



Engineering, Operations, & Technology Committee

Update on Invasive Mussels in State Water Project

Item 6b

January 13, 2025

Item 6b Update on Invasive Mussels in SWP

Subject

Invasive mussels in the State Water Project

Purpose

Provide an update on invasive quagga and golden mussels in the State Water Project and their current and possible impact on Metropolitan's operations

Next Steps

Continue monitoring invasive mussels in SWP, coordinate with state agencies, and assess potential control measures

Quagga Mussels in CRA

Invasion of the Colorado River Aqueduct

- First discovered in Lake Mead in January 2007
- Spread quickly through the CRA by July 2008
- Colonized intakes and raw water conveyance facilities
- Safety of drinking water not affected



Yorba Linda Feeder, 2011



Colonized Intake Trash Rack



Multi-Generation Cluster
of Quagga Mussels

Quagga Mussel Control in the CRA System



Continuous Chlorination at Copper Basin, Lake Mathews, Lake Skinner



Periodic Tower Chlorination at Lake Mathews and Lake Skinner



Periodic Cleaning of Trash Racks and Fish Screens



Desiccation, Cleaning and Inspections during CRA Shutdowns



Extensive Veliger Monitoring



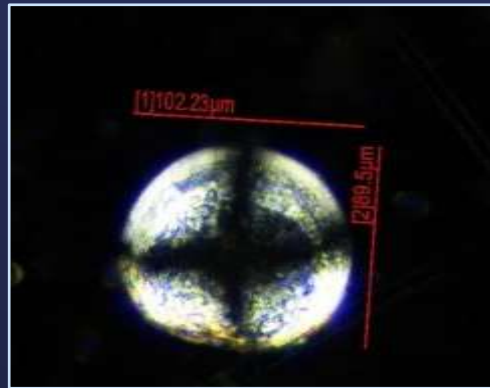
Control Measures (e.g., Filtration) during Raw Water Discharges

Quagga Mussels in West Branch State Water Project

- Adult mussel discoveries
 - 2016 — Pyramid Lake and Angeles Tunnel
 - 2021 — Pyramid Lake and Castaic Lake
 - 2023 — Pyramid, Elderberry Forebay, Castaic, and Castaic Lagoon
- Veliger monitoring by microscopy
 - January 2023 — Veligers (larval stages) consistently detected in Pyramid Lake, Castaic Lake, Foothill Feeder PCS, and Jensen Plant influent



Castaic Lake, 2021

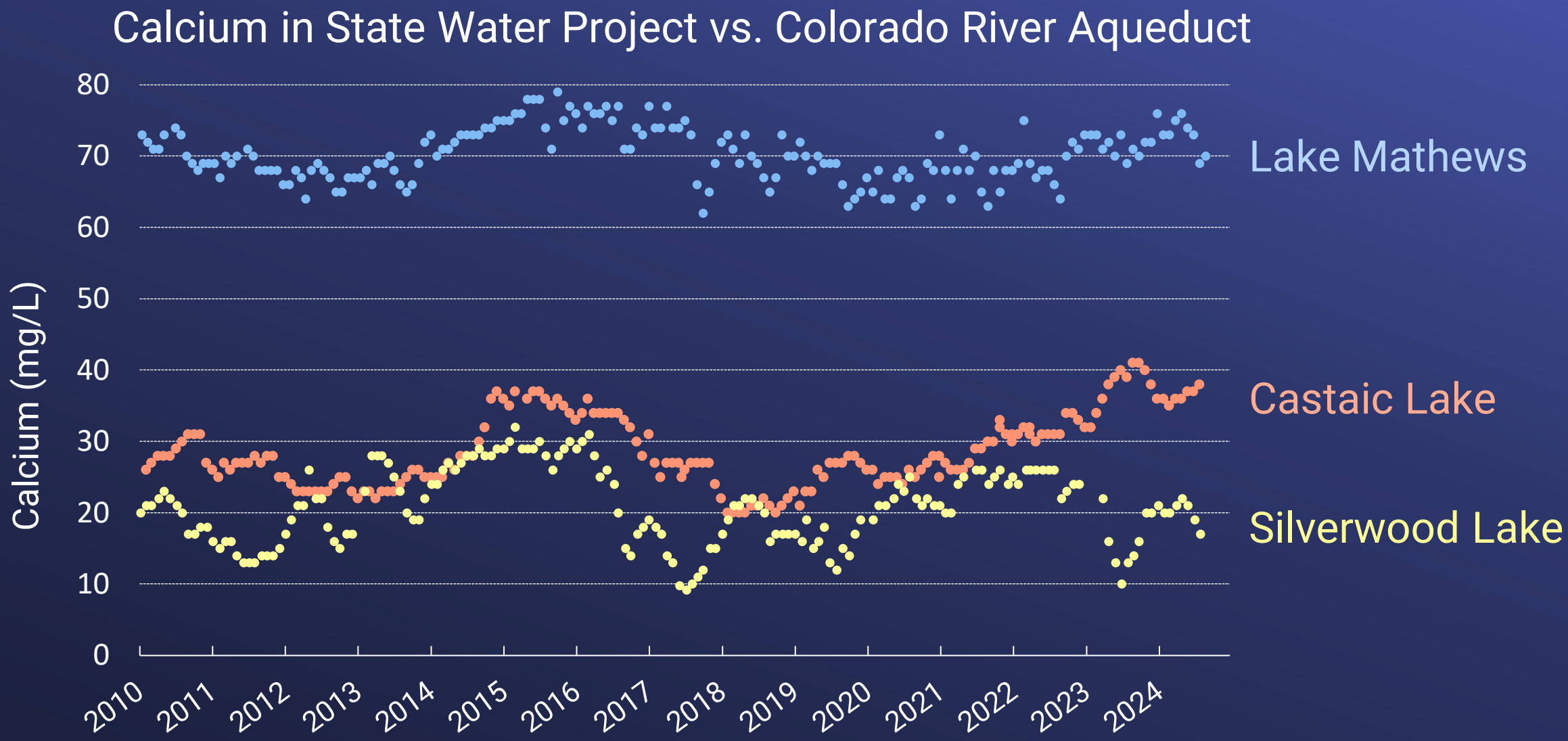


Foothill Pressure Control Structure veliger, 2023



Castaic Outlet Tower, Sept. 2024

Calcium in WB-SWP Supports Quagga Mussel Reproduction



Impact of Quagga Mussels on Current Operations

- Water leaving Castaic Lake is now considered to be infested
- More extensive monitoring of adults and veligers
- Control measures required to limit further spread and protect infrastructure
 - Raw water discharge plans for water deliveries and shutdowns
 - Implement control measures – percolation and/or filtration



Veliger Sampling at Castaic Lake



Veliger Monitoring by Microscopy



Filters for Raw Water Discharges

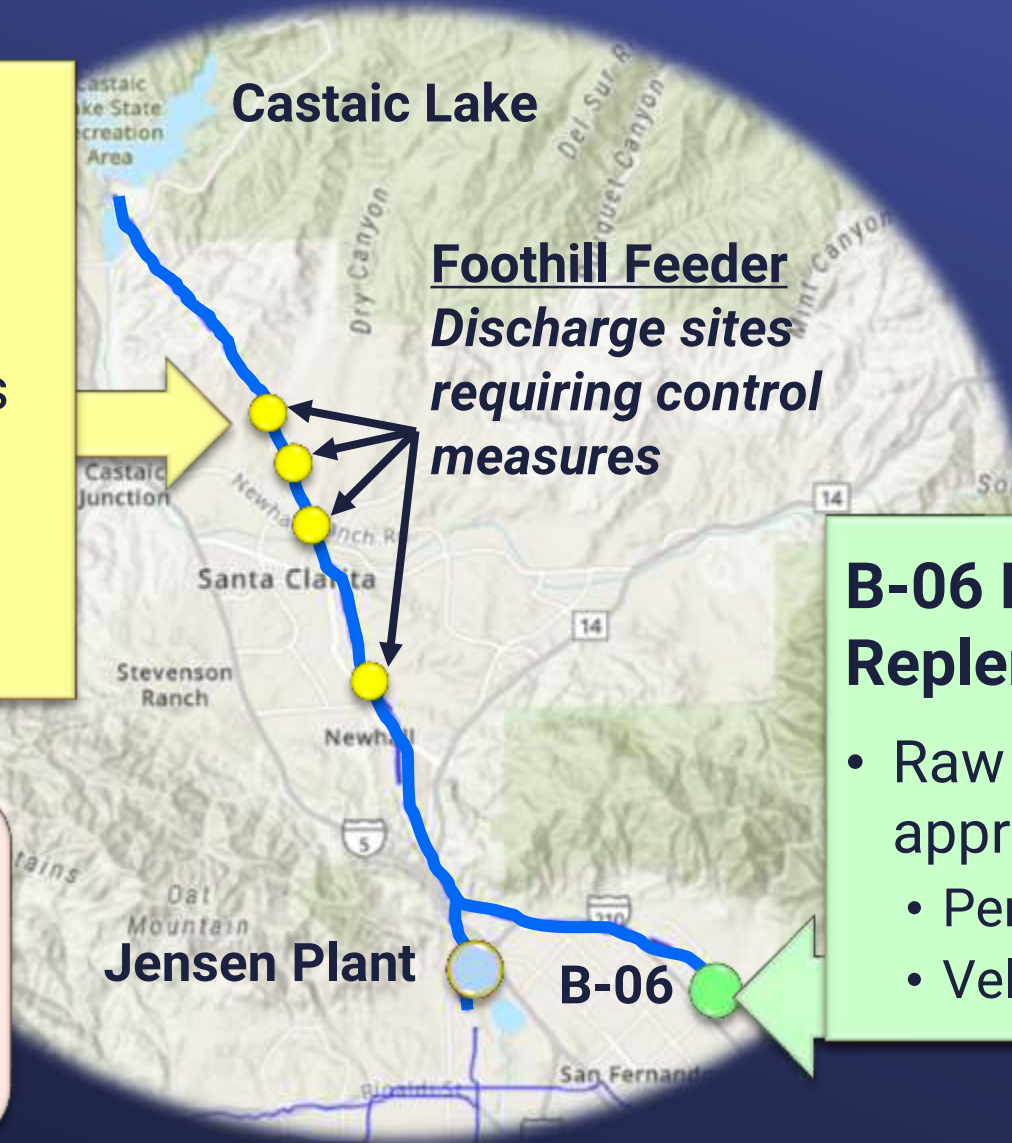
Quagga Mussel Impacts on Operations in WB-SWP

Foothill Feeder Shutdown

- Rescheduled from 2025 to 2026 to allow time to implement control measures
- Filtration
- Raw water discharge plan to be approved by CDFW

Next Steps

- Assess management and control options
- Coordinate with CDFW, DWR and other agencies



B-06 Delivery - Groundwater Replenishment, 2024-2025

- Raw water discharge plan approved by CDFW
 - Percolation
 - Veliger monitoring

New Invasive Mussels 2024



Golden Mussels

- Native to China and southeast Asia
- Similar to quagga mussels with impacts on infrastructure and operations
 - Veligers are free-swimming and migrate through water
 - Adults attach to solid surfaces
- Adapt to a wide range of freshwater environments
- Spread to at least nine countries in last 50 years
 - South America in 1990s

Global Distribution of Golden Mussels Prior to October 2024



Image credit: Boltovskoy, CC BY-SA 4.0

Global Distribution of Golden Mussels After October 2024

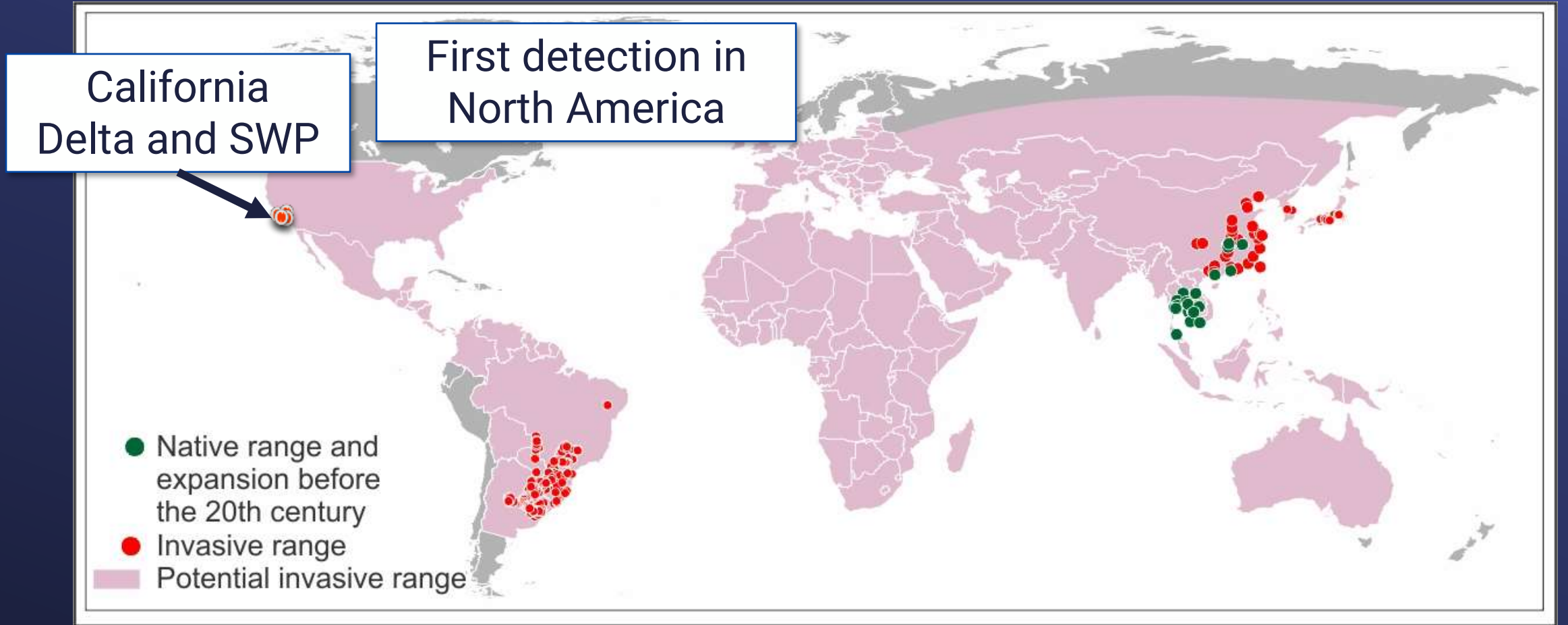
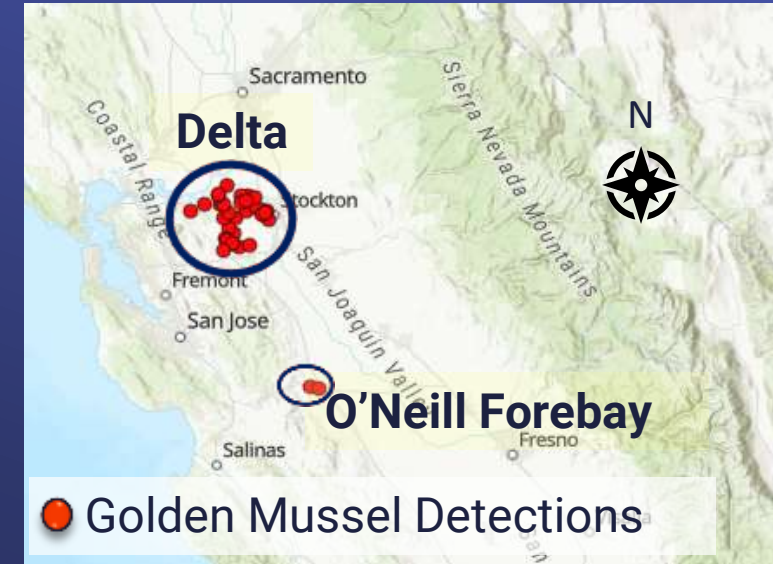


Image credit: Boltovskoy, CC BY-SA 4.0

Discovery of Golden Mussels in California Delta and SWP

- Adult mussels found in Port of Stockton and O'Neill Forebay at San Luis Res. in October 2024
- Subsequent inspections found mussels throughout the Delta
- Inspections implemented for boats leaving O'Neill Forebay
- California Fish & Game Commission added golden mussels to list of restricted species
- State taskforce formed to determine extent of invasion and assess control measures



Photos courtesy of DWR

Invasive Mussels in State Water Project

Next Steps

- Continue monitoring invasive mussels
- Assess management and control options
- Manage raw water releases when necessary
- Expand Quagga Mussel Control Plan to include golden mussels
- Coordinate with CDFW, DWR, and other agencies
- Provide updates to the Board and Member Agencies as needed

