Lake Berryessa Golden Mussel Prevention Plan

In October 2024, the California Department of Water Resources identified Golden Mussels in the Sacramento-San Joaquin Delta. As the water quality characteristics in Lake Berryessa are ideal for golden mussels and the Delta is within a one-hour drive to the Lake, it makes the Lake a high risk water body for infestation of golden mussels. A rapid response to prevent the introduction of these organisms into Lake Berryessa is imperative.

Action Plan

1. Effective immediately, all launch ramps at Lake Berryessa will be closed and the use of seals as part of the concession launch program will be implemented.

2. Any vessel wishing to launch at Lake Berryessa, must be quarantined for 30 days by being logged into the system and a red quarantine seal applied to the vessel. The vessel will not be allowed to launch on this date.

3. Vessels that have finished the 30-day quarantine may return to the lake and have the seal removed by authorized staff (e.g. SCWA, USBR, or Concessionaire) and will be allowed to launch. **If the seal has been removed, the quarantine is no longer effective and the vessel must restart the quarantine or go to No. 4 below.**

4. Any vessel wishing to launch sooner than the required 30-day quarantine period must have a hot-water decontamination performed by SCWA trained and approved staff. These vessels are allowed to launch immediately following decontamination.

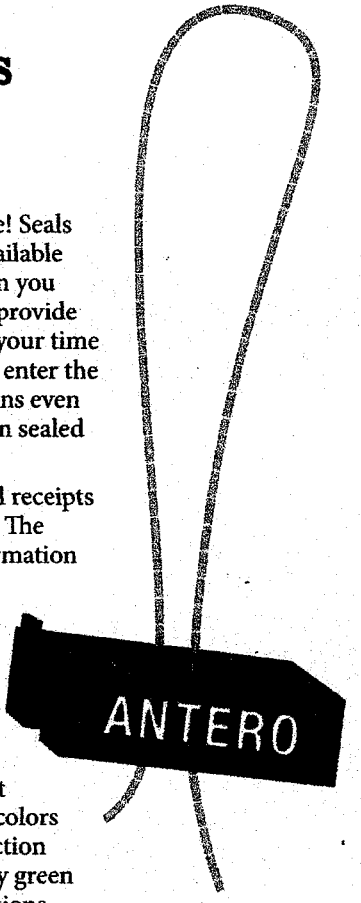
5. Upon exit from the Lake, all vessels must have a green seal attached by authorized staff to be allowed to return and freely launch at Lake Berryessa. If the green seal is removed, the vessel will need to undergo another quarantine period or decontamination.

6. Any vessels currently on the lake moored in slips may be used and are not subject to quarantine as long as they stay on Lake Berryessa.

In order to ensure continued adherence with these updated protocols, and to meet public demand for boat launch access to Lake Berryessa, SCWA has obtained permission from its board to purchase additional mobile decontamination units. Because Markley is one of the most active launch ramps on the lake, it will be in line to receive one of the first decontamination units, hopefully by mid December.

Concession and Reclamation employees will be WID Level II trained and be able to assist with decontaminating vessels. Current decontamination methods take between 30 to 60 minutes per vessel so there may be a charge for the decontamination process.

Go Green! Boat Inspection Seals Explained

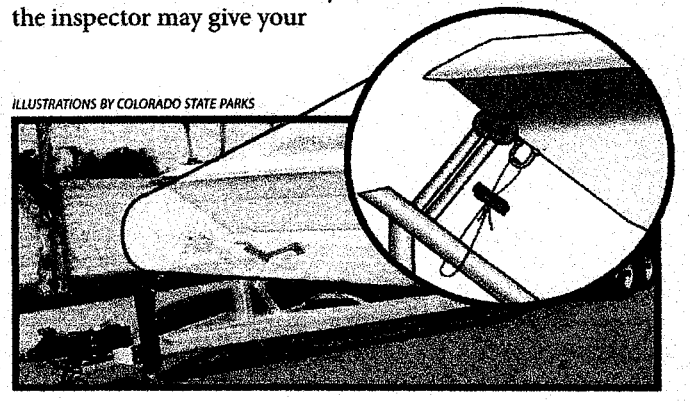


Green Seals

Green seals can save you time! Seals are free to boaters and are available at the inspection station when you exit a lake or reservoir. Seals provide documentation that reduces your time waiting in inspection lines to enter the water. Some inspection stations even open an express lane for green sealed boats on busy mornings.

Boat inspection seals and seal receipts are proof of prior inspection. The seal and receipt provide information about the last water your boat was at and the type of inspection performed there. Boat seals temporarily attach the boat to the trailer so that the inspector knows the boat has not launched since its last inspection. Several different colors are being used by boat inspection stations in Colorado, but only green seals are used across jurisdictions.

If you have a green seal, you must still stop at the inspection station to have the seal and receipt verified. In order for the seal to be valid, it must have a fully filled out receipt with a matching serial number. You will quickly be granted access if you are returning to the same location or if your boat has been out of the water for more than 30 days. If you are not returning to the same location or you have not been out of the water for more than 30 days, the inspector may give your boat a quick check to ensure it is clean and dry. If the boat is not clean and dry, you will get re-inspected. Keep your boat clean and dry and get on the water fast!



ILLUSTRATIONS BY COLORADO STATE PARKS

Boats are given green seals following an inspection or decontamination upon exiting a lake or reservoir with an inspection station, by request at the Denver or Grand Junction CDOW Offices or at one of the many marinas or marine dealers certified to do inspections. If one is not offered to you when you leave the lake or reservoir, be sure to ask for it!

What do yellow, blue, clear, and red seals mean?

Yellow, Blue, and Clear seals mean the same thing—they identify a boat that has exited a specific body of water and plans to return to that same body of water, such as overnight campers or permit holders. These other colored seals are **only** valid at the body of water in which the seal was applied. State Parks use yellow seals, the City of Aurora use blue seals, and the City of Westminster use clear seals to identify their returning boaters. If your boat has one of these seals and it doesn't return to the same water, it will be fully re-inspected at a different lake or reservoir.

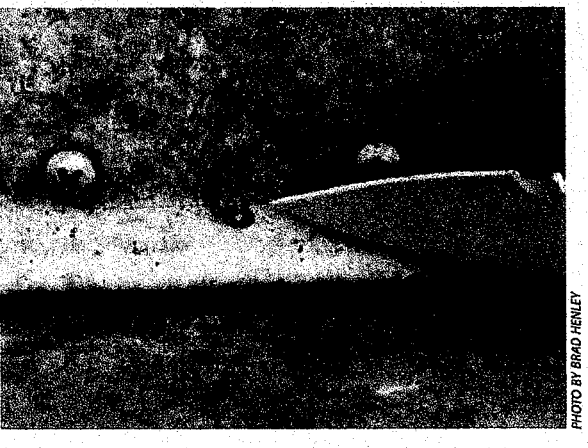


PHOTO BY BRAD HENLEY

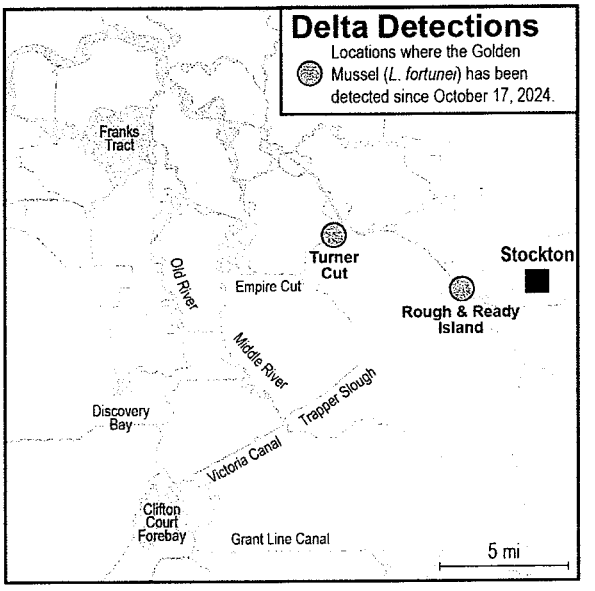
Red seals identify boats that are currently in a mandatory quarantine. Keeping a boat out of the water for a certain length of time based on temperature and humidity (usually more than 7 days) is an acceptable form of decontamination for ANS (zebra or quagga mussels can live out of the water for up to 30 days). However, the ANS must still be removed from the boat following the quarantine. Red seals are used by the City of Aurora, City of Boulder, and City of Westminster. These municipalities opt to use red seals to identify quarantined boats to protect their waters from ANS. If you go to a different water body with a red seal, your boat will be fully re-inspected and possibly decontaminated.

Golden Mussel (*Limnoperna fortunei*)

A new invasive mollusk was discovered in the Delta in October 2024.

Fast Facts

- Golden Mussels (*Limnoperna fortunei*) were found at Rough & Ready Island near Stockton, California on October 17, 2024.
- The Golden Mussel has been identified as one of the **highest-risk** invasive species globally
- This is the **first-ever** detection of the Golden Mussel in North America.
- Capable of rapid spread (> 240 km/yr in Brazil), these mussels post an **immediate and urgent threat** to both the Delta ecosystem and water-based built infrastructure.
- DWR is contributing to a multi-agency team to monitor and report Golden Mussel sightings and coordinate on possible strategies for control and eradication.



Map showing locations where the Golden Mussel has been found in the Sacramento – San Joaquin Delta.

Physiology & Ecology

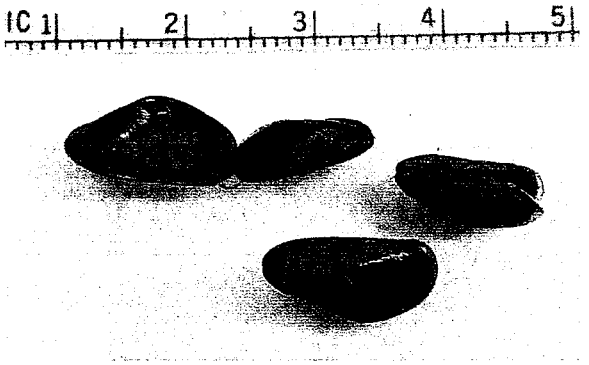
Physical Description: Golden Mussels are sessile (non-moving) bivalves (two-shelled mollusks) whose color varies from a light golden to darker yellowish-brown and brown hues. Adult shells are typically 2-3 cm in diameter, with some reaching sizes of >4 cm. Golden Mussels typically grow in dense, reeflike colonies containing as many as 200,000 organisms per square meter.

Habitat: Originating from China and southeast Asia, Golden Mussels now inhabit shallow (< 10 m), freshwater aquatic environments worldwide. They tolerate many environmental stressors including wide ranges of temperature, pollution, and low oxygen. Preferring fresh water, Golden Mussels can nevertheless tolerate salinity of up to 10 ppt for as much as 30 days (Sylvester et al., 2013).

Life History: Larvae develop into a mobile life stage (i.e., veligers) that propagate through water bodies before reaching the settling stage roughly 11-20 days after spawning. They then colonize hard surfaces and grow into adult mussels, remaining attached for the rest of their life span.

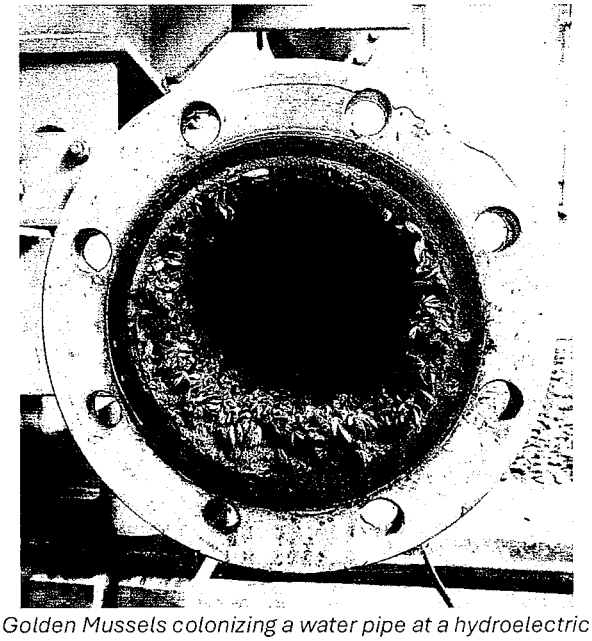
Ecosystem Impacts: Golden Mussels are effective ecosystem engineers capable of catalyzing environmental changes equivalent to those caused by Zebra and Quagga Mussels in the Great Lakes. They can dramatically reduce plankton abundance, leading to broad food web impacts. Their ability to rapidly colonize surfaces jeopardizes infrastructure in any infested water bodies.

Monitoring Notes: Golden Mussel colonies typically attach to solid substrates. They are found piers, moorings, rocks, boats, and other submerged objects but can survive subaerial exposure in tidal systems (Boltovskoy et al., 2022). The do not inhabit in soft sediments and are therefore unlikely to be detected using typical benthic monitoring approaches (e.g., grabs and cores).

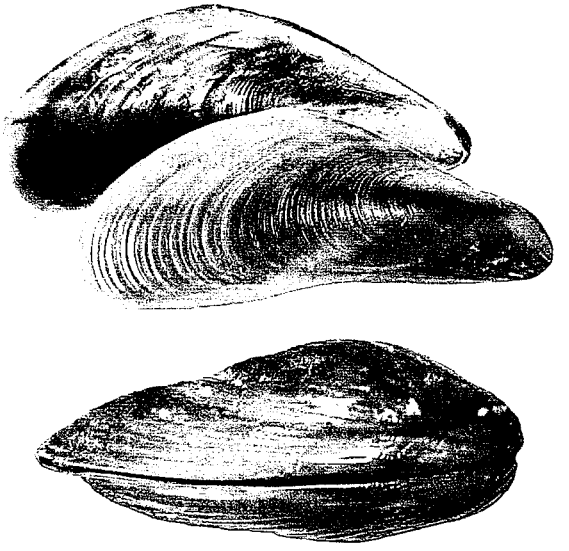


Golden Mussel shells collected in October 2024 at a water quality station at Rough & Ready Island near Stockton in San Joaquin County, California, USA. Photo: Elizabeth Wells, Ph. D. (DWR)

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



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



*Shells of the invasive Golden Mussel (*Limnoperna fortunei*) showing general morphology (Boltovskoy, 2017).*

References

Boltovskoy et al. (2022) "What we know and don't know about the invasive golden mussel *Limnoperna fortunei*" *Hydrobiologia*. pp 1-48. doi: 10/npxb.

Fusaro et al. (2024) *Limnoperna fortunei*: U.S. Geological Survey, Nonindigenous Aquatic Species Database and NOAA Great Lakes Aquatic Nonindigenous Species Information System.

Moutinho (2021) "A Golden Menace" *Science*. Vol. 374(6566), pp. 390–393. doi: 10/npkd.

Sylvester et al. (2013) "Fluctuating salinity improves survival of the invasive freshwater golden mussel at high salinity: implications for the introduction of aquatic species through estuarine ports." *Biological Invasions*. Vol. 15, pp. 1355–1366. doi: 10/gvxd4c.