



Looking Downstream Fall 2022 update

National Park Service Research in Poopenaut Valley



Greg Stock, Catherine Fong, Sarah Stock, Avery Meeker, Kimiora Ward &
Melissa Booher

National Park Service, Resources Management & Science

Jeff Holmquist & Jutta Schmidt-Gegenbach
University of California, Los Angeles, White Mountain Research Center

Purpose of Looking Downstream project

Investigate the riverine, riparian, wetland, and meadow ecosystems in Poopenaut Valley below O'Shaughnessy Dam to assess their overall condition and inform future water management for ecological benefit

Methods

- Quantify the hydrology (river, tributary, and groundwater flows) across a range of environmental conditions
- Vegetation surveys of riparian, wetland, and meadow habitats
- Bird and bat surveys of riverine and riparian habitat
- Benthic macroinvertebrate surveys



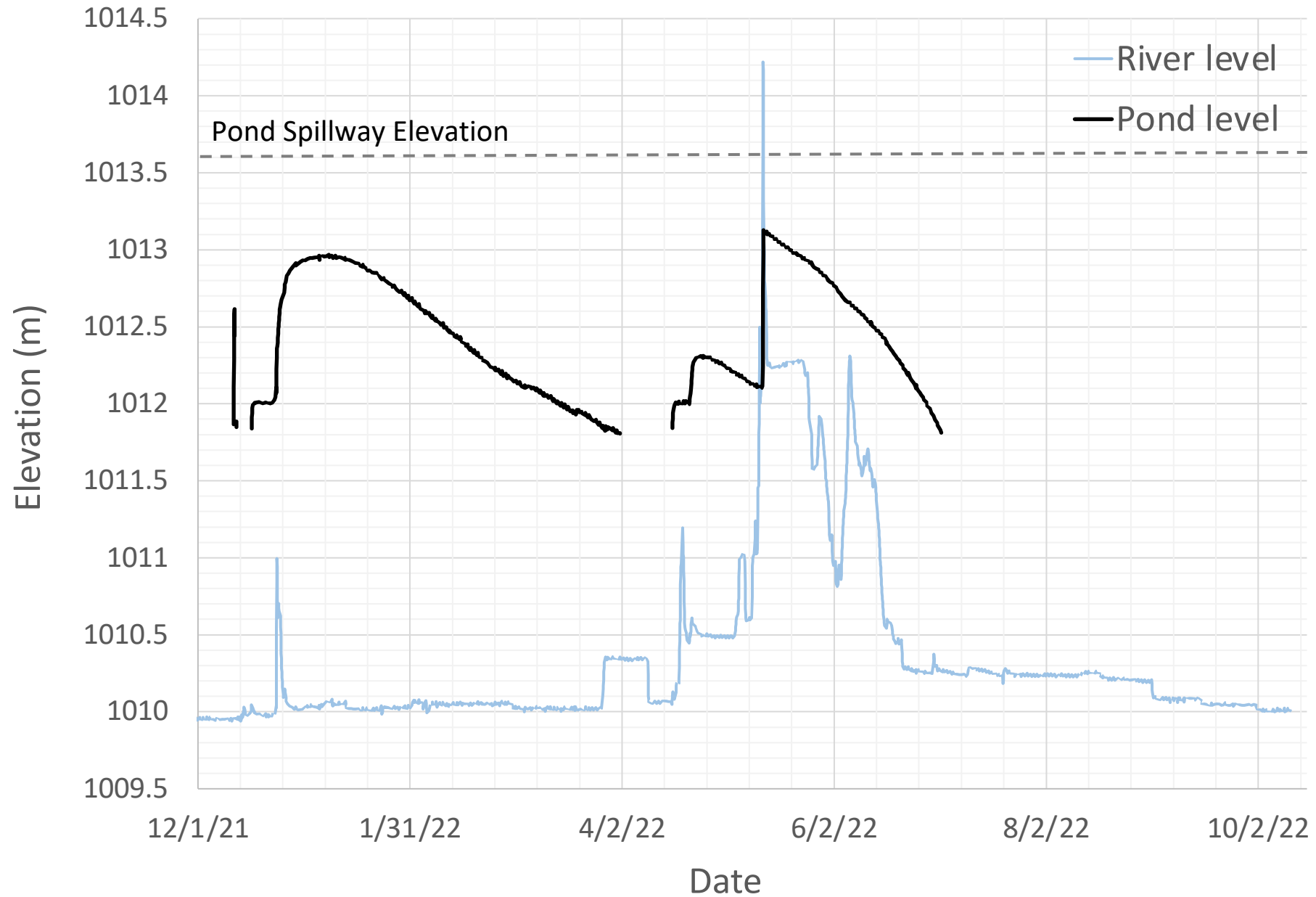
Poopenaut Valley hydrologic monitoring



- River discharge
- Tributary discharges
- Seasonal pond stage
- Groundwater levels (piezometers)

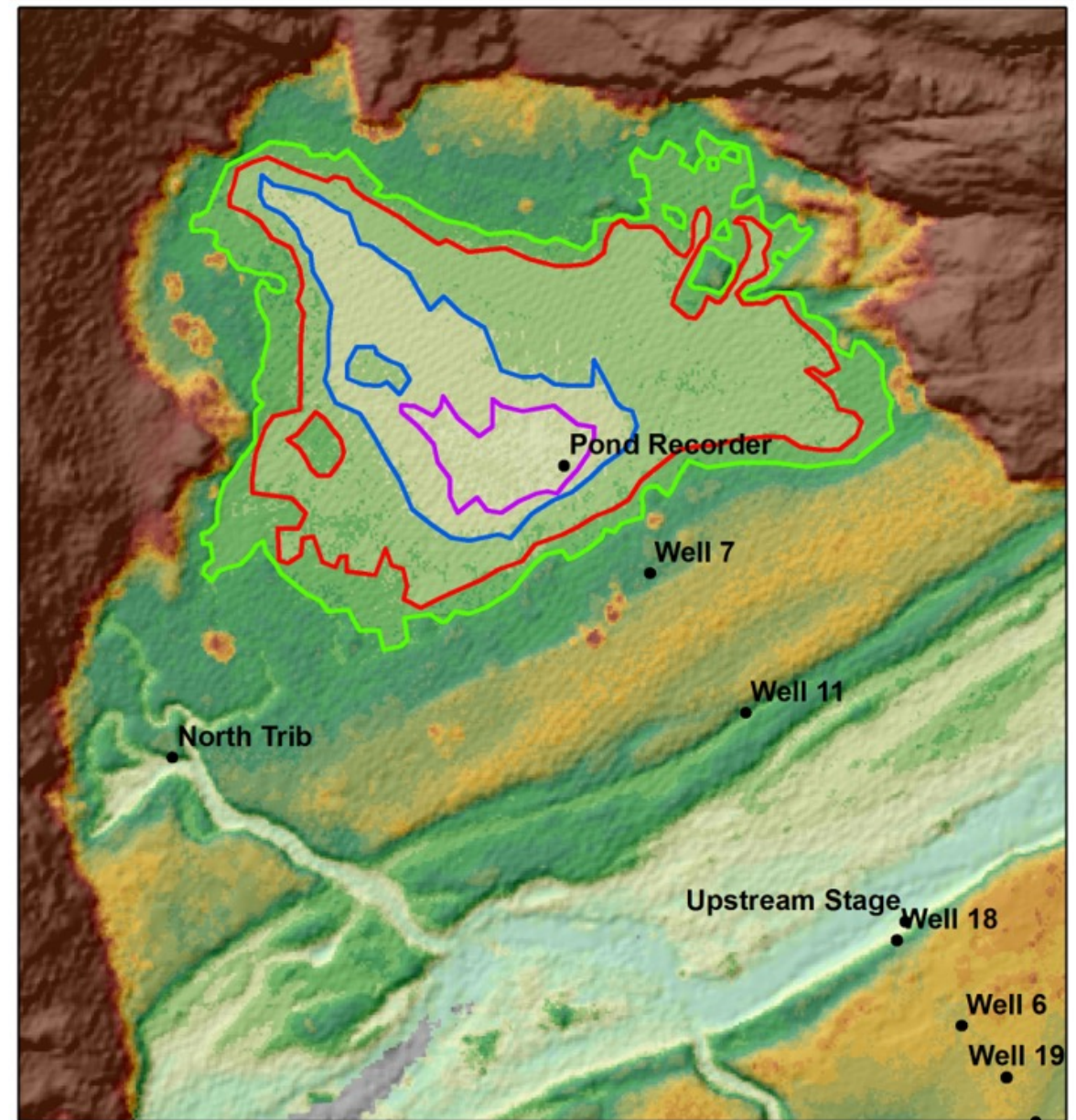


Spring pulse flow and pond fill



Spring pulse flow and pond fill

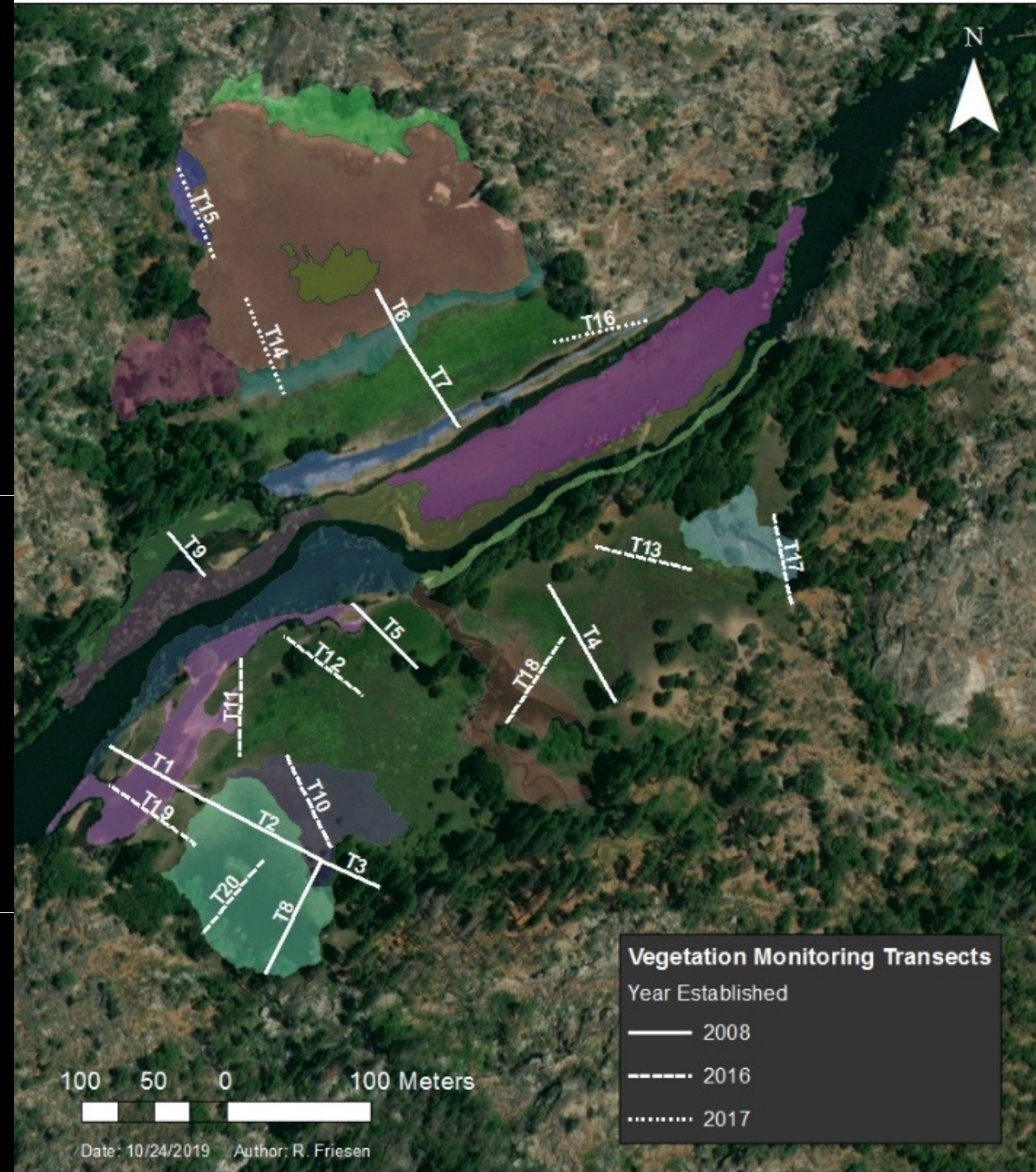
- Tuolumne River was above pond spillway elevation (1013.6 m) for ~5 hours
- The pond recorder shows the pond only reached a maximum water surface elevation of 1013.1 m (red polygon), so not full
- Pond drainage after fill
 - Water surface dropped at a rate of 3 cm/day
 - Pond took 51 days to go dry



0 15 30 60 90 120 Meters

Poopenaut Valley vegetation monitoring

- Repeat point intercept transects
- Repeat photopoints
- Wetland delineation (every 5 years)



Legend

-  2017 delineation
-  2012 delineation
-  2007 delineation



Poopenaut Valley bird surveys

- 17th consecutive year of breeding bird surveys
- 3 visits between May 25 and June 29, 2022
- 50 species recorded
 - 8 Confirmed breeding species
 - 25 Probable breeding species
- Spot Mapped 16 territories
 - 2 confirmed successful nests
- Lowest year (since 2007) for relative species abundance and richness

Most frequently detected species in 2022

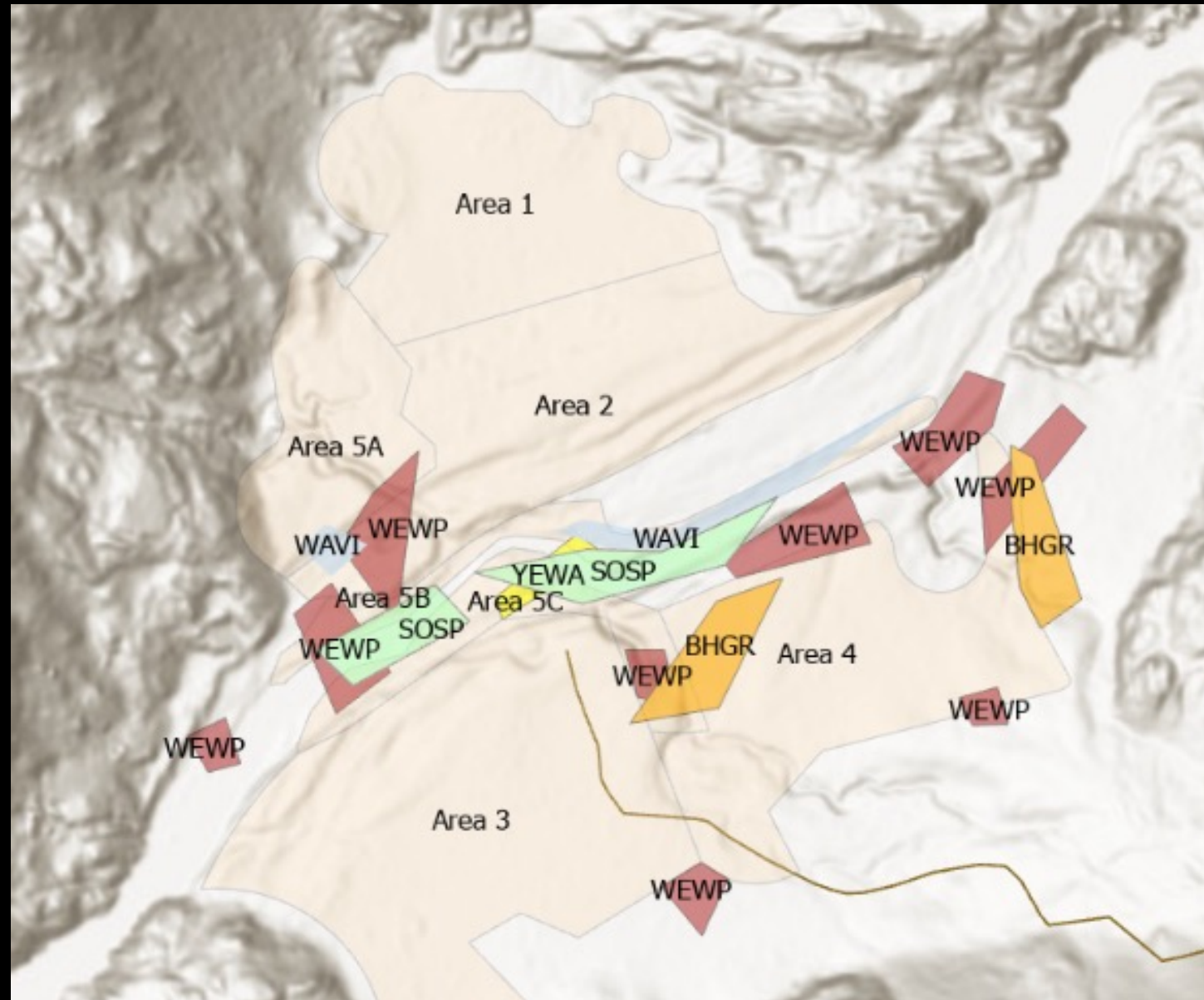
Common Name	Scientific Name	Relative Abundance
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	2.1
Violet-green swallow	<i>Tachycineta thalassina</i>	1.07
Red-winged blackbird	<i>Agelaius phoeniceus</i>	0.87
Spotted towhee	<i>Pipilo maculatus</i>	0.87
American robin	<i>Turdus migratorius</i>	0.8



Spot Mapping

Mapping breeding territories of riparian focal species

- 16 territories total in 2022
- Only 2 confirmed territories successfully raised chicks to flight
- Large presence of Brewers blackbirds (historically absent from this area)
- Highest territory count yet of Western wood-pewee (9)



Spot mapping territory overview for five riparian focal species. BHGR = Black-headed grosbeak, SOSP = Song sparrow, WAVE = Warbling vireo, WEWP = Western wood-pewee, and YEWA = Yellow warbler.

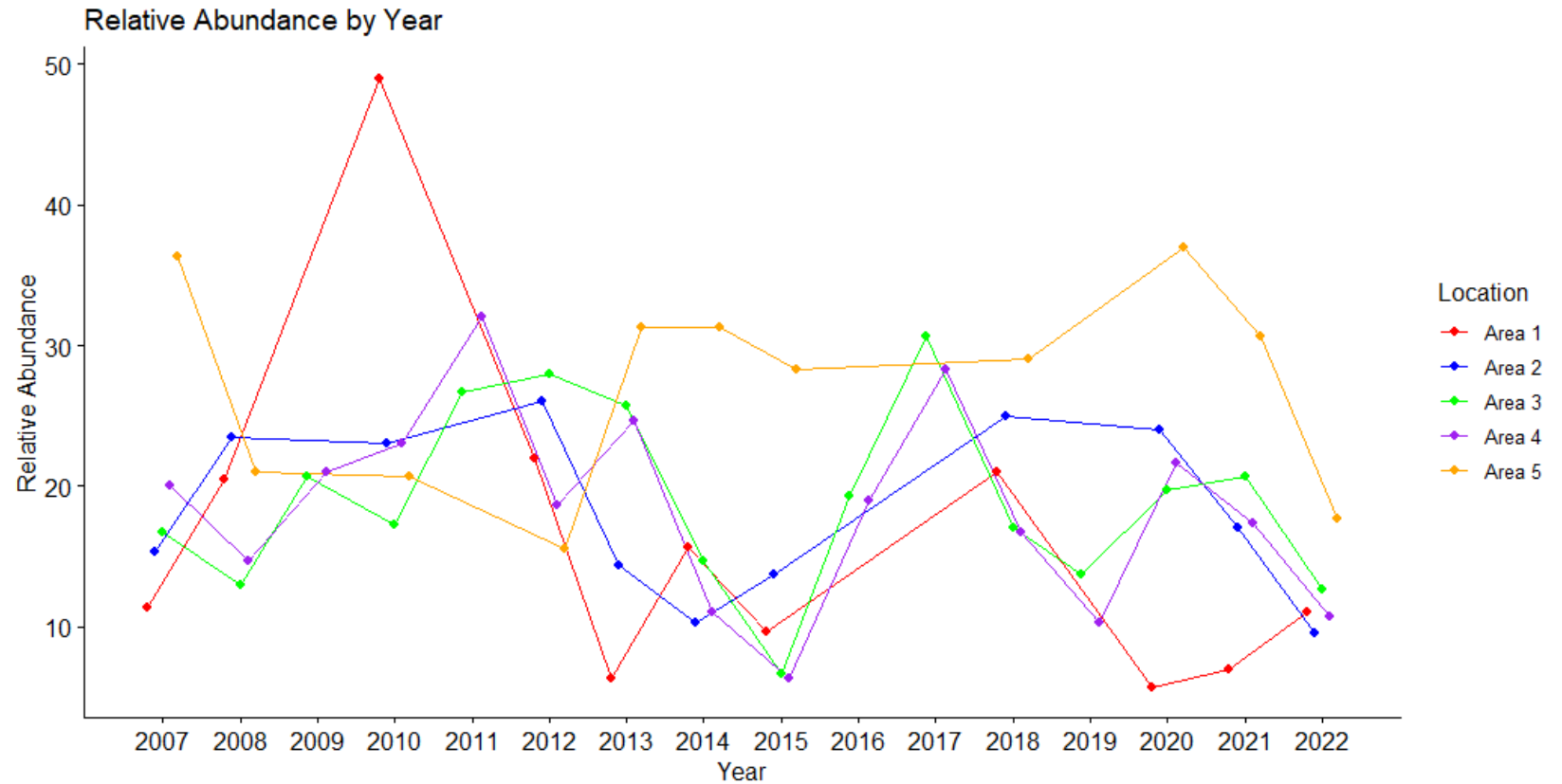
Area Searches and Point Counts

Point Counts

- 74 detections from 24 species

Area Searches

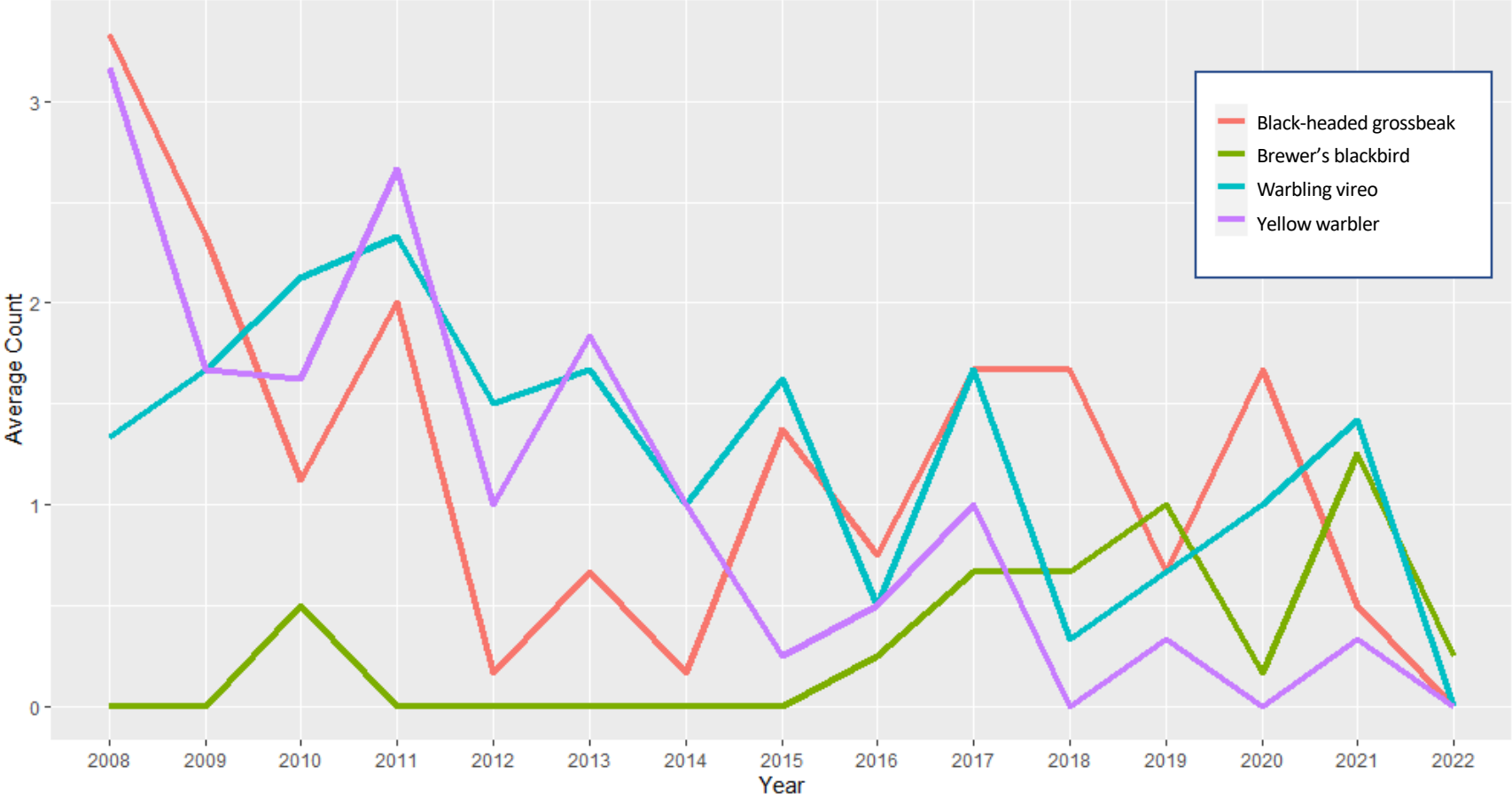
- Recorded 278 individuals from 40 species
- Riparian corridor (Area 5) had highest species abundance and richness



Relative abundance from area search surveys in each of the five areas in Poopenaut Valley.

Bird data trends

- General declines of riparian species over time (2008-2022)
- Increase in Brewer's blackbird
- Other important variables:
 - Streamflow below 25th percentile*
 - Drought







Average species count each year from 2008-2022.

*Desrosiers et al. 2022

RESEARCH ARTICLE

Low flows in a regulated river system are associated with reduced breeding bird abundance and diversity in Yosemite National Park, California

Michelle A. Desrosiers¹  | Lynn N. Schofield^{1,2}  | Breeanne K. Jackson^{1,3}  | Sarah S. Stock¹ 

¹Resources Management and Science Division, Yosemite National Park, El Portal, California, USA

²Institute for Bird Populations, Point Reyes Station, California, USA

³Sierra Nevada Research Institute, University of California, Merced, California, USA

Correspondence

Michelle A. Desrosiers, Resources Management and Science Division, Yosemite National Park, 5083 Foresta Road, P.O. Box 700, El Portal, CA, USA.
Email: michelle.desrosiers@gmail.com

Funding information

San Francisco Public Utilities Commission

Abstract

River regulation can alter the magnitude, frequency, duration, and timing of flows, which influences the function of downstream ecosystems. Bird communities can be useful indicators of ecosystem function as individual species respond to varied changes in habitat structure and food availability. We examined the relative importance of different aspects of a regulated flow regime (average daily flow, the number of days flows fell below the 25th percentile, the timing and magnitude of maximum flows, and the inter-annual duration of flows below the historical median) on predicted bird abundance and diversity using 11 years of data collected within a floodplain meadow system located downstream of Hetch Hetchy Reservoir in Yosemite National Park, California. We found that prolonged periods of low flows were negatively associated with the number of breeding birds detected, as well as the species richness of the breeding bird community. Species richness was also negatively correlated with delays in spring runoff delivery. We opportunistically looked at the same hydrologic variables in a parallel unregulated system, the Merced River through Yosemite Valley, and did not find the same strong relationship with bird community data. This suggests that the dam may be exacerbating the effects of drought.

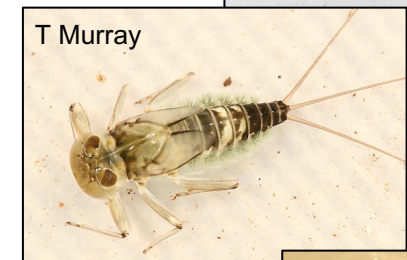
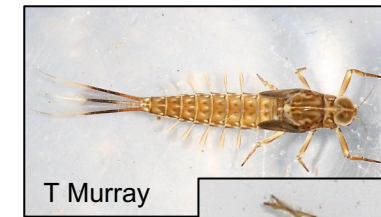
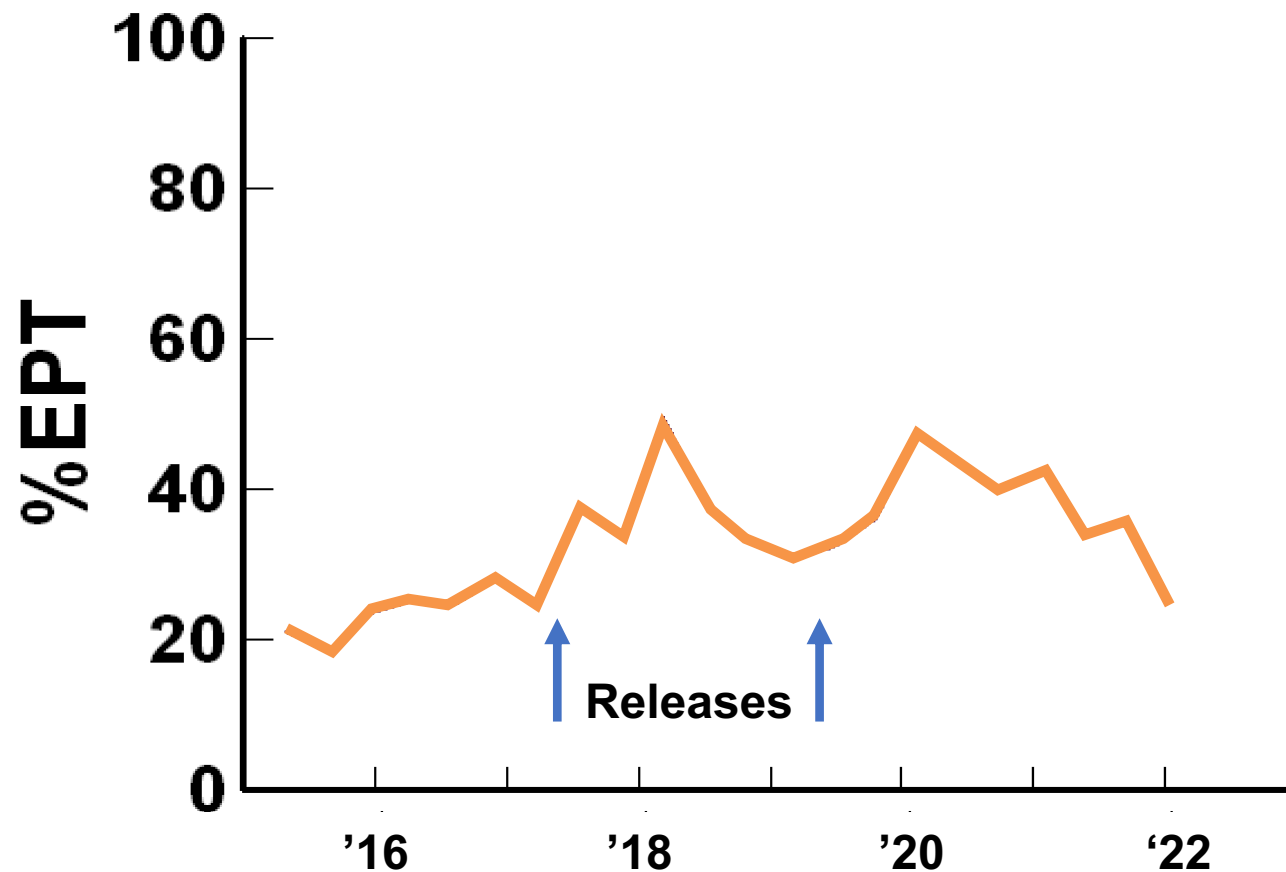
River insects and algae above and below Hetch Hetchy

Large 2017 releases provided benefits for several years, but conditions are now reverting



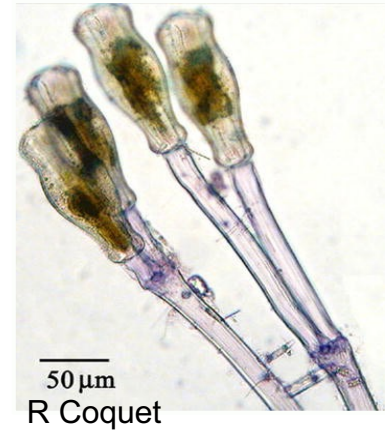
River insects below Hetch Hetchy reservoir

- Below-dam %EPT (mayflies, stoneflies, caddisflies) now decreasing
- “New” EPT taxa appeared below dam after floods, half are now decreasing or absent from samples



Algae below Hetch Hetchy reservoir

- *Didymosphenia geminata* (invasive diatom) was steadily increasing below-dam prior to large releases
- Greatly reduced by 2017 flood events
- Didymo now again at all below-dam sites



**Below-dam sample:
Didymo, streaming green algae**



**Reference sample:
Little Didymo or algae, large fauna**





0 0.25 0.5 km

~ Muir's stakes

1872 glacier extent

B2

B1

4 3 2 1
5

