



# Update on the Golden Mussels in the State Water Project

Board of Directors

July 7, 2025



# Discussion Topics

- Golden Mussel Background
- Detections in the State Water Project
- Golden Mussel Biology and Conveyance Impacts
- State Water Project Monitoring
- Statewide Coordination



*Golden Mussels colonizing a water pipe at a hydroelectric plant in Brazil ([Mountinho, 2021](#)).*

# Golden Mussel Background

- New invasive Mollusk (Golden Mussel) discovered in the Delta and O'Neill Forebay in October 2024
- First ever detection of the Golden Mussel in North America, originating from China and southeast Asia, and has been identified as one of the highest-risk invasive species globally
- Likely introduced through international shipping into the Port of Stockton



*Golden Mussel shells collected in October 2024 at a water quality station at Rough & Ready Island near Stockton in San Joaquin County, California, USA. Photo: Elizabeth Wells, Ph. D. (DWR)*





## Golden Mussel Discovered in Delta

Golden mussels colonizing the exterior hull of a quality equipment at Rough and Ready Island in 2024. Photo: Jay Aldrich (DWR)



# Golden Mussel Detections

- Golden mussels have been confirmed in approximately 30 locations throughout the California Delta and in the State Water Project, including:
- Banks Pumping Plant
- O'Neill Forebay at San Luis Reservoir
- Further south in the Coastal Aqueduct

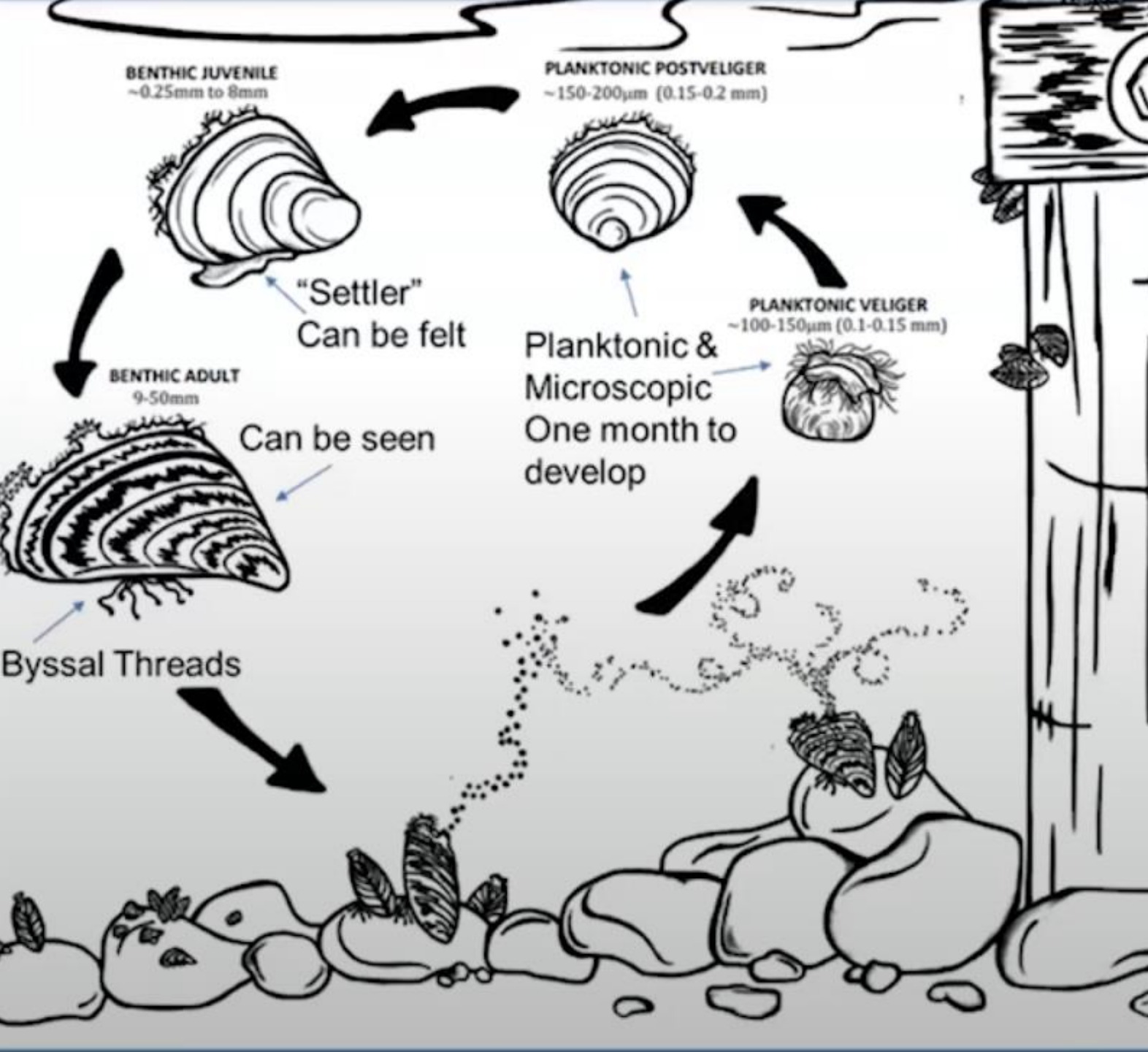


## Golden Mussel Biology

- Golden Mussels attached to surfaces with their byssal threads
- Can attach to each other and form large colonies
- Can attached to boats and spread to other waterbodies
- Can survive out of water for days
- Lifespan is approximately 3-4 years



Byssal threads



## Golden Mussel Biology

- Golden Mussel Larval stage (veliger's) are microscopic, and free-float in the water
- Survive several weeks
- Enters facilities in raw water (SWP) and attach inside
- Spread downstream with water flow or transported by boats

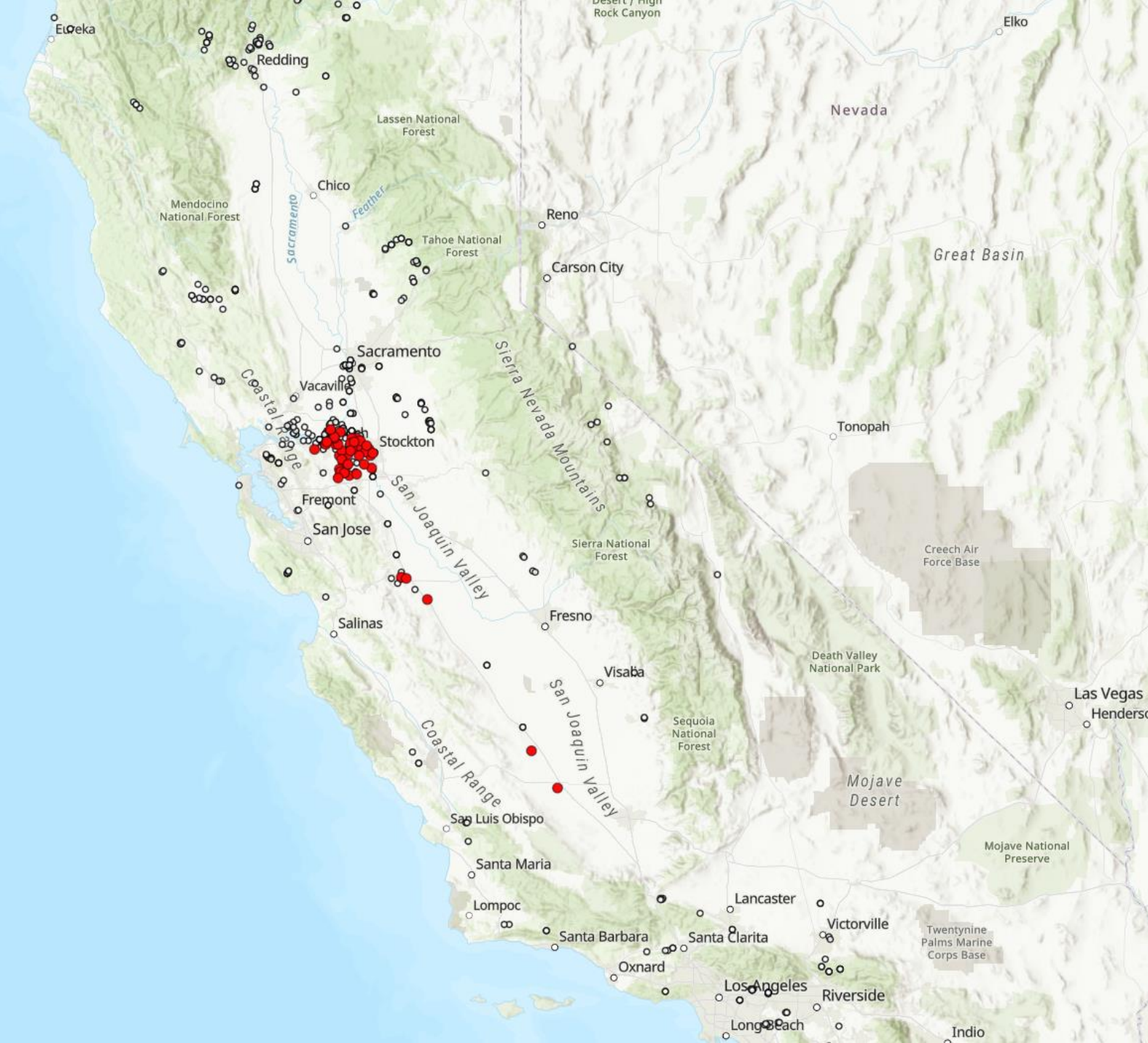




# Golden Mussel Impacts

- Golden Mussel are filter feeders
  - Feeds on phytoplankton & increases the water clarity
- Promotes harmful algae blooms
  - Doesn't feed on blue-green algae or cyanobacteria
- Increased water clarity
  - Deeper sunlight penetration promote harmful algae blooms
- Biofouling
  - They attach in dense clusters, clogging water conveyance systems, pipelines, pumps, filters, and hydropower facilities





# Golden Mussel SWP Monitoring

- Sampling Stations for the Golden Mussel (and other Mussels) are located throughout the SWP system and sampled by DWR
- Monitoring Stations sampling includes Golden, Quagga, and Zebra Mussels
  - DNA, veliger's, adults
- Facility inspections
  - Raw water intakes
  - Fish screens & trash racks
  - Dewatered pipelines





## Golden Mussel SWP Monitoring

- Boat Sampling Stations for the Golden Mussel, Zebra, and Quagga Mussel have been increased to prevent the spread.
  - Inspectors found Golden Mussels on a boat trying to enter Lake Tahoe
  - “We are fortunate to have such highly trained inspectors and committed partners at marinas and boat ramps, but protecting the waters of the Tahoe region from the spread of aquatic invasive species takes all of us.”



# Golden Mussel DNA Autosampler at Citrus Reservoir

- SBVMWD had an DNA autosampler stationed and several settling plates at Citrus Reservoir for two weeks in April
- The autosampler sampled water daily through the 2-week period
- Test results are still pending, and staff continue to strategize the need and interval of repeat sampling



# Golden Mussel Statewide Coordination

- Golden Mussel Task Force formed
- Multi-Agency effort to develop a Statewide response framework
  - Specific teams focused on Monitoring, Containment, Outreach, Policy, and Funding
  - Framework released in April 2025
  - Ongoing Science and Outreach Coordination
  - Increased boat inspections across the State to prevent the spread

State of California

## GOLDEN MUSSEL RESPONSE FRAMEWORK

California Department of Fish and Wildlife

California State Parks

California Department of Water Resources

California State Lands Commission

California Department of Food and Agriculture

California State Water Resources Control Board

United States Bureau of Reclamation

United States Fish and Wildlife Service

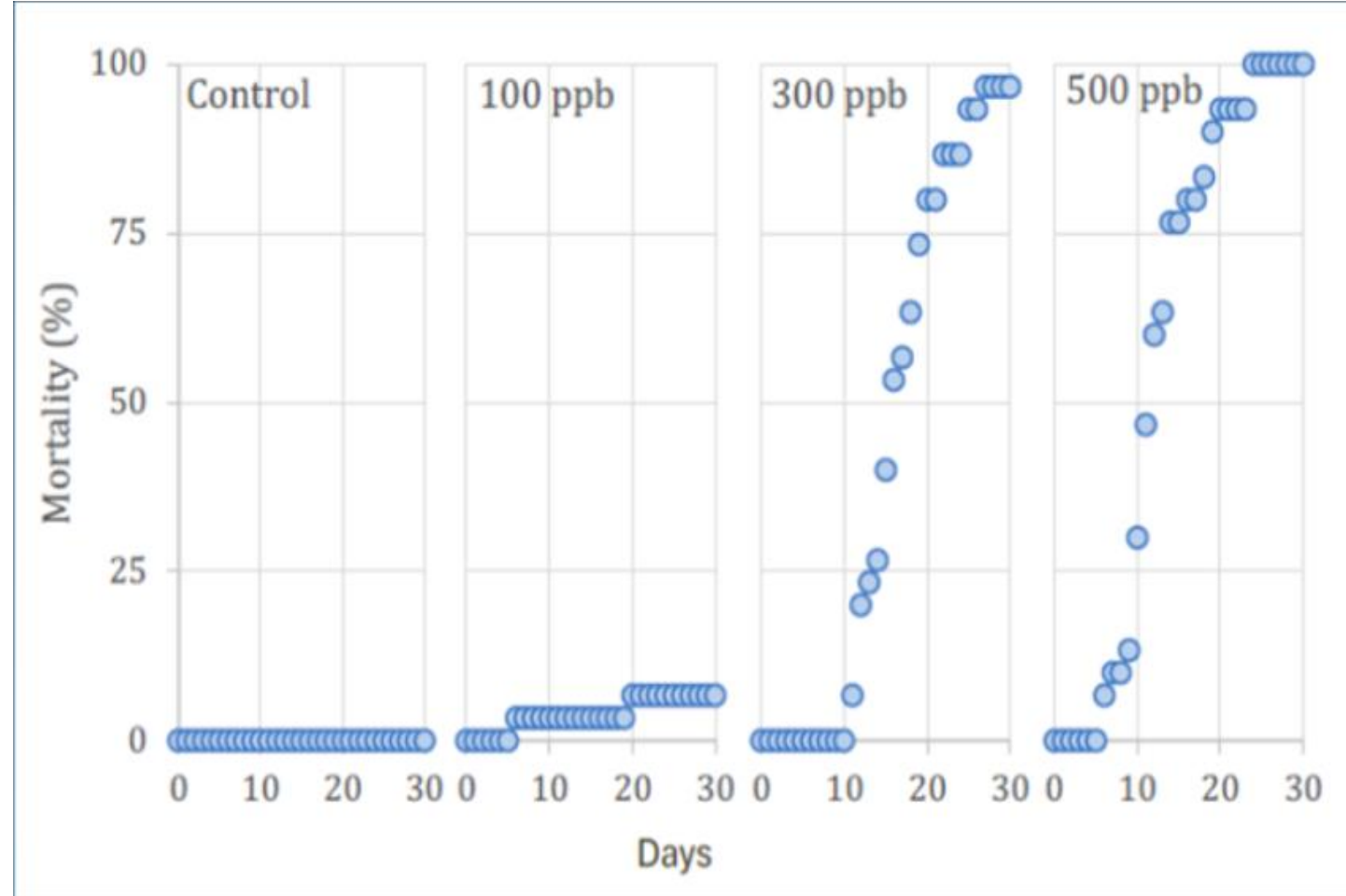
April 14, 2025



# Golden Mussel

## Statewide Coordination

- DWR Conducted Copper Exposure Trials On Golden Mussels
- Adult mussels exposed to copper pesticides for 30 days
- EarthTec QZ and Cutrine Plus
- 3 copper concentrations
- 30-Day Results:
  - 100 ppb = 0% - 7% mortality
  - 300 ppb = 94% - 97% mortality
  - 500 ppb = 100% mortality
- EarthTec QZ = 24 days to 100% mortality
- Cutrine Plus – 28 days to 100% mortality



# Take Aways



- Golden Mussels were first discovered in North America in the Delta in October 2024 via shipping container ship
- Golden Mussels have a high reproductive and growth rate
- Detections of Golden Mussel have reached San Luis Reservoir and further south as Check 24 (Costal Branch of SWP)
- Golden Mussels have the potential to cause statewide water quality issues and damage SWP infrastructure
- DWR is monitoring and conducting various treatment methods to eliminate the presence of Golden Mussels
- EBX Citrus Reservoir has already had Golden Mussel DNA samples taken in April 2025



# Questions?



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A MUSSEL**

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 GOLDEN MUSSEL

 QUAGGA MUSSEL

 ZEBRA MUSSEL