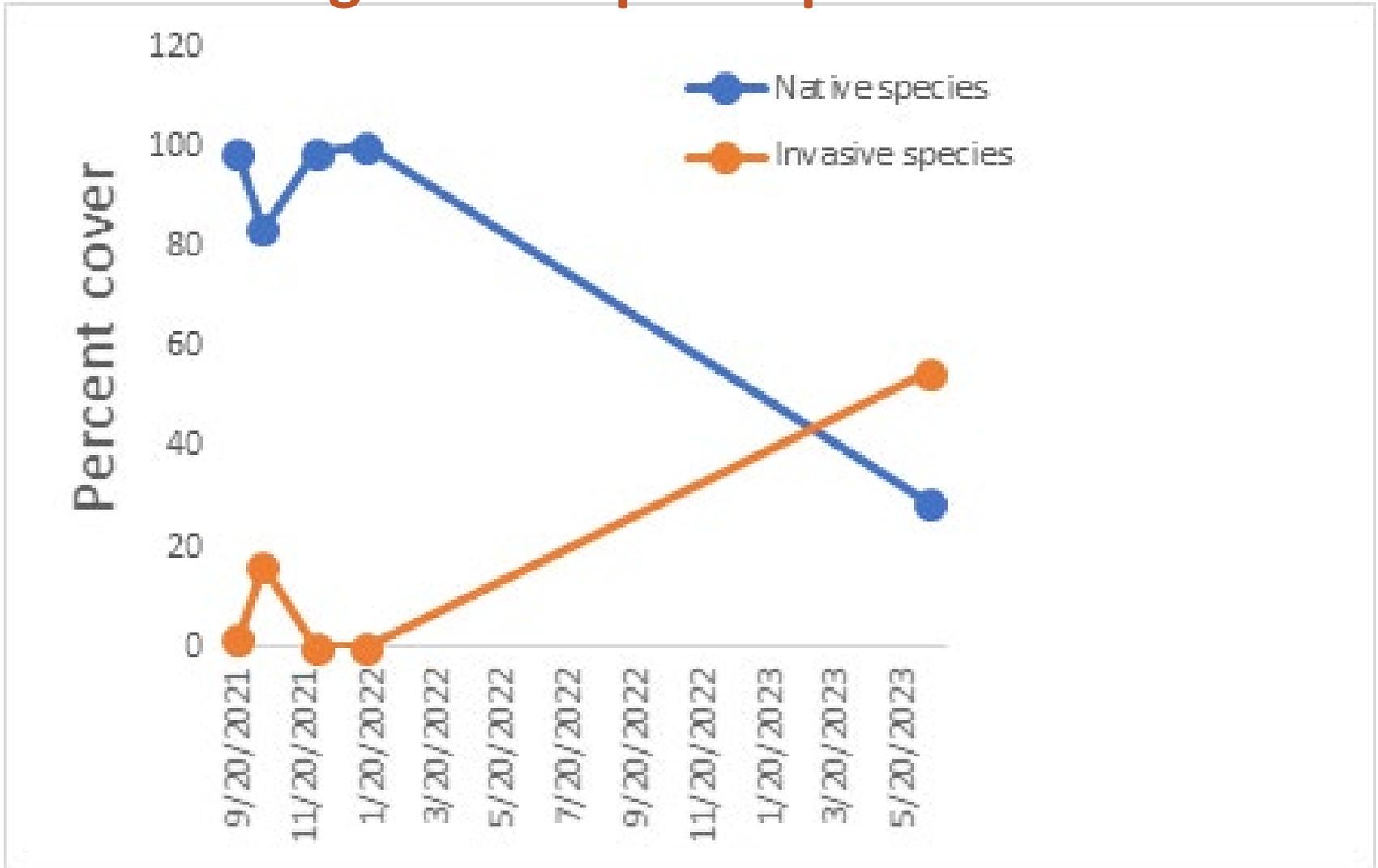
- Mugwort has increased from 37% cover to 99% cover in 2022
- Plant Cover and Plant Height increased
- The area has recovered from the fire, and we have added diversity through replanting native forbs and grasses



Mugwort (*Artemisia douglasiana*) Fire Resiliency 2021 – 2022)

| Culturally Significant Native Species | Survey Dates | | | |
|---|-------------------------|-----------------------------|-----------------------------|----------------------------|
| | 9/20/2021 (96% Bare) | 10/12/2021 (73.45% Bare) | 12/01/2021 (79.04% Bare) | 1/16/2022 (67.86% Bare) |
| California Mugwort (<i>Artemisia douglasiana</i>) | 75.31 | 67.62 | 98.00 | 99.00 |
| Narrow Leaf Willow (<i>Salix exigua</i>) | 20.15 | 12.52 | 1.00 | 1.00 |
| Mulefat (<i>Baccharis salicifolia</i>) | 1.63 | 2.83 | T | 0.00 |
| California Blackberry (<i>Rubus ursinus</i>) | 0.33 | 0.26 | 0.00 | 0.00 |
| Gumplant (<i>Grindelia camporum</i>) | 1.15 | 0.00 | T | 0.00 |
| Creeping Wildrye (<i>Elymus triticoides</i>) | 0.00 | 0.41 | 0.00 | 0.00 |
| Native Species Relative Total | 98.57 | 83.64 | 99.00 | 100.00 |
| Invasive Species | | | | |
| Himalayan Blackberry (<i>Rubus armeniacus</i>) | 1.43 | 4.64 | T | 0.00 |
| Bermuda Grass (<i>Cynodon dactylon</i>) | 0.00 | 11.71 | 0.00 | 0.00 |
| Black Mustard (<i>Brassica nigra</i>) | 0.00 | 0.00 | 0.00 | 0.00 |
| Hairy Vetch (<i>Vicia villosa</i>) | 0.00 | 0.00 | 0.00 | 0.00 |
| Ripgut Brome (<i>Bromus diandrus</i>) | 0.00 | 0.00 | 0.00 | 0.00 |
| Invasive Species Relative Total | 1.43 | 16.35 | T | 0.00 |
| Total | 100.00 | 100.00 | 100.00 | 100.00 |

June 2023 – We added experimental native plants in 2022, opening up the area and increasing invasive plant species



After native plants thrived, we had a huge amount of hand weeding

(vetch, poison hemlock, star thistle, tall whitetop)



Post-fire Replanting and Adaptive Management - Watering and Weeding all Summer



Yarrow, California poppy, Gumplant, Soaproot, Milkweed

Pollinator Seed Mix

(Calflora <https://www.calflora.org/>)

- Woodland Clarkia (*Clarkia unguiculata*)
- Fort Miller Clarkia (*Clarkia williamsonii*)
- CA poppy (*Eschscholzia californica*)
- Gumweed (*Grindelia camporum*)
- Bolanders sunflower (*Helianthus bolanderi*)
- Yarrow (*Achillea millefolium*)
- Chick Lupine (*Lupinus microcarpus* var. *densiflorus*)
- Rock Phacelia (*Phacelia californica*)
- Great Valley Phacelia (*Phacelia ciliata*)

Pollinator and Pinole Plant Experiments



Clarkia unguiculata



Helianthus bolanderi



Chick Lupine



Rock Phacelia



Great Valley Phacelia

Traditional Ecological Knowledge

Pinole – Tarweed Seeds



Native Americans tended diverse natural resources:

1. Tarweed seeds are harvested for porridge (pinole), a staple food
2. Also important for pollinators
3. Plant tarweed to replace weedy black mustard



Milkweed (*Asclepias speciosa* and *A. fascicularis*) Soaproot (*Chlorogalum pomeridianum*)



Frank
Furtado,
2019

Impact of Fire on Wildlife



Turtle nests all burned in
2021



Swainson's hawk nest
burned with eggs/ chicks in
nest

2022 Post-Fire Turtle Nesting Surveys



Wildlife Cameras



Summary

1. Culturally important plants are resilient and rejuvenated post-wildfire.
2. Excellent natural recruitment - mugwort, white root, elderberry, creeping wild rye, narrowleaf willow, CA blackberry, CA grape, yarrow etc
3. Weeds also stimulated by fire, Intensive Adaptive Management Required
4. Wildlife benefited from post fire conditions, turtle nesting more accessible.
5. Recommend - Introduce Traditional Fire Management

Tribal Summit – Next Steps

1. Create Tribal Stewardship Partnership advising stewardship for Bushy Lake
2. Educate Stakeholders on lower American River– tribal co-management of site
3. Eco Cultural Revitalization – Bring back Traditional Fire Management and Stewardship of Relatives
4. Regenerative Funding
5. Youth and elders, inter-generational participation in beneficial fire, gathering and tending

High Impact Student Authentic Learning Experiences, Research and Devotion – all sentient beings



Thank you - Awanata Dream Team (*Awanata – Miwok – turtle*)



Bushy Lake Awanata Dream Team

Awanata Dream Team

Kathleen Colima Aguirre

Gunner Michaelson

Maddie Sierra

Dustin Ho

**Dereck Martinez-
Goodwin**

Risa Fackler

Maria Mauricio

Joel Craven

Emily Turner

Professional Collaborators

Dr. Michelle Stevens (Co-PI)

Becky Rozumowicz-Kodsuntie (Co-PI)

Jeff Alvarez (Co-PI and Turtle Advisor)

**Alexandra von Ehrenkrook (Graduate Student,
Senior Research Assistant)**

Dr. Time Davidson, CSUS – Aquatic Organisms

Dr. Jamie Kneitel, CSUS – Water Quality

Dr. Kevin Cornwell – Hydrology and Geology

Daniel Williams – Sacramento Audubon

Acknowledgement of First Nations

We recommend this information be utilized to honor California Indian cultures in the watershed whose ancestors cared for, managed, and conducted specific renewal ceremonies.

We also recommend this information be used for the conservation of native species and traditional resource management, and as a template for the cultural and ecological restoration of this valuable habitat

Acknowledgement of Support

Bushy Lake Conceptual Restoration Plan Grant WC-1943CA from the CA Wildlife Conservation Board

Presidents Circle Bushy Lake Restoration Grant to rebuild after June 6, 2021, wildfire

Jeff Alvarez, The Wildlife Project

Sierra Club – River Partners - Green, Inc.

Save the American River Association

Sacramento Audubon

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Thank you for listening



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