



— BUREAU OF —
RECLAMATION

Lake Berryessa Golden Mussel Prevention Plan

Lake Berryessa

California Great Basin Region



1. Introduction

On November 14, 2024, Lake Berryessa Field Office, Central California Area Office, and California Great Basin Regional Office employees met with Solano County Water Agency, direct managed concessions and Napa County Managing Partner colleagues to discuss the California Department of Water Resources identification of Golden Mussels in the Sacramento-San Joaquin Delta in October 2024. While no direction had been received by that date to respond to the threat, those assembled reached a consensus on the need to take immediate action by developing and implementing a Golden Mussel Prevention Plan to protect water and recreation resources at Lake Berryessa.

1.1 Lake Berryessa

Lake Berryessa is the Solano Project reservoir owned by the U.S. Bureau of Reclamation (Reclamation) and operated under a cooperative agreement by the Solano County Water Agency (SCWA)/Solano Irrigation District. The project provides flood control protection to the City of Winters and other downstream communities, as well as high-quality water supply for irrigation and the cities of Vacaville, Suisun City, Vallejo, and Fairfield.

At capacity, Lake Berryessa stores 1.6 million acre feet of water and is one of the largest bodies of fresh water in California. The lake is 23 miles long, 3 miles wide, with 165 miles of shoreline. Nestled between Blue Ridge and Cedar Roughs, east of the Napa Valley, Lake Berryessa offers year-round recreation opportunities. Berryessa's water reaches temperatures of up to 75 degrees in the summer, making it an ideal place for water sports. Anglers enjoy fishing for both cold and warm water species, such as rainbow trout, bass, catfish, crappie, and bluegill.

1.2 Existing Mussel Prevention Program

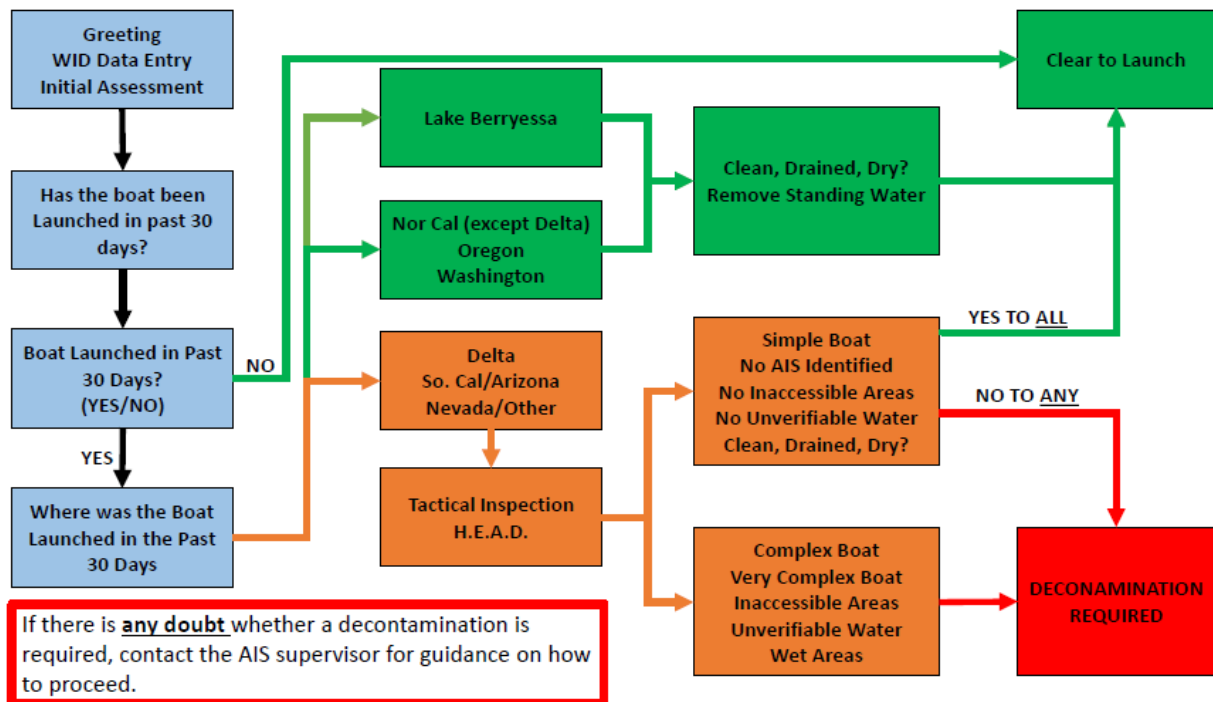
Reclamation, SCWA, and Lake Berryessa Concessioners have for years participated in a mussel prevention effort.

1.2.1 Early Detection Monitoring

Reclamation staff perform plankton tows on a monthly basis April-September during the busy recreation season. Collection points focus on areas boaters are likely to congregate including Capell Cove Launch Ramp, Monticello Dam, and under Putah Creek Bridge. SCWA conducts plankton tows and water quality monitoring year-round in addition to monitoring a series of early detection colonization devices on floating restrooms and no-wake buoys around the lake.

1.2.2 Watercraft Inspection

When staff is available, Concessioners, Reclamation employees, and SCWA staff conduct watercraft screening and inspection at all 6 launch ramps currently operating around the reservoir. Watercraft that have been cleaned, drained, and dried for 30 days are eligible to launch immediately at Lake Berryessa. Vessels that have not launched from a water body with a known infestation are immediately cleared to launch. Vessels who do not meet either criteria must be inspected, and if found to be in a condition warranting additional caution due to a lack of cleanliness or the presence of standing water, wait 30 days to launch or arrange for a decontamination. During the busy recreation season, SCWA traditionally supplies a cadre of interns to conduct screenings and inspections at launch ramps across the lake.



SCWA has developed a concessionaire incentive program to encourage inspections and the use of seals to mark boats last retrieved from Berryessa. Concessioners are offered a small amount of monetary compensation for every vessel on which a tag is applied between the bow eye and the trailer so that upon return to the Lake, processing through the vessel screening and inspection is expedited.

1.2.3 Decontamination

SCWA personnel currently operate two decontamination units by appointment only. Depending on the complexity of the vessel, decontaminations take two employees 30 to 90 minutes to flush all compartments and systems with pressurized hot water.

1.2.4 Education

Reclamation maintains one remaining billboard along Berryessa-Knoxville Road promoting the Clean, Drain, Dry message. Reclamation and SCWA employees maintain a stock of educational materials for use in the Dufer Point Visitor Center and tabling events throughout the North Bay.

1.3 Golden Mussels

With the recent discovery of adult golden mussels throughout the Sacramento Delta, a rapid response to prevent, or slow, the introduction of these organisms into the Lake is imperative.

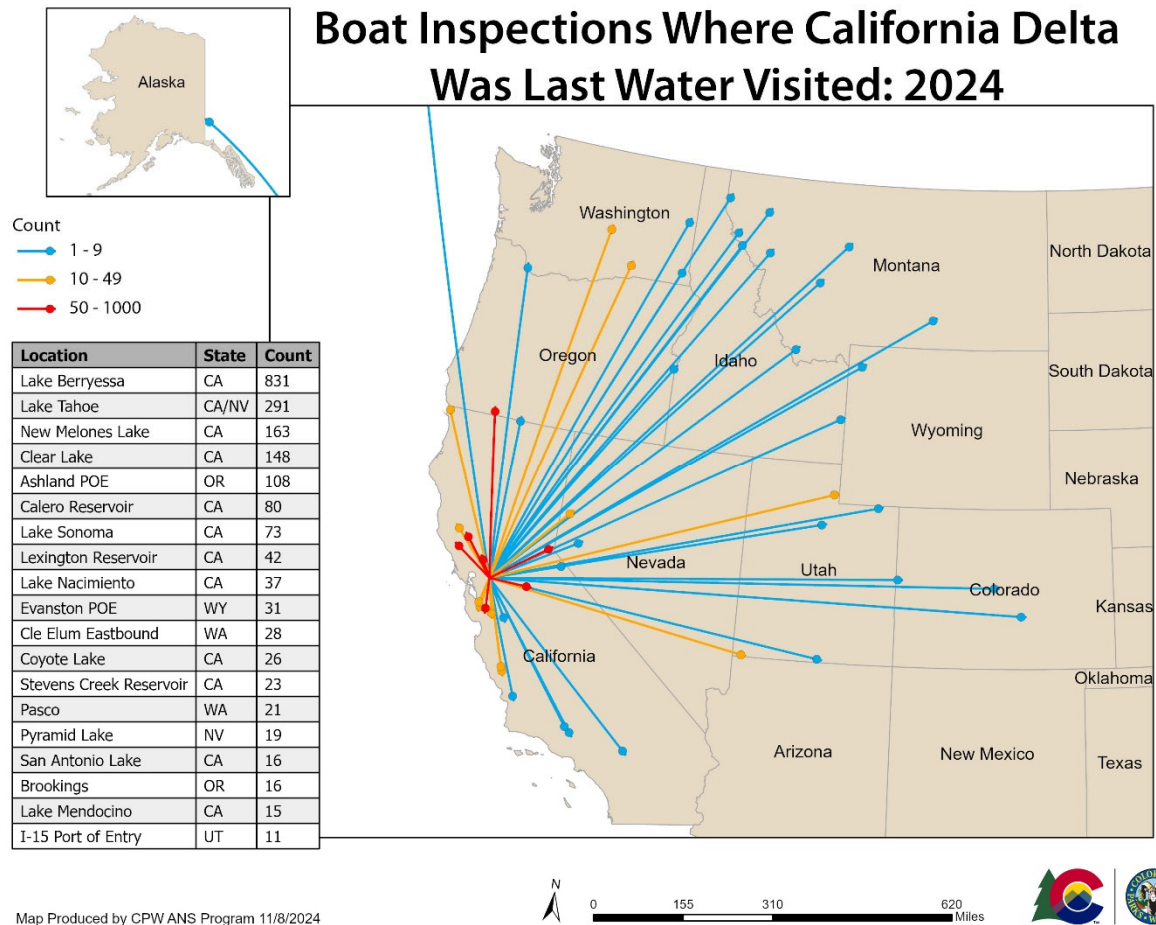
Species Comparison

Parameter	Numeric Value		References
	Q/Z mussels	Golden mussel	
Calcium	10-25 mg/L	1–50 mg/L	Mackie and Brinsmead 2017
Salinity	≤4 ppt	0–3 ppt; up to 23 ppt w/ FW pulses	Sylvester et al. 2013
Temperature (adult survival)	1-32 °C (34-90°F)	5–35 °C (41-95°F)	Oliveira et al. 2010
Temperature (spawning)	12-18 °C (54-64°F)	16–28 °C (61- 82°F)	Darrigran et al. 2003
Temperature (larval devel)	20-22 °C (68-72°F)	16– 28 °C (61- 82°F)	Ricciardi 1998
pH	7.4-8.4	5-10	Yang et al. 2023
DO	0.1–13.3 mg/L	3.7–11.2 mg/L	Mackie and Brinsmead 2017
Depth	≤ 50m (164 ft)	0.5 – 40m (1.5-131ft) , 10m* (33 ft)	Darrigran 2022
Sexual Maturity (shell size)	8–9 mm (~½ in)	6-8 mm (~¼ to ½ in)	Xu et al. 2013

The primary mode of transport of these mussels occurs while they are in the larval free-swimming life stage and are microscopic in size. Therefore, they can be easily transported in various compartments (e.g. live wells, ballast tanks, bilges, engine systems and storage compartments) of recreational watercraft from one waterbody to another in a very short timeframe. As the water quality characteristics in the Lake 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.

As golden mussels take several months to reach sexual maturity, the determination of whether golden mussels are present or absent in the Lake may not be made in a short timeframe. If larval mussels are introduced through recreational methods, the amount of dilution that would occur with the relatively small number of free-swimming organisms would make them nearly impossible to detect. Settled juvenile or adult mussels can also be difficult to locate and the most common method for early detection using plankton tows will likely not show the presence of golden mussels until adult organisms have begun spawning, releasing hundreds of thousands, if not millions, of eggs into the water.

2. Action Plan



Given that the Golden Mussels are able to thrive in an environmental niche that is much broader than the zebra and quagga mussels already screened for, and that Delta boaters are more likely to visit Lake Berryessa than any other water body, Reclamation, its concessioners, its partners, and SCWA have elected to increase their oversight of boat launching and add Delta launch sites to the list of the infested water bodies we screen out before launching.

2.1 Early Detection Monitoring

SCWA intends to continue and expand monitoring of its early detection colonization devices and conduct plankton tows on a bi-monthly basis throughout the year.

2.2 Watercraft Inspection

Reclamation, SCWA, and Lake Berryessa Concessioners and Partners will work together to improve compliance with the Lake's existing invasive mussel protocol.

Effective November 14, 2024, all Sacramento-San Joaquin Delta launch points, as well as San Luis Reservoir and the O'Neill Forebay will be treated as infested waterbodies for the purposes of screening-out at-risk vessels. This includes all agency vessels including, but not limited to, Reclamation, SCWA, the Napa County Sheriff's Office, CHP, AMR Ambulance, DWR, PG&E, and California Department of Fish and Wildlife.

On November 14, 2024, The Lake Berryessa Park Manager provided formal direction to all concessioners to bar the launching of vessels visiting from the Delta until an updated prevention protocol is approved and enacted.

Effective November 14, 2024, all concession launch ramps around the lake will limit their hours of operation to dates and times when staff are available to conduct vessel screenings, inspections and seal application and removal.

On November 14th, 2024, Capell Cove Launch Ramp is temporarily closed until a sustainable staffing plan is implemented. In the meantime, the site will be available for use by Special Event Permit, provided event organizers are able to arrange with Reclamation and SCWA personnel in advance to meet the updated requirements in this protocol.

Effective November 25, 2024, use of seals as part of the concessionaire incentive program will be implemented.

Beginning in 2024, Reclamation Park Rangers reached out to all special event permit holders and applicants to ensure procedures are in place for mussel screenings, inspections, quarantines, and/or decontaminations for all permitted events.

2.3 Seal Implementation

Effective November 25th, 2024, any vessel wishing to launch must be inspected, logged into the WID system and a red quarantine seal shall be applied for 30 days, and the vessel will not be permitted to launch at that time. The seal must remain intact, and the vessel will not have been launched in any other waterbody during the quarantine period.

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.

Red quarantine seals are currently applied for free at the following sites:

- Gone Fishin' Marine: 1880 N Lincoln St, Dixon, CA 95620, Tuesday-Friday 9am-5pm, Saturday 9am-4pm.

- Family Marine: 265 Benton Court, Suisun City, CA 94585, Monday- Friday 9am-3pm, Saturday by appointment only (*Please call ahead at 707-673-2700*)
- Sweeney's Sports: 835 Lincoln Avenue, Napa, CA 94558, Tuesday-Saturday by appointment only, 2pm-5pm. (*Please call ahead to make an appointment at 707-255-5544*)
- A Small Fishing Boat: 11383 Pyrites Way, Rancho Cordova, CA 95670, Tuesday – Friday: 9:00am – 5:00pm, Saturday: 10:00am – 4:00pm (*Please call ahead at 916-737-2628 to make sure that the store is open*).
- Solano County Water Agency Office Parking Lot: 810 Vaca Valley Pkwy #202, Vacaville, CA 95688, Mon-Fri 9am-3pm
- Jensen Marine: 1237 Fortna Ave, Woodland, CA, 95776, Monday-Friday, 9am-4pm (*Please call ahead at 530-662-7755 to make sure that the store is open*).
- A-Team Marine: Please call ahead at 530-304-5379 to schedule a time to receive your red seal
- Hillside Powersports & Marine, 2575 So Main Street, Lakeport, CA, 95453, 707-263-9000, Tues-Sat 9am-5pm (707-263-9000)
- All boat launches around Lake Berryessa
 - Markley Cove
 - Pleasure Cove
 - Steele Canyon
 - Spanish Flat
 - Putah Canyon
- Dufer Point Visitor Center: 5520 Knoxville Road, Napa, CA 94558, Saturdays from noon to 3 pm by appointment. Call (707)905-7896.

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. Should a vessel be decontaminated at another facility or by another entity, that decontamination will not be valid unless a seal is applied to the vessel.

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

All trailered watercraft (including non-motorized watercraft) require a quarantine or decontamination prior to launching at Berryessa. Non-trailered watercraft with combustion engines, or stand-alone outboard motors also require a quarantine or decontamination prior to launching at Berryessa. Hand launched watercraft with electric trolling motors, like fishing kayaks, do not have to quarantine. Non-motorized watercraft, such as kayaks and paddleboards, are encouraged to be inspected for free at any watercraft inspection station, or if you are instructed to do so by trained staff at popular launch locations. All paddlers are encouraged to arrive Clean, Drained, and Dry.

Concessionaires are encouraged to participate in the seal program as part of the SCWA concessionaire incentive program.

2.4 Decontamination

As of November 14th, 2024, SCWA has obtained permission from its board to purchase additional mobile decontamination units. Currently SCWA has fabricated four additional units that will be deployed around the lake. Once SCWA defines how liability for the decontamination units that will be used shall be addressed, concession and Reclamation employees will be WID Level II trained and be able to assist with decontaminating vessels at their facilities.

2.5 Education

SCWA anticipates installing additional signage along State Route 128 and at boat launches in addition to utilizing digital marketing and radio broadcasts.

On November 15, 2024, California Great Basin Region Public Affairs (PAO) issued a press release to announce the temporary closure of Capell Cove and the ban on recent Delta vessels. On November 25, 2024, PAO issued a second press release to announce the implementation of the seal program. Field Office Staff are following up with Public Affairs to continue to advertise the program with tentative plans for a social media post and an Open House.

Additional posters and handouts have been prepared for residents of the Berryessa Estates Community who will be self-patrolling their launch site. The Berryessa Pines community has been briefed on the change in launching protocol and residents have been invited to receive their seals from the Dufer Point Visitor Center.

3. Sustainability

In order to ensure continued adherence with these updated protocols, and to meet public demand for boat launch access during the busy recreation season, additional steps will need to be taken.

3.1 Capell Cove Staffing Plan

Reclamation directly manages Capell Cove Launch Ramp. The majority of use fees and mussel screening and inspections were conducted on the honor system as the Field Office's structure currently does not include positions to staff the launch ramp.

Field Office staff are reviewing options to reopen the ramp including adding staff with appropriations, seeking mussel intern funding through the Regional Office's Mussel Program,

advertising a business opportunity, or establishing a Park Host opportunity. In the meantime, the Lake will need to rely on Concessioners to provide early and late launching opportunities.

3.2 Special Event Permitting and Coordination

SCWA will work closely with USBR and CDFW regarding staffing special events. Currently CDFW is reaching out to all fishing tournament organizers to adjust tournament dates so that Delta tournaments do not fall within the required 30-day Lake Berryessa quarantine window. However, these watercrafts must still adhere to the Lake Berryessa seal implementation or decontamination programs.

3.3 Concession Decontamination Rate Approval

Monetizing decontaminations is a valuable incentive for our concessionaires. It is anticipated that Reclamation would need to amend concession contracts to include this new service. Prior to implementing Decon rates, all partners will need to advertise a date to end free decontaminations.

3.4 Improved Decontamination Infrastructure

Current decontamination methods available at Lake Berryessa take between 30 to 90 minutes per vessel. As technology improves, investment in infrastructure such as dip tanks ([Lake Powell AIS Boat Decontamination Dip Tank \(May 2021\) - YouTube](#)) that improve decontamination efficiency, and safety may be worthwhile.

3.5 Update Napa County Ordinances

SCWA and Reclamation staff will work with Napa County to re-open an effort to receive approval for a new Napa County Ordinance to deter evasion of Lake Berryessa's Invasive Mussel Prevention Protocol.

3.6 Seal Reciprocity

Reclamation staff and SCWA are defining the parameters that mussel prevention programs must meet, or exceed, to be eligible for a reciprocal launch program. This would lessen the burden on local vendors to supply all quarantine seals and on boaters to travel to a distant quarantine site a month before launching.

As of May 16, 2025, Launch Ramps at Lake Berryessa will honor any sealed vessels meeting the following criteria:

- 30-day red quarantine seals, from any agency, recorded as having completed a 30-day quarantine in the WID system.
- Seals from other agencies, or states, that have been applied to watercraft for a period of 30 days or longer and are recorded in the WID. These seals may be any color.
- Seals from a waterbody or state that does not use the WID system will be accepted if the seal had been applied to the watercraft for a period of 30 days or longer, and is accompanied by a physical paper receipt.
- Lake Tahoe Blue seals will be accepted due to the longevity and robustness of the Lake Tahoe AIS prevention and decontamination program.

Discussion about adding additional water bodies will occur in FY 26.