

**Clear Lake Integrated Preparedness Plan/Resilience Plan for Dreissenid Mussel
Management**

A Rapid Response and Transition to Containment Plan

Signature Page

Acknowledgements

Citation

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Executive Summary

To be populated upon completion

Purpose of the Plan

The purpose of this *Integrated Preparedness Plan/Resilience Plan for Dreissenid Mussel Management* is to improve the preparedness capabilities of Clear Lake water managers to protect Clear Lake water resources in the event of an invasive dreissenid mussel introduction and/or establishment. The plan provides guidance to prepare partners and other entities to efficiently and effectively respond to a dreissenid mussel detection to minimize spread within and beyond Clear Lake, and protect natural, recreational, cultural, economic, and other resources. This plan is intended to build upon the *Lake County Quagga and Zebra Mussel Prevention Plan* (2019), which guides prevention efforts associated with an introduction and establishment of dreissenids in Lake County water bodies. The contents of this plan are limited to containment via overland transport (i.e., watercraft), which is within the jurisdiction of Lake County Water Resources Department (LCWRD), and acknowledges the critical role the LCWRD plays in preventing the spread of dreissenids through containment and potential control efforts.

Objectives and Capability Targets

The plan will be used to routinely test core capabilities associated with prevention and response. Core capabilities include:

- **Planning** – Identify critical objectives, describe the sequence and scope of tasks to achieve objectives, ensure objectives are implementable, and develop and execute actions in coordination with regional jurisdictions.
 - **Capability Target** – Within one week of a dreissenid confirmation, describe the roles and responsibilities of partner organizations involved in incident management response across all jurisdictions, and sequence the scope of tasks needed to prevent, protect, mitigate, and respond to the introduction.
 - **Capability Target** – Maintain, on a regular basis (i.e., quick annual review and thorough 5-year review), this *Integrated Preparedness Plan/Resilience Plan for Dreissenid Mussel Management*, to ensure roles and responsibilities across jurisdictions as well as sequence and actions needed to prevent an introduction and/or establishment of dreissenids, is understood.
- **Public Information** – Deliver coordinated, prompt, reliable, and actionable information to the whole community through clear, consistent, accessible, culturally competent and appropriate methods¹ to relay information regarding the dreissenid detection as well as actions being taken.
 - **Capability Targets**
 - Within 24 hours of a dreissenid detection, notify CDFW QZM-AIS Regional Coordinator (Environmental Scientist) and invasive species hotline @ invasives@wildlife.ca.gov and/or Invasive Species Program @ 866-440-9530.

¹ Based on best available science/laboratory methods and standardized field methodologies.

- Within one week of a dreissenid detection, and within three days of a dreissenid confirmation, deliver reliable and actionable messages with the public and collaborators that define the threat, describe actions being taken, and include required actions by the public and collaborators.
 - Capability Target – One month prior to taking action to attempt to eradicate, or limit the spread of dreissenids, deliver reliable messages to the public and collaborators about potential control actions and any necessary temporary closures, or shutdowns (e.g., municipal water suppliers, self-supplied water users).
- **Operational Coordination** – Establish and maintain a unified and coordinated operational structure and process that appropriately integrates all critical collaborators.
 - Capability Target – Within one week of a dreissenid detection, establish and maintain an Incident Command Structure (ICS) and process with partner organizations.
 - Capability Target – Annually test and update the *Integrated Preparedness Plan/Resilience Plan for Dreissenid Mussel Management*, validating roles and responsibilities and other core plan elements.
 - Capability Target – Ensure adequate resources exist to respond to an introduction of dreissenids in Clear Lake and neighboring regional water bodies by coordinating and positioning equipment (e.g., booms) in an easily accessible location, establishing protocols and procedures for accessing and replacing that equipment.
 - Capability Target – Share information about water body surveillance results across regional water body jurisdictions. Within one week of a dreissenid detection, provide notification to decision makers and partners involved in incident management of the current and projected situation.
- **Screening, Search, and Detection** – Identify, discover, or locate dreissenids through active and passive surveillance and search procedures including assessments, surveillance methods, or physical investigation.
 - Capability Target – Monitor Clear Lake and other county water bodies on a regular basis using plankton tows, settling plates, and physical observations to detect an introduction of dreissenids.
 - Capability Target – Per Chapter 15, Article IX,² ensure all watercraft launched in Clear Lake have both local inspection stickers and state mussel fee stickers, and are clean, drained, and dry prior to launch.
 - Capability Target – Ensure all high-risk watercraft launched in Clear Lake are inspected prior to launch.

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https://library.municode.com/ca/lake_county/codes/code_of_ordinances?nodeId=COOR_CH15RE_ARTIXWAVEI
NPR

- **Risk Management for Protection Programs and Activities** – Identify, assess, and prioritize risks to inform activities, countermeasures, and investments.
 - Core Capability – Annually conduct a review of relevant threats and hazards, vulnerabilities, and strategies for risk management covering publicly managed and/or regulated critical infrastructure (e.g., water delivery).

- **Response** – Implement appropriate actions to eradicate an introduction of, or limit the spread of, dreissenids within Clear Lake and other regional water bodies.
 - Core Capability – Per Title 14, Section 672.1(a)(1), within 60 days of a dreissenid detection, describe the suite of options available to eradicate, or limit the spread of, the dreissenid population, and obtain the necessary permits and marshal the necessary resources to effect action.

Background

Preparing for an Introduction of Dreissenids in Lake County

In December of 2022, the County of Lake Water Resources Department launched this project to develop an *Invasive Mussel Introduction Rapid Response and Containment Transition Plan for Clear Lake, in Lake County, California*. The overall goal for the project is to improve the current aquatic invasive species prevention program while preparing for an invasive quagga or zebra mussel (“QZ”) introduction into Clear Lake, or neighboring Lake County water bodies.³ Preparing for an introduction is a process to understand and determine potential control options and develop a containment strategy that can be implemented quickly and efficiently to reduce local economic, environmental, cultural, and social impacts as well as prevent the spread of invasive mussels in northern California and other uninfested western waters. Any potential response to an introduction of dreissenids to Clear Lake will vary based on a variety of factors, including the scope and extent of the infestation upon discovery. The materials and information provided in this report are guidelines, and are not prescription relative to the actions that would likely be taken.

Clear Lake Water Management and History

Clear Lake and its associated 520 square mile watershed are a complex ecosystem consisting of a large, shallow, eutrophic lake that is used for recreation, tourism, and municipal, domestic, and agricultural water supply and provides important habitat for fish and wildlife. The lake is California’s largest, natural freshwater lake located entirely within the state, has 68 miles of surface area, and an average depth of 26 feet.

The lake drains into the Sacramento River via Cache Creek (Lake County 2010). The major tributaries to Clear Lake, which flow primarily during the winter months and contribute 73% of

³ Clear Lake, Indian Valley Reservoir, Lake Pillsbury, Blue Lakes, Hidden Valley Lake and Highlands Springs Reservoir.

the total stream flow into Clear Lake, include Scotts and Middle Creeks (northwest) and Kelsey Creek in Big Valley (south) (Lake County 2010).

Extensive modifications of the lake, shoreline, and watershed since the mid-1800s have resulted in an 85% loss of natural wetlands as well as nitrogen and phosphorus cycling imbalance contributing to frequent cyanobacteria algal blooms (Giusti 2009). Several water purveyors have developed cyanotoxin management plans (Highlands Mutual Water Company 2016) to prepare for and mitigate risks from harmful algal blooms and cyanotoxins in Clear Lake to protect public drinking water. Clear Lake was added to the federal Clean Water Act Section 303(d) list of impaired water bodies for nutrients in 1986 (Lake County 2010). The Lake County Clean Water Program established a *Program Effectiveness and Improvement Plan* in 2021 to mitigate polluted stormwater runoff, and in particular, high priority pollutants of concern (phosphorus associated with sediment and nutrients) and increases in peak flows caused by development (EOA 2021). Drought, mining, chemicals, and invasive species have contributed to water and natural resource impairments:

- Extended periods of drought correlate with increases in phosphorus in all three arms of the lake (Suchanek et al. 2002, De Palma-Dow et al. 2022). A major factor in the stimulation and persistence of cyanobacteria blooms in Clear Lake relates to periods of anoxia (during periods of calm) that reduce dissolved oxygen and may act to release phosphorus from the sediments, followed by periods of active water column mixing (windy periods) which distribute those nutrients throughout the water column (Florea et al. 2022).
- Clear Lake contains elevated levels of mercury caused by the Sulphur Bank Mercury Mine, an open pit mercury mine on the Oaks Arm of Clear Lake. The mine opened in 1865, became an open pit mine in 1927, ceased operations in 1957, and is now a Superfund site (Lake County 2010).
- Dichlorodiphenyldichloroethane (DDD) was applied to Clear Lake in the 1940s and 1950s to control the Clear Lake gnat (*Chaoborus astictopus*), a nuisance to residents and recreationists (Giusti 2009). Contamination of the ecosystem and collapse of Western Grebe populations occurred.
- Introduction and establishment of non-native fishes and invasive plants, such as Hydrilla (*Hydrilla verticillata*), have displaced native fish species (Giusti 2009, Feyrer 2019).

Drinking Water Systems that Draw Water from the Clear Lake Watershed

Clear Lake provides drinking water to 60% (serving ~40,000 people) of the population of Lake County and provides a reliable water source for nearby agriculture within the basin and downstream through Yolo County and to the California Central Valley. Clear Lake has been described as the county's most valuable asset, providing economic and ecological stability to the entire region. The popularity and accessibility of Clear Lake combined with its ideal water quality conditions suitable for mussel establishment, make the risk of an invasive mussel invasion extremely high (Lake County Watershed Protection District 2019).

According to the California Rural Water Association (CRWA), there are a total of 17 Clear Lake utility surface water systems with a total of at least 17,545 service connections that draw water from the lake (Appendix A).⁴ Stored water is managed by Yolo County Flood Control and Water Conservation District.

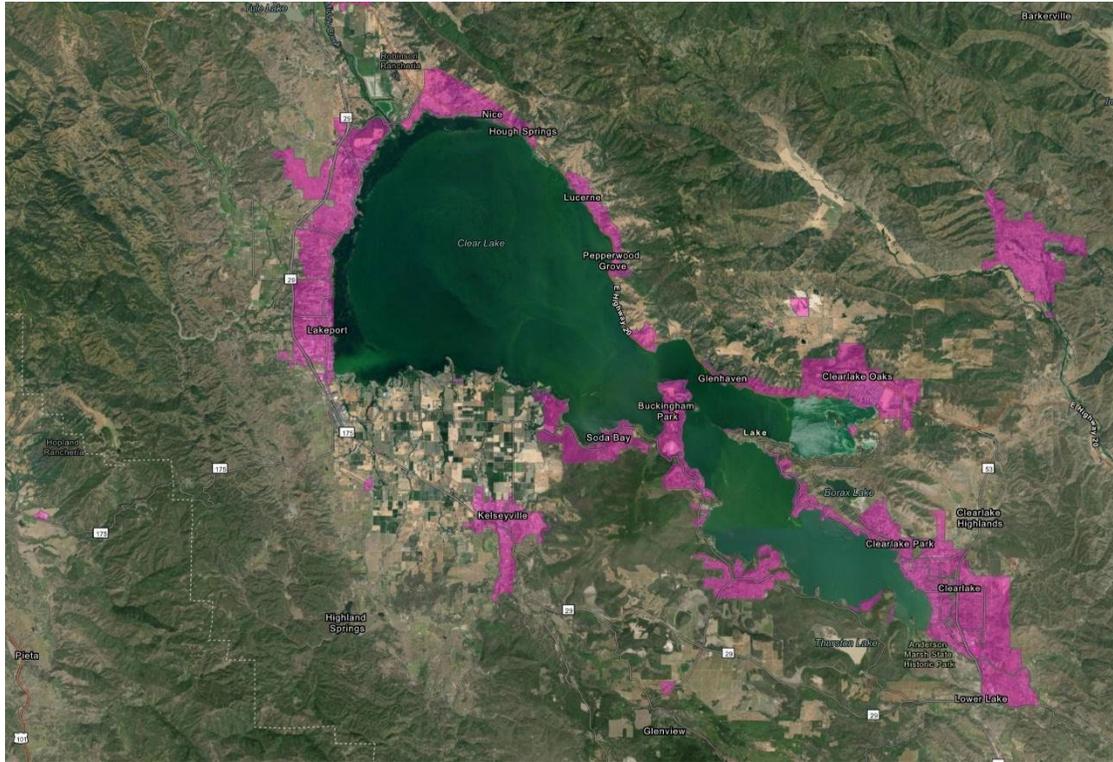


Figure 1. Clear Lake Water System Area Boundaries. Source: California Water Boards Water System Area Boundaries map. Accessed 26 Dec 2022.

The water level in Clear Lake has been manipulated by operation of the Cache Creek Dam since 1914 (Highlands Mutual Water Company 2016). The Yolo County Flood Control and Water Conservation District owns the rights to use the water in the lake (Suchanek et al. 2002) and regulates the depth of the lake (determined by the Rumsey gauge) between 0–7.56 feet, under non-flood conditions and 0–9.00 feet under flood conditions (Lake County 2010). Clear Lake can drop from 3–6.5 feet in any given summer and fluctuates 5.5 feet each year on average (Lake County 2010). If the lake falls below 3.22 Rumsey on May 1, Yolo County receives no water; it receives increasing amounts of water up to 150,000 acre-feet, when the lake is full (Lake County 2010).

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<https://gispublic.waterboards.ca.gov/portal/apps/webappviewer/index.html?id=272351aa7db14435989647a86e6d3ad8>

There are numerous private self-supplied water users that extract water from Clear Lake. These entities are not required to report their water use, therefore no estimates exist for number of users, nor the amount of water they obtain from Clear Lake.

The drinking water treatment rates in Clear Lake are among the highest in the state of California because of existing Clear Lake water quality issues and conditions, including harmful algal blooms, which are predicted to worsen with climate change stressors (Kennard 2021). Although Lake County surface water systems adequately remove microcystins from finished drinking water, the cost to treat the water is proportional to the presence of harmful algal blooms, and funding has not been identified to adequately address predicted water treatment costs (Kennard 2021).

Clear Lake Recreation and Tourism

Lake County's economy is based largely on tourism and recreation. In 2021, travel-related spending totaled \$175.7 million, and state and local tax revenue totaled \$13.6 million (Dean Runyon Associates 2022). Travel-related industry employment in the county was the highest on record in 2021 and contributed to 1,820 jobs (Dean Runyon Associates 2022).

Clear Lake has about 100 miles of shoreline and nearly 10 miles of public access, including public parks, open space, Caltrans right-of-ways, road ends, islands, and county-owned property ([Konocti Regional Trails](#)). [An online map](#) provides access points with and without amenities. Appendix B lists the Clear Lake marinas, boat rental facilities, public boat launches, marine services, and sailing facilities on Clear Lake. There are currently 11 free public boat launches, and five marinas and harbors are open year-round to trailered vessels. Lake County Department of Public Services maintains 13 free public swim beaches on Clear Lake. California State Parks owns and operates Clear Lake State Park, which has both beach access and boat launch facilities, and Anderson Marsh State Historic Park, which boasts non-motorized water trails. Both of these parks are significant attractions for lake visitors. Clear Lake has at least 20 private resorts with launch ramps, and numerous private access points. There are at least 749 private or public access points on the lake; about 450 access points are accessible by motorized vessels.

Clear Lake hosts thousands of visitors, and their watercraft, each year. The pre-pandemic 2017 Lake County Q/Z mussel mandatory boater sticker program documented the sale of more than 6,000 resident vessel stickers and more than 9,000 non-resident vessel stickers. Although global pandemic and drought complications reduced travel and access to Clear Lake, about 15,000 stickers were sold annually in 2020–2022.

Bass Master Magazine has ranked Clear Lake one of the top six bass fishing lakes in the United States since 2013. By April of 2023, the California Department of Fish and Wildlife (CDFW) had approved a total of [91 fishing tournaments on Clear Lake](#) in 2023, including tournaments for catfish (2), black bass (72), crappie (##), and carp (2). Tournaments range from one to three days in length. According to the U.S. Fish and Wildlife Service and U.S. Department of Commerce (2011), each angler spends an average of about \$58 per day when fishing Clear Lake. Fishing on Clear Lake is at least a million-dollar-a-year activity (Giusti 2016).

Climate Change Stressors: Lake County Water Bodies

Climate change adaptation is the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (IPCC 2022). The goal of climate change adaptation is to reduce risk from climate-related hazards while seeking opportunities for other benefits and reducing vulnerabilities across community systems.

Physical changes drive change in individual species, communities, and whole lake ecosystems (Parmesan et al. 2022). Yet there remains high confidence that protection and restoration of natural and semi-natural ecosystems are key adaptation measures that can lessen the impacts of climate change on biodiversity and people (Parmesan et al. 2022).

Climate change is predicted to increase the frequency of 100-year storm events, which is projected to increase risk from natural flooding to lakeside real estate and public utilities as well as additional risk of increased sedimentation, nutrient inputs, and acid mine drainage from the Sulphur Bank Mercury Mine (Suchanek et al. 2002).

Conversely, climate change also is forecast to extend drought conditions. During the typically dry season, drought causes lowered lake levels that could condense and concentrate populations of dreissenids into smaller areas as shorelines become dry and exposed.

As diurnal temperatures (daytime highs/overnight lows) increase due to changing climate, water temperatures also will increase, keeping waters warmer and more hospitable to dreissenids. Although dreissenids prefer temps of 68-77 degrees F, which is a typical temperature range during the summer, dreissenids can persist in water temperatures up to 86 degrees F (Karateyev et al. 1998).

Lake County needs to consider climate change impacts as it prepares for an introduction of dreissenids. Factors that should be considered:

- Watercraft decontamination stations that minimize the use of water, or use waterless cleaning systems, which would be especially important during times of drought.
- Watercraft decontamination stations that are energy contained units (e.g., solar powered), which may be important during times of widespread power outages.
- Modification of surveillance techniques to ensure lake locations with high risk of dreissenid introduction are regularly sampled, including during periods of drought.
- Use of emerging technologies (e.g., eDNA and newly developed assays (Marshall et al. 2022)) to complement standardized prevention monitoring methods (e.g., veliger tows, visual surface surveys) to efficiently and effectively detect dreissenids.
- Human use patterns (e.g., boat ramp use) that change as a result of severe climatic events.

Vulnerability of Clear Lake and Regional Water Bodies to Dreissenids

Clear Lake is at a high risk for introduction of dreissenids because of the volume of out-of-county boaters that use the water body, the reputation nationally as a blue-ribbon warm water

fishery, numerous and free access points for visiting boaters, and water chemistry conducive to invasive mussel establishment (Lake County Watershed Protection District 2019).

It is open year-round with access for trailered vessels in all seasons, except during periods of extreme drought, when the water level becomes too low to provide adequate access to boaters. Clear Lake is a national fishing destination, hosting more than 100 tournaments annually, from local club contests to large-scale commercial events that can have more than 1,000 entries. A total of 1,094 approved fishing tournaments occurred between 1/1/2015 and 12/31/2022. The lake is also an attraction for water recreationist activities, including tubing, swimming, sailing, kayaking, paddle boarding, water skiing, jet skiing, and leisure boating. Because invasive mussels are primarily spread by adult mussels attached to boats or veligers in water within boat compartments (e.g., bilge, motor), there is a high probability of an invasive mussel introduction via one of at least 500 public or private boat ramps from a visiting vessel.

In addition, environmental conditions in Clear Lake and other water bodies located within Lake County, such as water temperature, calcium, pH, dissolved oxygen, turbidity, conductivity and salinity, are well within the ranges preferred by dreissenids (Pucherelli et al. 2016, Whittier et al. 2008, Cohen 2005). The most important water characteristic that indicates a high risk of dreissenid colonization is a calcium level of 15 mg/L or greater. Clear Lake has an average 25 mg/L calcium level (DWR Water Data Library⁵).

Increased water temperatures and nutrients in the water column (DePalma-Dow et al. 2021) with extended drought periods expose more shoreline making motorized access to designated Clear Lake launch locations more difficult. This results in more boats being hand launched, or launched in illegal launching locations. Hand launched watercraft are not required to participate in the mussel fee sticker program. In addition, ramp monitors are not located at every potential launch location along the lake shoreline. These vulnerabilities expose Clear Lake to potential invasive mussel introductions.

Water Body Monitoring in Clear Lake and Other County Lakes

California Title 14, Section 672.1 requires that any agency with a dreissenid prevention program submit an annual report by March 31 for the previous calendar year that summarizes any changes in the reservoir's vulnerability, monitoring results, and management activities to the California Department of Fish and Wildlife (CDFW). The information included herein was extracted from 2018–2021 reports from Lake County to CDFW.

The Lake County Watershed Protection District administers the Q/Z mussel prevention program and monitors for Q/Z mussels in Blue Lakes, Clear Lake, Hidden Valley Lake, Highland Springs, Indian Valley Reservoir, and Lake Pillsbury per CDFW monitoring protocols.⁶ The district monitors for Q/Z mussels using the following methods:

⁵ <https://wdl.water.ca.gov/waterdatalibrary/Map.aspx>

⁶ <https://www.wildlife.ca.gov/Conservation/Invasives/Quagga-Mussels>

- Monthly artificial substrates are monitored per CDFW procedures, primarily near public boat ramps and access points. During extremely high or low water levels, some substrates are either removed, or not checked monthly.
- Infrastructure/surface structure (e.g., docks, buoys) are monitored by the district and citizens at the conclusion of the summer season, or when buoys are moved. During years of low water levels, shoreline surveys are conducted.
- Veliger tows using plankton nets are conducted per CDFW mussel tow protocols. These water samples, and others (e.g., Lake Pillsbury - Pacific Gas & Electric administers) are sent to CDFW's Shellfish Health Lab in Bodega Bay for analysis using cross-polarized light microscopy.
- District water purveyor (Appendix A) monitor for mussel presence when maintenance is performed on inlet pipes, screens, and filters.

The specific details of each of these methods, the locations of surveys, and the results are documented in reports the district completes and sends to CDFW annually.⁷ Water levels, COVID, staffing, and other factors can affect the level of survey sampling, locations, and intensity on an annual basis.

⁷ <https://www.lakecountyca.gov/Archive.aspx?AMID=77>

Potential Effects of Invasive Mussels on Clear Lake

There are numerous factors to consider when estimating the potential effects of invasive mussels on a water body. System-wide effects of quagga and zebra mussels depend on water mixing rates, lake morphology, and turnover rates (Karatayev et al. 2015). Potential effects to Clear Lake (Figure 1) include:

A disrupted food chain that negatively affects fisheries and wildlife—Quagga and zebra mussels (*Dreissena* spp.) are known as ecosystem engineers because they control the availability of resources to other organisms by the physical changes they cause in the environment (Jones et al. 1994) and have profound effects on lake and river ecosystem function and structure (Zhu et al. 2006). The ecological effects of these mussels are considered the most far-reaching relative to other aquatic invasive species (AIS), causing local extinction of many native mollusks (Strayer and Malcom 2007; Burlakova et al. 2014), changing the structure of food webs and fish assemblages, and contributing to the collapse of valuable sport fish populations (Kelly et al. 2010; Bossenbroek et al. 2009; Strayer 2009; Pimentel et al. 2005). Increased occurrences of harmful algal blooms (Higgins and Vander Zanden 2010) can contribute to declines in fish populations (Knoll et al. 2008). Once established, invasive mussels commonly reach densities of more than 10,000 individuals per square meter (Depew 2021).

System-wide effects of quagga and zebra mussels depend on water mixing rates, lake morphology, and turnover rates (Karatayev et al. 2015). Quagga mussels can be found in all regions of a lake, form larger populations, may filter larger volumes of water and may have greater system-wide effects (especially in deep lakes) compared to zebra mussels, which are restricted to shallower portions of lakes (Karatayev et al. 2015). After initial invasion, invasive mussels will primarily have direct effects on ecological communities whereas post-invasion, less predictable impacts will likely be indirect effects that cause ecosystem changes (Karatayev et al. 2015). Proactive, pre-invasion management investments that emphasize the importance of prevention and early detection are much lower than reactive, post-invasion expenditure (Cuthbert et al. 2022).

Quagga and zebra mussels filter particles from the water, resulting in improved water clarity (Karatayev et al. 1997, 2002), and corresponding increases in benthification, (Mills et al. 2003). Scientists refer to this as "turning ecosystems upside down" because of the transfer of energy to littoral areas with concurrent increases in benthic biomass (Mayer et al. 2014; Rumzie et al. 2021).

Boats, engines, docks, and other infrastructure (e.g., water delivery supply lines) encrusted with invasive mussels—Dreissenid mussels grow on a variety of infrastructure systems, including water intake pipes for drinking water, irrigation, power plants, locks, and dams and canal systems, greatly impacting operation and maintenance costs (ISAC 2016). Continual attachment can increase corrosion rates of steel and concrete (USGS 2016), leaving equipment and infrastructure vulnerable to failure. Additionally, the mussels grow on navigational buoys, docks, and hulls of boats and ships—increasing drag, affecting steering, and clogging engine intakes—all of which can lead to overheating and engine malfunctions (ISAC 2016).

Beaches and shoreline encrusted with sharp shells—The shells from dead dreissenid mussels can wash ashore, smothering beaches and potentially injuring swimmers and other water recreationalists from cuts sustained from the shells’ sharp edges (Nelson 2019).

Boating restrictions to reduce spread of mussels—Mandatory watercraft inspections prior to launch, closures of boat ramps, restrictions on shore launching, mandatory Mussel Fee Stickers, and closed water bodies are examples of boating restrictions that have been implemented as a result of dreissenid introductions. In 2008, zebra mussels were detected in the popular recreational area, the San Justo Reservoir in California. The reservoir, operated by the Bureau of Reclamation (BOR), was closed to any public use and has remained closed, “resulting in a dramatic, detrimental impact on the community, economy, and environment in San Benito County.”⁸ In 2022, BOR was asked by two Congressional representatives⁹ to prioritize and expedite an initial project scoping process for the \$2.1 to 3.1 million¹⁰ Zebra Mussel Eradication Project at the San Justo Reservoir, which has an eradication plan that includes two years of reservoir treatment with potassium chloride followed by three years of monitoring.



Figure 2. Likely changes from an invasive mussel invasion in Clear Lake.

⁸ <https://panetta.house.gov/media/press-releases/rep-panetta-leads-letter-rep-lofgren-request-expedited-process-san-justo>

⁹ Rep. Jimmy Panetta (D-CA-20) and Rep. Zoe Lofgren (D-CA-19)

¹⁰ Estimated costs in 2018.

Increased cost and maintenance for clogged, fouled, or contaminated water delivery infrastructure— Clear Lake is a source of water for several water districts, which treat and provide municipal drinking water for thousands of people. In addition, many individual homeowners with individual water systems draw water from the lake.

Invasive mussels pose serious threats to hydropower infrastructure and operations (Rumzie et al. 2021). Invasive mussels can affect all facility components exposed to raw water; mussels can clog pipelines and water intakes and disrupt operations at hydroelectric power plants, municipal water supply facilities, and conveyance systems used in irrigation, resulting in water lines incapable of supplying a consistent and reliable source of water (Vissichelli 2018). Smell, bacteria, and decay are other key issues associated with a mussel infestation; management response is continual cleaning, treatment, mitigation filters, and other actions. A 2021 study of costs associated with invasive mussel impacts and management at 13 hydropower facilities in Canada and the United States (Rumzie et al. 2021) documented costs associated with established invasive mussels in both preventative control measures and increased maintenance.

- Preventative control capital costs (one-time costs) ranged from \$100,000 to \$200,000 per facility
- Preventative control annual costs ranged from \$4,000 to \$141,700 per facility
- Increased maintenance re-occurring costs ranged from \$22,000 to \$505,000 per facility
- Increased maintenance annual costs ranged from \$26,000 to \$112,000 per facility
- Annual monitoring costs ranged from \$1,970 to \$47,245 per facility
- Unplanned outages cost per occurrence ranged from \$44,000 to \$80,000 per facility
- Unplanned outages total cost was \$849,000

Examples of preventative and maintenance costs include treating with chlorine, cleaning generator coolers 3-4 times per year to remove mussel debris, and increased labor costs to maintain all hydropower equipment.

The cost to remove mussels and manage drinking water intakes at Hoover, Davis, and Parker Dams, three facilities with invasive mussel infestations on the Colorado River, was more than \$6,026,100 in 2016. Mussel-related costs at Hoover, Davis, and Parker Dams through 2016 totaled \$6,025,100, and expected costs from 2017 to 2026 totaled \$10,372,108 (Boyd 2016). The State of Washington estimated direct impacts to dams from invasive mussels is \$42.9 million (Community Attributes 2017). The cost for the management response is passed to the consumer (Vissichelli 2018).

Fishing tournament restrictions—The CDFW *Guidance for Developing a Dreissenid Mussel Prevention Program* (2020) acknowledges that fishing tournaments are a common human-mediated pathway of dreissenid mussel introduction. The document further states that “conditions on fishing tournaments” are a potential management action to prevent a dreissenid mussel introduction.

Loss of revenue to Lake County communities—To date there are no studies estimating the impact of invasive mussels on tourism (Nelson 2019). However, the State of Montana used a scenario-based approach for recreational fishing to estimate the economic damages – 2 percent, 5 percent, and 10 percent reductions in visitation as a result of dreissenid establishment. Tourism spending was assumed to be proportional to visitation. They documented a 2-10% range of percent reductions in visitation and the corresponding reduction in spending. If visitation is reduced by two percent, the most conservative scenario, the amount of money spent by nonresident visitors would decrease by \$17.8 million, a half of a percent reduction in total tourist spending in 2017. At the 10 percent reduction in visitation, tourism spending would decrease by \$89 million or 2.6 percent of total tourist spending in 2017. The 2 percent and 10 percent reductions in visitation were used for the lower and upper bound estimates, respectively. The State of Montana calculated estimated per day expenditures for resident anglers multiplied by the number of days of fishing, total angler expenditures for 2013 amounted to approximately \$193 million (Swanson 2016).

Reduction in property values—The effect of dreissenid mussels on property values has not been explicitly estimated, however, the economic impacts of invasive aquatic plants, algal blooms, and degraded water quality due to excess nutrients on home sale price have been well documented (Horsch and Lewis 2009, Zhang and Boyle 2010, Baron et al. 2016, Walsh et al. 2011; Bingham et al. 2015; Ara et al. 2006).

- Results from multiple studies in Minnesota, New Hampshire and Maine demonstrated a 1-meter decrease in water clarity decreased property values from 3.1 to 8.6 percent with a median value of 5.8 percent (Jakus et al. 2013).
- In an assessment of the economic impact of harmful algal blooms to property values on Lake Erie, Bingham et al. (2015) used a 10 percent reduction in value to shoreline properties.
- A study of Ohio lakes found harmful algal blooms with microcystin levels in excess of 1 µg/L reduced lakefront property values by 22 percent (Wolf and Klaiber 2017).
- In northern Wisconsin, lakefront property values decreased by 8 percent, on average, after invasion of Eurasian milfoil (Horsch and Lewis 2009).
- The presence of milfoil and native aquatic vegetation in Vermont lakes decreased property value ranging from 0.3 percent to 16.4 percent depending on the degree of total macrophyte (aquatic plant) coverage (Zhang and Boyle 2010).
- Montana State General Fund and county governments where affected properties are located estimated a decrease in property tax revenue from the lowered property values (Nelson 2019). Predicted losses in property tax revenue from decreases in lakefront property value ranged from \$2.2 to \$3.8 million per year.

Legal Authorities and Current Statutes

The primary agency responsible for managing the dreissenid mussel prevention program in Lake County is the Lake County Watershed Protection District (LCWPD). The LCWPD, a management structure endowed with specific authorities by the U.S. Congress and the California

State Legislature, is administered by the Director of Water Resources who reports to the County Board of Supervisors, which acts as its Board of Directors. The LCWPD plans, manages, maintains, implements, and evaluates all aquatic invasive species programs, such as the Aquatic Plant Management Program and the Q/Z Mussel Prevention Program. The LCWPD relies on several partners for program implementation, including Pacific Gas and Electric (conducts dreissenid veliger tows in Lake Pillsbury), citizen scientists (perform substrate monitoring in Blue Lakes, Lake Pillsbury, and Hidden Valley Lake), California Department of Fish and Wildlife North Central Region (conducting veliger tows, visual surface surveys, water quality, and calcium sampling at Clear Lake, Blue Lakes, and Indian Valley Reservoir), and the California State Parks Division of Boating and Waterways (provides grant funds to support the County's boat ramp monitor network for Clear Lake, inspection training and equipment, and all essential educational materials). The County of Lake accepted responsibility for the protection of Clear Lake's basin from the State Lands Commission in 1973; this transfer of responsibility resulted in lakebed management and shoreline protection ordinances in Lake County's Municipal Code. In 2009, Lake County's Department of Water Resources (DWR) separated from the Department of Public Works, and responsibility for the Watershed Protection District management was transferred to DWR.

California delegates the responsibility for preventing and managing dreissenid mussel infestations to local water body managers (Fish and Game Code Title 14). Local codes and ordinances are therefore critically important in establishing local authorities to establish prevention programs. Relevant regulations and their associated hyperlinks are included in Appendix C. In March 2008, the Lake County Board of Supervisors passed an emergency ordinance establishing an inspection program for all water vessels launched in Lake County. This program, in its emergency form, introduced a mussel sticker program based on the honor system. Eventually the emergency ordinance was replaced by Ordinances 2915 (2009), 2936 (2011), and 2976 (2012) that established a fee-based inspection program for all water vessels launched in the County of Lake. The mussel ordinance is also located in [Lake County Code Article IX of Chapter 15 \(Appendix X\)](#). The physical prevention program is a three-tiered system based on the risk level (tier 1 - screening, tier 2 - inspection, tier 3 - decontamination) of the vessel for transporting invasive mussels to Lake County.

Jurisdictional Roles and Responsibilities

Per Fish and Game Code Section 2301, in the event of a dreissenid introduction in Clear Lake, the lead entity in the implementation of the rapid response containment and transition plan and the development of a Control Plan is "a public or private agency that operates a water supply system).

California Fish and Game Code Sections [2301 and 2302](#) include the following key components:

Fish and Game Code, Section 2301

- Makes it illegal to possess, import, ship, or transport in the state, or place, plant, or cause to be placed or planted in any water within the state, dreissenid mussels.
- Gives the CDFW Director, or his/her designee, the authority to conduct watercraft inspections and stop conveyances, mandate decontaminations, and impound or quarantine conveyances. This section also provides authority to conduct watercraft inspections within waters that contain dreissenids, to close or restrict access to affected waters or facilities, and to inspect, quarantine, or disinfect conveyances removed from, or introduced to affected waters.
- A public or private agency that operates a water supply system shall cooperate with the department to implement measures to avoid infestation by dreissenid mussels and to control or eradicate any infestation that may occur in a water supply system. If dreissenid mussels are detected, the operator of the water supply system, in cooperation with the department, shall prepare and implement a plan to control or eradicate dreissenid mussels within the system.
- Any entity that discovers dreissenid mussels within this state shall immediately report the discovery to the department.
- Provides penalties for entities that violate this section.

Fish and Game Code, Section 2302

- Any person, or federal, state, or local agency, district, or authority that owns or manages a reservoir where recreational, boating, or fishing activities are permitted must assess the vulnerability of the reservoir for the introduction of dreissenid mussels and develop and implement public education, monitoring, and management of recreational, boating or fishing activities designed to prevent the introduction of dreissenids. The entity must also visually monitor for the presence of mussels.
- Provides penalties for entities that violate this section.

California Code of Regulations, Title 14 Section 672 relates to the possession, importation, and transportation of dreissenid mussels. Key elements include:

- Dreissenid Mussel Permits authorize entities to possess, import, ship, or transport dead dreissenids for the purposes of outreach, education, species verification, training, or other purposes deemed by CDFW.
- Provisions are included relative to denial and revocation of permits as well as requests for reconsideration.

California Code of Regulations, Title 14 Section 672.1 relates to dreissenid control and prevention. Key elements include:

- **Control Plan** - Within 60 days of CDFW requesting, or within 60 days of dreissenids being detected, public or private agencies that operate water supply systems must immediately develop a dreissenid mussel control plan and implement measures to prevent further spread. The plans must include a description of the status of the dreissenid population at the time of plan development, control activities, and monitoring to determine dreissenid population changes. The plan may also include maintenance

activities to maintain functionality of the water supply facility. Annual reports are submitted by March 31 of each year, including information on changes in dreissenid populations, control activities implemented, and monitoring results. This section provides penalties for violations of the section.

- **Prevention Program** – Entities that own or manage a reservoir where recreational, boating, or fishing activities are permitting must implement a dreissenid mussel prevention program that includes a vulnerability assessment for dreissenids, a monitoring program, and management of recreational activities that prevent the introduction of mussels, and to keep them from being moved from the waterbody. Annual reports re: the prevention program are due annually by March 31. This section provides penalties for violation of the section.
- **Inspection of Conveyances** – Makes it unlawful for anyone to refuse to comply with or interfere with a CDFW employee or their designee re: impounding or quarantining a conveyance suspected to contain dreissenids, and makes it unlawful to tamper with a method used to identify a conveyance as quarantined. This section provides penalties for violation of the section.

California Code of Regulations, Title 14 Section 672.2 related to dreissenid mussel penalty and appeal procedures.

Rapid Response Strategy

Mechanisms of Response

In the event of a detection of dreissenid mussels, deliberate actions will be taken to determine the scope of the detection, and appropriate containment, control and eradication responses. The LCWPD is engaged in active monitoring to detect dreissenid mussels through regular sampling efforts for veligers and adults. Additional entities are also engaged in monitoring infrastructure or water delivery systems for adult dreissenids.

Key response activities may occur simultaneously at various stages of response but may also be influenced by the nature of the detection. The rapid response process begins the moment there is a report of a dreissenid detection made.

Confirmation of Detection

Purpose: Determine if the report of detection is factual and confirm the species identification

Lead: LCWPD in collaboration with CDFW

The nature of the initial dreissenid detection may be from routine monitoring by LCWPD, partner monitoring, public surveillance, or public reporting. Regardless of the nature of the initial detection, per Fish and Game Code Section 2301 “any entity that discovers dreissenid mussels within the state shall immediately report the discovery to the CDFW”. The discovery should be reported to the [CDFW Region 2 Quagga/Zebra Mussel Scientist](#) (or CDFW wildlife officers if Region 2 Mussel Scientist is not available) and via the CDFW online Quagga Mussel Observation Report Form (Appendix X).¹¹ CDFW will work with the reporting entity to confirm the detection once the report is received.

It may be possible that a detection is made of an adult or veliger, which will prompt action but methods of confirmation and speed at which actions are taken will vary. Further, depending on the nature of that detection, the dynamics of the situation may be highly variable.

- A detection of one or more adult mussels can be confirmed visually by CDFW and/or LCWPD.
- A detection of one or more veliger mussels will be verified by the best available laboratory methodologies. The independent identification methods will include cross-polarized light microscopy (CPLM) and polymerase chain reaction (PCR). The sample may also be sequenced. . Veliger samples conducted by CDFW, LCWPD and PG&E in the county () are analyzed by CDFW Shellfish Health Lab in Bodega Bay, California.

¹¹ <https://wildlife.ca.gov/Conservation/Invasives/Quagga-Mussels/Observation-Report>

Classification of waterbody following confirmation detection is important for communicating among regional managers, collaborators and the public. The classification will also help determine level of decision-making by LCWPD and CDFW.

Waterbody Classifications¹²:

- Status Unknown – Water that has not been monitored.
- Undetected/Negative – Sampling/testing is on-going, and nothing has been detected, or nothing has been detected in the time frames for de-listing.
- Inconclusive (temporary status) – Waterbody has not met the minimum criteria¹³ for detection.
- Suspect – Waterbody that has met the minimum criteria for detection.
- Positive – Multiple (2 or more) subsequent sampling events that meet the minimum criteria for detection.
- Infested – A waterbody that has an established (recruiting or reproducing) population of dreissenids.

Declaration of Emergency in Lake County

Purpose: Brings situation of dreissenid detection and response into a countywide scale of response.

Lead: LCWPD

Per Ordinance 31, Lake County may declare a local state of emergency. The scope of a dreissenid situation will influence the level of response and the scale of that response. An emergency declaration helps to inform the level of concern of the situation to all in Lake County and may be vital for the mobilization of funding to conduct response actions.

Notification Communication

Purpose: Ensure that factual and timely information is communicated with appropriate entities, including regional water body managers.

Lead: LCWPD and CDFW

With the confirmation of detection and species identification complete, there will be multiple notifications made to allow area partners to respond in tandem to the developing situation. There are many communications that are needed early in the response process.

¹² Classifications were developed by the Western Regional Panel on Aquatic Nuisance Species, Building Consensus in the West Committee (WRP 2019).

¹³ Minimum criteria for detection - The scientifically based process to confirm the presence of ANS which must include two independent results from the same sample using scientifically accepted techniques. Scientifically accepted techniques may be cross polarized microscopy, PCR or gene sequencing on the organism tissue (WRP 2019).

1. CDFW requires immediate notification of a dreissenid detection . Once LCWPD provides notification to CDFW, a recognition of that notification will be made by CDFW to ensure that it has been received.
2. Once the detection and species identification has been confirmed, detailed information will be provided to USGS Non-Indigenous Aquatic Species Database by CDFW. This information sharing allows for a broad distribution of information via the USGS national alert system.

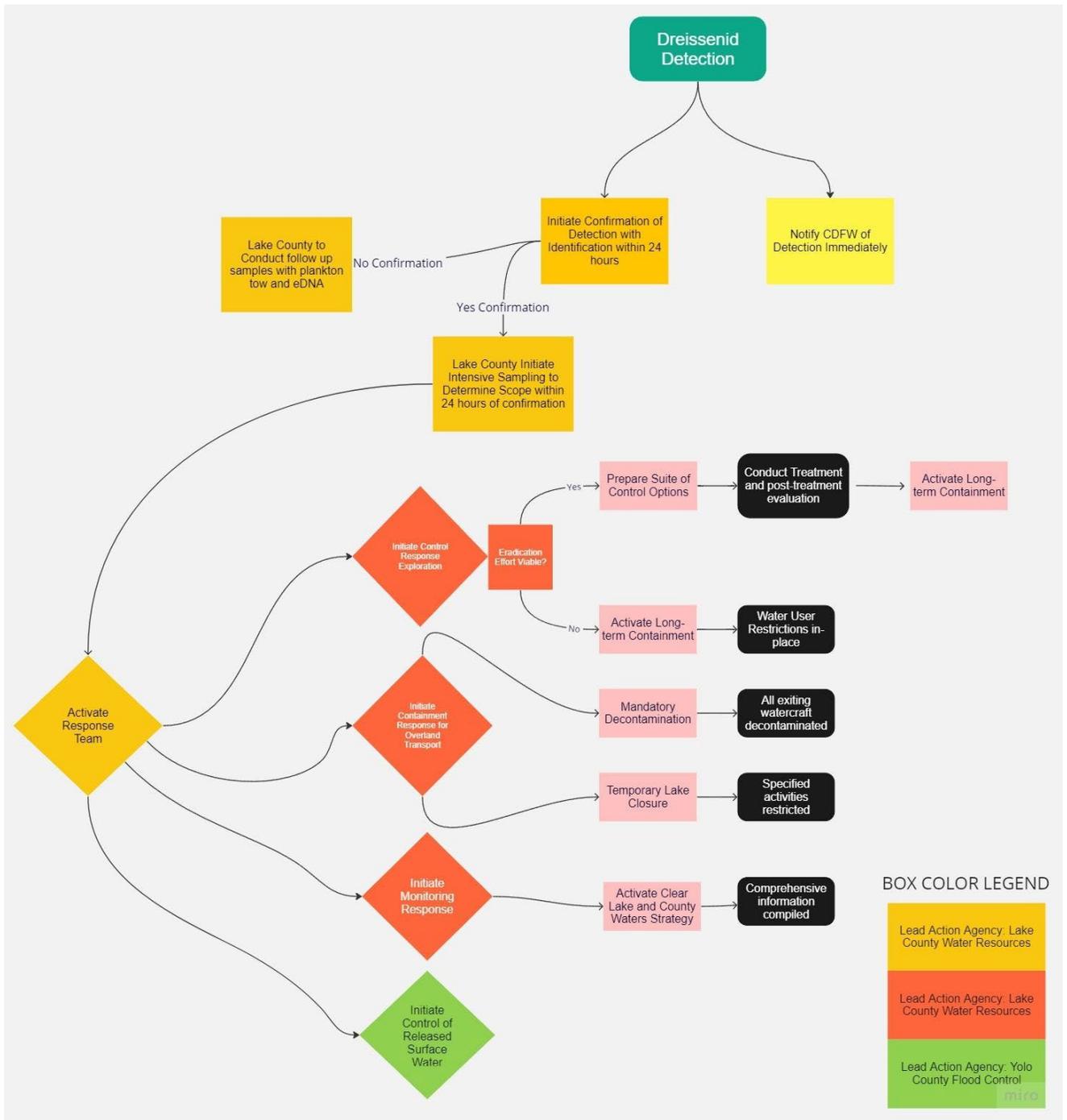


Figure 3. Dreissenid management response decision matrix.

Delineate Scope of Response

Purpose: Determine the scope of the dreissenid detection to inform management response.

Lead: LCWPD

Following the confirmation of detection, multiple strategies will be deployed to further delineate the scope of the infestation. To understand and characterize the nature of the detected population (e.g., if there are multiple age classes, multiple locations, or isolated populations), deliberate searches using canine shoreline teams, volunteer shoreline teams, eDNA samples, local lake water rights users (checks water filters), and dive teams may be deployed simultaneously. A coordinated strategy will capture all search information into digital visualization to better understand the management scope and subsequent management actions.

Activate Incident Command System and Response Team

Purpose: Engage in process to adequately address scale of management situation.

Lead: LCWPD

If it has been determined that there is potential to implement control options based on the scope and scale of the infestation, containment options and monitoring options must be initiated, then the incident command system (ICS) will be activated (Figure 3). The ICS brings structure and organization to a complex management situation. Moreover, if the incident has important legal, political, and public ramifications, then ICS will be needed to support the management of the situation. See Appendix A – ISC Assignment Structure. California Water Resources Department is the lead action agency.

The scope of the dreissenid infestation will influence the number of individuals needed for response. A veliger detection followed by unconfirmed results can likely be handled by several Lake County staff, however, a veliger detection that leads to an adult detection/established population likely will require staff from multiple agencies in addition to a cadre of volunteers.

Following the structure found within Appendix A, the Operations of the incident will take multiple pathways to formulate and explore control, containment, and monitoring options. Control options may include small- or large-scale chemical application (in combination with mechanical methods such as curtains) to attempt to eradicate or minimize a population of dreissenids.

Containment

Containment options may include a suite of strategies to address any possible vector of spread leaving Clear Lake, including watercraft, infrastructure, water delivery systems, and other human activities. Containment options will be weighed by a response team and will be determined based on the specific details of the detection and scope.

Monitoring options may include a strategy to understand dreissenid distribution within Clear Lake and relevant neighboring waterbodies. Monitoring options will be weighed by a response

team and will be determined based on specific details of the detection and scope. Each category of management options must identify staff and resource needs, budget requirements, feasibility of success, and results of taking a no-action approach.

Activation of Communication

Upon assembling the ICS team, a communication strategy will be needed to provide information to key regional partners, collaborators, lake users, and the public (Table 3). Weekly public information sharing (e.g., meetings, webinars, or conference calls) and a web page will be created by the county. Press releases, social media, and other unique information products will be delivered to user groups. Clear communication for internal and external entities will ensure affected parties understand activities and roles of everyone involved.

Communication Hub 1	Communication Hub 2	Communication Hub 3
Type of information shared: Initial confirmed detection Milestones	Type of information shared: Waterbody status Management actions	Type of information shared: Prevention requirements Closures Decontamination requirements and location
Method of Communication: Phone Briefing documents	Method of Communication: Online meetings Email briefings	Method of Communication: Social media, website, press releases
Frequency: Upon confirmed detection Weekly progress updates As needed with key decision points	Frequency: Weekly	Frequency: As new requirements are required
Primary Entities: Governor staff County officials State legislators	Primary Entities: Surrounding county managers Surrounding state AIS managers	Primary Entities: Local businesses Boaters Recreationists Homeowners Area residents

Figure 4. Three types of communication hubs, including the type of information shared, method of communication, frequency, and entities involved.

Response Actions

An exploration of a variety of responses will help determine the transition to successful long-term containment and management. As a response progresses, existing prevention management actions will proceed in the protection of Clear Lake from all AIS, however, likely with modifications. Considerations that may inform response actions include:

- Anticipated costs of eradication effort and subsequent monitoring, coupled with available funding
- Available resources (personnel, equipment, etc.) for all aspects of response (e.g., signage, barrier curtains, chemicals, grants to partners, increased monitoring, additional oversight of watercraft monitoring)
- Regional and local distribution of dreissenids
 - single vs. multiple, continuous vs. patchy, isolated vs. widespread.
 - upstream vs. downstream, edge vs. interior, etc.
- Dreissenid age class structure or life stages present of infestation, if known
- Pathways/source (if known) – identified, controlled, eliminated, etc.
- Species track record of eradication/control attempts
- Ability to obtain required permits and permissions (e.g., Emergency ESA Consultation) in expedited timeframe
- Survey and assessment confidence
- Affected native fish and wildlife habitats
- Time of year in relation to reproduction, migration, etc.
- Amount of water in the system to be treated. Consider the following:
 - Potential for drawdown or flows reduced before treatment
 - Flow sources, including springs, and the potential to regulate that flow
- Land use patterns
- Presence of state or federally listed rare, threatened, or endangered species
- Presence of critical or significant habitats
- Regulatory hurdles associated with control actions (e.g., use of chemicals)

Prevention Response Actions

Purpose: Address active prevention program needs and adjustments as response is implemented.

Lead: LCWPD

As Control and Monitoring response teams are examining options, actions that address the current program may be implemented in recognition of modifications or adjustments that may be needed to conform to new needs to manage waterbody users and water usage users.

Considerations of the following areas of prevention will include:

- Directions and actions for local Lake County Mussel Sticker Program
- Alteration/amendments to Ordinance 15 of Lake County Code

Control Response Options

Purpose: Determine the possible eradication or control options and their feasibility to minimize spread.

Lead: LCWPD

Implementation of any chemical response will require a full analysis of potential ecological, economic, cultural impacts to Clear Lake. An evaluation of all the possible actions or no-action will be needed to determine the best actions necessary.

Any control response using curtains/barriers (e.g., a response action in a marina would involve temporarily installing vertical curtains/barriers from the surface of the water to the sediment to create an enclosed area for chemical treatment) and chemicals will require a suite of permits (Appendix E) or compliance needs. If threatened or endangered species, or their critical habitats, exist within the geographic scope of the project, an Endangered Species Act consultation process will be triggered (see [Fish and Wildlife Service Section 7 Consultation](#) section).¹⁴ There is a limited number of chemicals that currently exist for controlling dreissenid mussels, including potassium chloride (KCl or potash) and Earth TechQZ. Methods to contain chemical control applications with the use of a temporary physical barrier or boom will be required. Numerous other considerations, including safety, best management practices, and tradeoffs associated with taking no action should be considered.

Containment Response Options

Purpose: Determine containment response options and their feasibility to minimize spread.

Lead: LCWPD

Regardless of the scope of the dreissenid population, there will be a need to contain the mussels within Clear Lake to prevent further spread. Immediate containment will be implemented while Control Response Options are explored. See section on Containment for further details.

Immediate containment response may require:

- Temporary closure of the lake to all motorized, non-motorized activity, including the installation of temporary signage and barriers. This could be achieved through Ordinance 31, Declaring a State of Emergency, in which the Sheriff of Lake County, or their designee, can issue Closure Orders for water bodies.
- Mandatory decontamination of all watercraft exiting Clear Lake (note: It has been recommended that Lake County modify its ordinance to mandate mandatory decontamination of watercraft exiting Clear Lake upon infestation by dreissenids).
- A moratorium of all current and future fishing tournaments permitted within Clear Lake.

¹⁴ <http://www.crbdirt.com/introduction>

LCWPD would make the determination if Clear Lake will be closed to use, and will take the necessary steps. However, the purpose of this plan is to ensure steps are taken in advance of a dreissenid introduction to avoid the need for lake access closure.

Monitoring Response Options

Purpose: Address active prevention program needs and adjustments as response is implemented.

Lead: LCWPD

Additional monitoring of the waterbody and nearby waters will be important for understanding the scope and scale of the infestation. Expanded monitoring efforts will likely also be needed during implementation of control options. These include, but are not limited to, monitoring within the following systems:

- Municipal water intakes
- Private water intakes
- Thurston Lake¹⁵, Hidden Valley Lake, Indian Valley Reservoir, Lake Pillsbury, Lake Mendocino, Highland Spring Reservoir, Blue Lakes
- Cache Creek dam infrastructure
- High priority water delivery systems within the watershed

Termination of ICS Response

Understanding when an ICS led response is complete will be determined by a variety of factors, but ultimately will be at the discretion of the lead action agency. However, there are valuable indicators that may help determine that the incident has shifted to a long-term management situation, rather than a response situation. In general, when all the actions for monitoring, containment, and control have been exhausted, a response team is terminated. Factors that may indicate there is no longer a need to operate ICS for the incident include:

- A shift to long-term monitoring strategies to understand dreissenid population dynamics has been initiated (e.g., all municipal water users are actively participating in strategic sampling in cooperation with Lake County).
- A shift to long-term containment has been initiated.¹⁶ Note: Lake County mobile watercraft decontamination stations (three) are operational and staffed in designated areas with drains to water treatment systems. Permanent decontamination stations are being considered.
- Control efforts have been conducted and post-monitoring efforts to understand the success/failure of control have been completed.
- The frequency of communication about the project to local collaborators becomes minimal. Communication about the status of the infestation will continue in

¹⁵ Thurston Lake is a private lake and would require discussions with landowners to expand monitoring efforts.

¹⁶ Lake County mobile watercraft decontamination stations (3) are operational and staffed in designated areas with drains to water treatment systems.

perpetuity as part of ongoing containment efforts, however, the frequency of communications lessen.

- Emergency resources (e.g., signage, mobile watercraft decontamination stations) are dismantled/reassigned/returned.

A report post-response will be completed to help identify all aspects of the response and inform improvement of capabilities, capacity, and training. Documentation of the response will be a critical aspect to assist in improving response strategies for other natural resource emergency situations and may also be useful for surrounding jurisdictions to successfully respond to different dreissenid situations.

Transition to Containment

Adequate financial and staff resources are needed to effectively plan for, implement, and evaluate dreissenid response and containment strategies. The Columbia River Basin website (<https://www.westernais.org>) lists examples of dreissenid eradication projects and their costs¹⁷, however, cost and effectiveness will vary greatly depending on the water body and the scope and extent of the infestation.

Immediately after verification, short-term containment actions should be implemented. If dreissenids cannot be eradicated using chemical, biological, or mechanical methods, containment strategies must be implemented long-term to contain dreissenids to the source water body.

The following timeline illustrates verification of identification, accompanying tasks, and water body status following preliminary detection of dreissenid mussels (Figure 6). In this illustration, the assumption is that veligers were detected.

Figure 6. The timeline from initial detection to implementing the management plan for Clear Lake.



¹⁷ <https://www.westernais.org/rapid-response>

Invasive Mussels Found in Clear Lake

Invasive mussels have been detected in Clear Lake. The Lake County Water Resources Department is implementing its containment plan to determine the extent of the invasion, prevent further spread in Lake County and beyond, and assess whether it is possible to eradicate the mussels.

To learn the latest about potential effects on Clear Lake water users, please check the county websites:

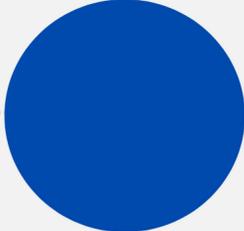
- <https://www.lakecountycalifornia.gov/407/Water-Resources>
- <https://www.clearlakemusselprevention.org/>

We will also be providing regular updates on this Facebook page.

What can you do?

- Clean, Drain, and Dry your watercraft and irrigation equipment before use in other water bodies.
- Spread the word to others.





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- <https://www.lakecountycalifornia.gov/407/Water-Resources>
- <https://www.clearlakemusselprevention.org/>
- <https://www.facebook.com/lakecountywater/>

What can I do?

- Clean, Drain, and Dry your watercraft and irrigation equipment before use in other water bodies.
- Spread the word to others.





Invasive Mussels Found in Clear Lake

What is the situation?

Invasive aquatic mussels were recently detected in Clear Lake. Sampling is continuing at the suspect locations, and the results will be used to develop a response plan.

What are invasive mussels?

Zebra and quagga mussels are small (¼ to 1½ inch long) freshwater mollusks with yellow and brown striped shells. Both mussel species can attach to hard surfaces in the water of lakes and rivers, and quagga mussels also attach to soft surfaces. Their microscopic larvae, called veligers, attach to suitable substrates to grow.

Why are we concerned?

Zebra and quagga mussels can:

- Disrupt the food chain in the lake, negatively affecting fish and other wildlife
- Reduce property values
- Increase costs to maintain and deliver water because of clogged, fouled, or contaminated water delivery infrastructure
- Result in fishing tournament and boating restrictions
- Increase costs to maintain docks and ramps
- Foul beaches and shorelines with sharp shells
- Increase costs to maintain encrusted boats and engines



What is LCWPD doing about invasive mussels?

Lake County Water Resources Department has been preparing for an introduction of invasive mussels for more than a decade.

The mussel sticker program has funded numerous prevention efforts, including lake monitoring, watercraft inspections and decontaminations, staff to implement the program, prevention planning and coordination with regional water body managers, and planning and other activities to prepare for an introduction.

Our program staff and resources will be dedicated to transitioning from prevention to containment as we focus on containing the infestation and assessing whether or not it is possible to eradicate the invasive mussels.

Additional resources:

- <https://www.lakecountycalifornia.gov/1248/Invasive-Mussel-Prevention>
- <https://www.clearlakemusselprevention.org/>

What Can I Do to Prevent the Spread of Invasive Mussels in Lake County and Beyond?

- Clean, Drain, and Dry your watercraft and irrigation equipment before use in other water bodies.
- Spread the word to others about the importance about what each one of us can do to prevent the spread.



STOP AQUATIC HITCHHIKERS!
Be A Good Steward.
Clean, Drain, Dry.
StopAquaticHitchhikers.org

Figure 6. Outreach materials to share information about a detection of dreissenids in Clear Lake include a social media post, flier, and door hanger.

Outreach materials to inform public of transition strategy

To prepare LCWPD staff for an introduction of invasive mussels, this plan includes several draft templates of outreach materials. The materials, which include an 8.5 x 11 flier, door hanger, and social media post, have been produced to allow district staff to modify and update the templates as needed. Appendix F includes a draft press release.

Recommended Amendments to Ordinances in Chapters 15 and 23 and other Code Ordinances

The National Sea Grant Law Center reviewed existing ordinances and proposed Lake County consider the following to strengthen dreissenid prevention and containment efforts:

- Add a definition for “pollutant” and explicitly include a reference to aquatic invasive species (AIS). Aquatic invasive species are pollutants under the federal Clean Water Act, thus the reference is probably not necessary from a legal standpoint.
- Add a definition of “significant impact” that includes the decision threshold. “Significant impact” is the term used in the “catch-all” permit procedure in Sec. 23-4.
- Consider mentioning AIS in Section 6.4(B) Construction (page 11) – e.g., materials used in construction should be free from AIS, materials should be decontaminated before moving to another site, etc.
- Several sections in ordinances that have the potential to include language associated with containment:
 - Sec. 6.8(D) for relocation of floating structures (page 14). Incorporate language that requires inspection and decontamination before relocation.
 - Sec. 23-8 for Marinas and Harbors (page 15) – The county could encourage/require marinas to offer decontamination facilities or require inspections before boats leave marinas, etc.
 - Section 23.13.4 Removal of improvements (page 20) – The county could require inspection/decontamination upon removal of an improvement if the structure is being moved to another location; or, the county could require proper disposal.
 - Section 12.4 – Littering and pollution (page 18) – Add a provision regarding AIS to reinforce that AIS are pollutants and introduction is prohibited.
 - Section 12.6 for discharge – Explicitly reference AIS and potentially require use of best management practices.
- As a condition of the shoreline encroachment permit, the county could require an annual inspection/monitoring and reporting of results, and then identify some actions that needed to be taken if mussels are detected.
- In addition, and outside the scope of the shoreline ordinance, but potentially associated with other statutes, the county could likely impose an annual inspection of structures as part of routine county inspections; these inspections could incorporate both safety issues as well as AIS.
- The county could state in its ordinances that it is unlawful to launch a boat from any place other than a ramp, private dock, pier, designated beach. This would allow the county to cite or fine people who are launching their boats from any shoreline location

and help to ensure that watercraft are inspected prior to launch. There are examples of counties that define “boat launch facilities” as being “a boat ramp, dock, pier or other facility designated by the department for launching boats into the water” (e.g., Island County, Washington, Chapter 9.40). This Washington county states that “It is unlawful for any person to launch or recover a boat in and Island County park except in areas specifically designated and/or marked for that purpose; provided, that this provision does not apply in case of an emergency (9.40.165).” Tempe, Arizona mandates that “all public watercraft must be launched at a designated boat launch facility.”

Actions to Transition Prevention Program Staff to Containment Activities

The following actions should be implemented upon verification of dreissenids:¹⁸

- **Per Section 2301**, any entity that discovers dreissenid mussels within this state shall immediately report the discovery to CDFW.
- **Per Section 2301**, public or private agencies that operate a water supply system shall cooperate with CDFW to implement measures to avoid infestation by dreissenid mussels and to control or eradicate any infestation that may occur in a water supply system. The operator of the water supply system, in cooperation with CDFW, shall prepare and implement a plan to control or eradicate dreissenid mussels within the system. In the case of Clear Lake, the County of Lake Water Resources Department has jurisdictional authority to manage Clear Lake per State Land Commission Chapter 639 (1973), including to act on behalf of the State Lands Commission to manage the water ways and water supply to protect the assets described in 639.
- Work with CDFW to evaluate the need to quarantine Clear Lake as needed to prevent spread by watercraft. If the determination is made that the lake should be quarantined,

¹⁸ Modified from State of Montana (2018).

close boat ramps and access points, and conduct public outreach to notify visitors and residents.

- If infrastructure is in place to inspect and decontaminate all watercraft exiting Clear Lake, implement mandatory watercraft inspection and decontamination program. Mandatory exit inspections and decontamination would occur at designated locations around the perimeter of Clear Lake by staff trained in Uniform Minimum Protocols and Standards for Watercraft Inspection and Decontamination procedures. All vessels inspected or decontaminated will be identified with paperwork and a seal.
- Identify dispersal vectors (including movement by humans, fish and wildlife, water traffic, water flow, and other processes). Assume measures are needed to prevent release of veligers as well as movement of adult mussels.
- Assess the likely movement of boats and other watercraft that recently used the mussel detected water body to identify inspection needs in other water bodies.
- Develop and implement Hazard Analysis and Critical Control Point (HACCP) plans to ensure that personnel do not further spread the original introduction (see sidebar).
- Quarantine operations (e.g., hatcheries, aquaculture) that are likely to spread the species outside the affected watershed(s).
- Consider and implement any needed prevention of overland or aerial transport to other water bodies.
- Working in partnership with water purveyors, stop or slow water release to potentially uninfested sites.
- Consider special management measures for operations of locks and commercial vessel traffic, if appropriate.
- Stop all sanctioned water related events on the waterbody until appropriate containment protocols can be established.
- Watercraft inspection and decontamination stations

The five steps to implement HACCP planning to control a pathway from spreading dreissenid mussels and other AIS include (Britton et al. 2014):

- **Describe the activity:** The activity description includes specific information such as the who, what, when, where, how, and why of the project. The description offers a historical, working reference to facilitate plan review and communication with the facility staff and other resource management agency personnel.
- **Chart the flow of tasks for the activity:** This step provides an important visual tool that the HACCP team can use to complete the remaining steps of the plan. Here, a clear and concise, yet complete description of the tasks necessary to complete the overall activity is diagramed in a linear fashion.
- **Identify potential non-targets:** Any species that has a reasonable potential to be moved or introduced to new habitats should be identified to implement appropriate control measures to prevent an unintended invasion. These may include vertebrates, invertebrates, plants, or other organisms (e.g., diseases, pathogens, and parasites).
- **Analyze the risk of moving non-targets:** It is crucial to identify significant non-targets with respect to each required task within a larger activity so that effective measures to control them may be employed. During the analysis, the significance of each potential non-target is assessed by considering its risk of being moved within each individual task.
- **Complete the action plan:** The action plan addresses specific methods to control risks of non-target species. It lists specific information about controls, monitoring procedures, methods for evaluation, and corrective actions.

- Establish inspection and decontamination requirements on boats and equipment (following Uniform Minimum Protocols and Standards for Watercraft Inspection and Decontamination (UMPS) and CDFW Aquatic Invasive Species Decontamination Protocol)¹⁹, and provide for associated logistical support (e.g., decontamination units).
- Initiate a post haul-out inspection of boats and equipment.
- Ensure decontamination units are available at water body.
- Implement mandatory inspection and decontamination of boats upon entry and exit of water body.

Per Title 14 Section 672.1, within 60 days of CDFW requesting, or within 60 days of dreissenids being detected, public or private agencies that operate water supply systems must immediately develop a dreissenid mussel control plan and implement measures to prevent further spread. The plans must include a description of the status of the dreissenid population at the time of plan development, control activities, and monitoring to determine dreissenid population changes. The plan may also include maintenance activities to maintain functionality of the water supply facility. Annual reports are submitted by March 31 of each year, including information on changes in dreissenid populations, control activities implemented, and monitoring results.

○

Estimated Impacts to Water Purveyors to Conduct Dreissenid Mitigation

Dreissenids can colonize any surface where flows are less than 6.5 feet/second (O’Neill 1993). Costs associated with the management and control of dreissenid mussels varies with the extent of the mussel infestation in the source water and associated water treatment facility(ies), the complexity and size of the water treatment plant, the treatment goals, and other factors (Chakraborti et al. 2022). Maintaining pipelines and intakes adds considerably to capital and annual operations and maintenance costs for a drinking water treatment facility (Chakraborti et al. 2022).

The majority of facilities apply chlorine or KMnO₄ to protect water intake structures, conveyance pipes, and pumps whereas less common control methods included the use of chloramines and copper ion treatment (Chakraborti et al. 2022). A total of 10 case studies of drinking water facilities addressing ongoing mussel infestations demonstrated operations and maintenance (O&M)-based unit costs of mussel control varied from \$34.32/mil gal for 1-mgd capacity to \$12.63/mil gal for 2,640-mgd capacity, capital cost and O&M-based equivalent annual unit cost for treatment varied from \$78.56/mil gal for 1-mgd capacity to \$13.41/mil gal for 2,640-mgd capacity, and costs for larger water treatment plants (i.e., >10 mgd) varied between \$1.00/mil gal and \$13.00/mil gal (Chakraborti et al. 2022). The Coachella Valley Water District, an irrigation supplier in Southern California, assesses a quagga mussel mitigation

¹⁹ Lake County will modify operations as standardized protocols are updated (if needed).

surcharge of \$3.18-4.31 per acre-foot (2022 rates²⁰), which pays for monitoring and to prevent dreissenid colonization in the Coachella Canal infrastructure (Nelson 2019).

Estimated Impacts to Self-supply Drinking Water Systems

Self-supplied water users that extract their water from Clear Lake are not required to report, therefore, there is no estimate of self-supply domestic users, or the amount of water they withdraw. Private residence water intake systems generally include an onshore component (pump and distribution pipes to residence) and an offshore component (the pipe from its intake in the lake to the onshore pump) (O'Neill 1993). Two strategies can address mussels in these systems: whole residence in-line filters that remove mussel veligers, and in-line chlorine injection systems, which kills mussel veligers, juveniles, and adults drawn into the system, which also address taste and odor issues caused by mussels (O'Neill 1993). Costs per Mg of water withdrawn was \$1,345 for in-line filters and \$7,348 for chlorine injection systems (O'Neill 1993).

Potential Solutions to Mitigate, or Eradicate, Invasive Mussels from Clear Lake

The Columbia River Basin Dreissenid Incident Response Toolkit website (<http://www.crbdirt.com>) documents commonly used control methods to eradicate dreissenids. The website notes that a suite of physical, biological, and chemical options exists for controlling invasive mussels (<http://www.crbdirt.com/control-methods>). Some methods are appropriate solely for hydropower facilities and water delivery systems, in which fish and other aquatic species are not present and the water can be treated before being released into a sewage system. Other methods, which may have reduced toxicity to fish and living organisms, are more appropriate for open water situations. Although the website outlines numerous potential control options, many treatments may not be appropriate, or feasible, for response in open-water systems because of their toxicity to other aquatic species, including fishes, native bivalves, shellfish, and aquatic invertebrates.

Dahlberg et al. (2023) documented lessons learned from a retrospective analysis of 33 open water dreissenid mussel control projects in 23 North America lakes. Open water treatments have included:

- Physical methods, such as manual removal by divers, creating anoxia with benthic mats, and desiccation from waterbody drawdowns (Wimbush et al. 2009, Hargrove and Jensen 2012, Leuven et al. 2014).
- Biological methods, such as the use of fish, crayfish, parasites, and microbes intended to reduce mussel populations by predation or infection (Molloy 1998, Kirk et al. 2001, Reynolds and Donohoe 2001). Zequanox®, a U.S. Environmental Protection Agency registered molluscicide for dreissenid control, is included in this category.

²⁰ <http://www.cvwd.org/documentcenter/view/5381>

- Chemical methods, including copper-based pesticides (e.g., Natrix™ and EarthTec QZ® are copper-based products registered by the U.S. Environmental Protection Agency for dreissenid control); potassium chloride (KCl), which is not registered by the U.S. Environmental Protection Agency as a molluscicide, but has been used in open water to control zebra mussels through the use of a Section 24c Local Needs exemption and Section 18 Emergency Exemption. DeBruyckere (2019) documents numerous scientific studies on the potential effects of dreissenid chemical treatments on listed species and critical habitats.

The potential methodology Clear Lake water managers would use to mitigate, or eradicate invasive mussels would depend on the extent of the infestation, whether or not adults were detected, the chemicals registered for use as a molluscicide by the U.S. Environmental Protection Agency, and numerous other factors, not the least of which is the Clear Lake Hitch and any potential effects on this species and its habitats. The website, www.crbdirt.com, documents the potential steps associated with a dreissenid response. Although the website is focused on the Columbia River Basin states, similar steps would occur for any jurisdiction, and include the steps described in this report (e.g., Initial Detections and Notifications, Verification, Activate Incident Management System, etc.).

Sources of Funding for Dreissenid Response and Containment

There are numerous existing and potential sources of funding to support dreissenid efforts in Clear Lake. Some of the sources of funding listed below have very specific uses, e.g., some cannot be used for anything other than prevention efforts. These are listed here because there is potential for Lake County to solicit funding from these sources to amplify prevention efforts, e.g., permanent watercraft decontamination stations, which could also be used in the future should Clear Lake become infested with dreissenids.

- **Federal**

- U.S. Fish and Wildlife Service Quagga and Zebra Mussel Action Plan (QZAP) grant funding—The pool of grant funding funds proposals listed in principal areas towards the fulfillment of the top priorities in the QZAP for western U.S. waters, including limiting the spread of invasive mussels via containment (e.g., inspection and decontamination of watercraft moving from invaded water bodies to jurisdictions free of dreissenids). Maximum grant award is \$600,000. Grant announcement contact: Barak Shemai, barak_shemai@fws.gov
- U.S. Fish and Wildlife Service North American Wetlands Conservation Act (NAWCA) Small Grants—This program is a competitive, matching grants program that supports public-private partnerships implementing projects in the United States that further the goals of NAWCA. Maximum grant award is \$100,000. Grant announcement contact: Rodecia McKnight (Rodecia_McKnight@fws.gov).

- **Regional**

- The Westside Sacramento Integrated Regional Water Management (IRWM) Plan²¹ provides grant funding for water management as well as emergency disasters. This small grant program provides a maximum of \$25,000 per projects that align with its regional priorities, which include protecting and enhancing habitat and biological diversity; preserving, improving, and managing water quality for beneficial uses; and improving watershed and ecosystem education and awareness. Response and containment may qualify for this funding source.

- **Fee-based, user funding**

- Recreational registered watercraft
 - Per California Code of Regulations, Title 14, Section 5201, the State of California requires owners of motorized recreational vessels used in freshwater to purchase from the Department of Motor Vehicles an annual sticker, which is separate and in addition to the vessel registration. Funding from these stickers supports prevention efforts via a grant program administered by the California Division of Boating and Waterways.

²¹ <https://www.westsideirwm.com/>

- The mussel fee amount shall be \$8 when first paid during an even-numbered calendar year and \$16 when first paid during an odd-numbered calendar year. The mussel fee amount shall be \$16 thereafter and shall be valid for a period of two calendar years. The mussel fee sticker shall be valid through December 31 of every odd-numbered year.
- Per Lake County regulations, all vessels launched in Lake County water bodies must have a Lake County Quagga/Zebra sticker (in addition to the sticker noted above) (<https://www.nomussels.com/>). Resident and visitor stickers are \$20. The total number of stickers sold to residents and visitors and the total income received from 2016–2022 was \$832,180 and \$1,124,580, respectively (Table 1, Figure 8). The average income in 2016–2022 from sticker sales to residents and visitors was \$166,436 and \$224,916, respectively. These funds could be used for response and containment.

Table 1. Total number of stickers sold to residents and visitors, and income received, from 2016–2022.

	# Resident Stickers Sold	# Visitor Stickers Sold	Total Income from all sticker sales
2016	6,987	9,561	\$330,960
2017	8,978	6,279	\$305,140
2018	5,849	7,763	\$272,240
2019	6,282	8,872	\$303,080
2020	4,981	8,480	\$191,233
2021	4,939	8,851	\$186,501
2022	3,593	6,423	\$135,577

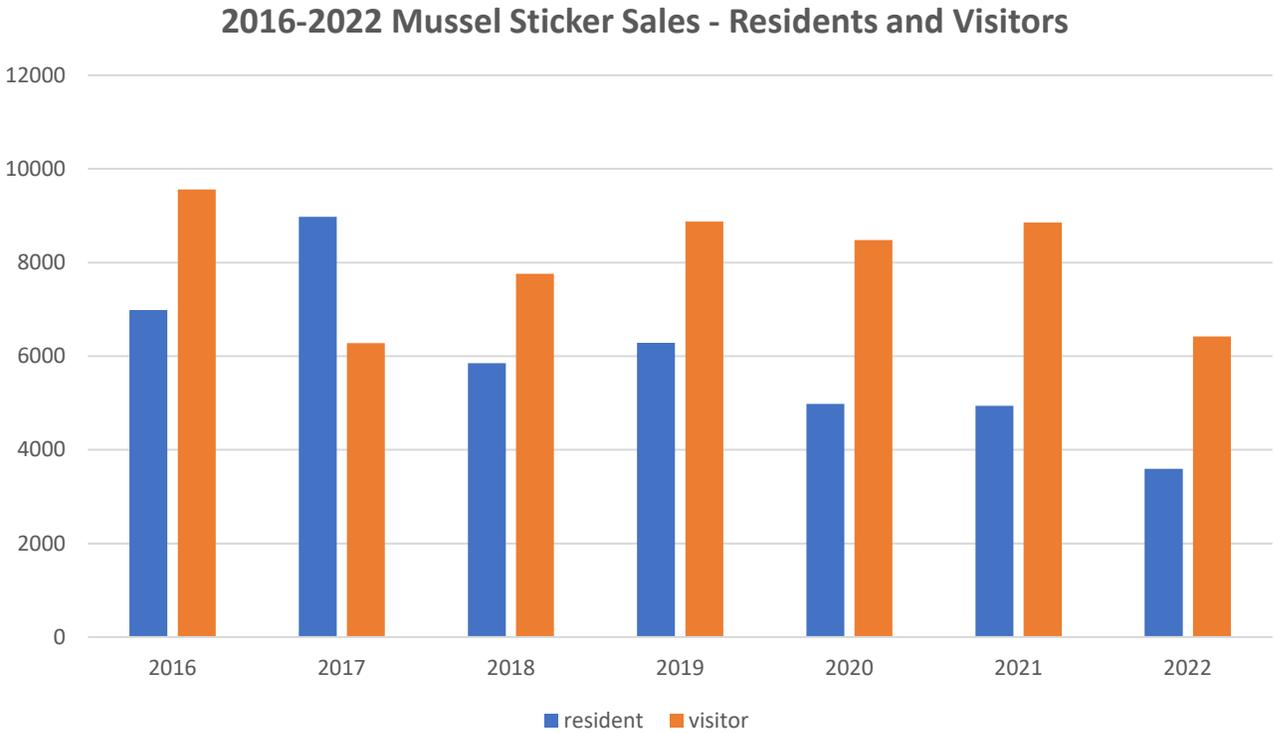


Figure 8. Mussel sticker sales to residents and visitors, 2016-2022.

- Seaplanes
 - Seaplanes have the potential to introduce or spread dreissenids and other aquatic invasive species. An event, called the *Clear Lake Splash In: Wings, Water & Wine* (<https://www.facebook.com/splashin/about>), is hosted annually at Clear Lake (excluding 2022, when the event was canceled, in part because of the exceptionally low water level of Clear Lake). The Splash-In is one of the largest seaplane fly-ins on the West Coast. The event is organized by the Lake County Chamber of Commerce. The same stickers that are issued to watercraft are issued to seaplane pilots.

Permanent Decontamination Station Feasibility Analysis

If eradication of dreissenids is not possible upon detection, actions must be taken to prevent spread of mussels from Clear Lake to other water bodies. Installation of adequate water/energy efficient watercraft decontamination stations must be completed to ensure that all watercraft leaving Clear Lake have no mussels on board, either attached to the vessel or floating in vessel/engine compartments, bilges, and other places that hold water. Options for decontamination stations:

- Fixed base systems (\$225,000 to \$450,000)—Hydro Engineering, LLC (<https://www.hydroblaster.com>) produces high-capacity fixed based systems consisting of a Hydrosite insulated equipment building connected to utilities (water, power, and fuel) as well as portable systems. Their permanent decontamination stations range from \$225,000 (single station systems with one wash pad – drive on, drive off ramp) to \$400,000-plus multiple (4-station) systems (e.g., 2 wash pads).
- Clean Wake Dip Tank (\$800,000)—Clean Wake LLC (<https://www.cleanwake.net/>) developed a dip tank that lowers a boat into the tank and fills and empties the ballast tank while the watercraft engines are running. This type of system was first used in Utah in 2021, and decontaminates vessels faster than manual decontamination, including those with complex systems.

Criteria to be considered for locations of permanent watercraft decontamination stations:

- Volume of watercraft launched from individual locations on Clear Lake.
- Locations where fishing tournament watercraft are launched.
- Proximity or accessibility to water, power, and sewer connections.
- Surface, slope, and distance to Clear Lake.
- Traffic patterns that capture major/preferred routes.
- Traffic patterns at proposed station location (e.g., safety considerations including preventing left-hand turns across lanes, overflow of waiting watercraft, surrounding speed limit allows ease of access if not then adequate signage).
- Area surrounding station has clear control points to prevent boats from launching/leaving until they have been decontaminated.
- Security - ability to “lock down” the decontamination unit when it is not being used.
- Minimal disturbance to natural landscape.
- Adequate space to house decontamination unit, structure for staff to remain safe, structure to house operational equipment, etc.

Based on these criteria and ingress and egress associated with Clear Lake, the most likely locations for permanent watercraft inspection and decontamination stations are Upper Lake Park or Upper Lake Roads Yard, Moose Lodge, Konocti USD Bus Yard or the industrial area north of the town of Clear Lake, the Vista Point Shopping Center or the Lakeport Public Works Yard (Figure 10).

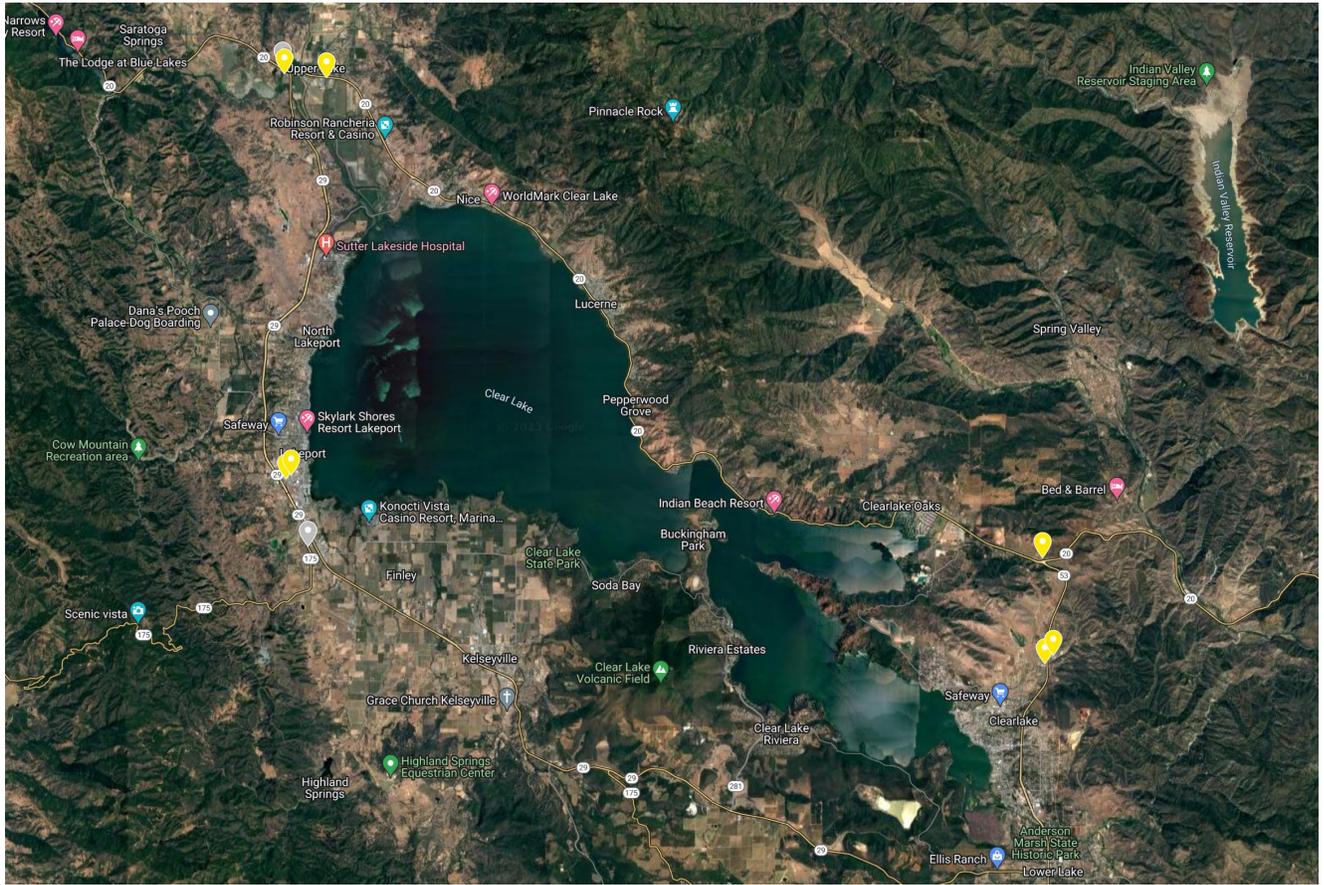


Figure 10. Potential locations for permanent watercraft inspection and decontamination stations based on the criteria for establishing stations.

Long-term Management Recommendations

1. Funding

- a. Develop a \$1,000,000 to \$1,500,000 emergency fund to prepare for an introduction of dreissenids to Clear Lake and neighboring water bodies.
- b. Consider changes to mussel sticker pricing to increase the cost of stickers to non-resident boaters and seaplane pilots.
- c. Consider establishing a mussel sticker for non-motorized non-resident watercraft.
- d. Consider establishment of a local municipal fee to offset and support operational expenses of prevention and containment programs.

2. Reporting

- a. Develop an online reporting system that requires self-supplied water users to register their water use with LCWPD and to create a database of self-supplied water users for notification purposes.
- b. Develop, implement, and enhance monitoring program by self-supplied water users within intake sources (e.g., citizen science monitoring).
- c. Increase and diversify monitoring operations annually to reach maximum capacity for sampling.

3. Capital Expenditures

- a. Purchase and staff four permanent watercraft inspection and decontamination stations for prevention and containment purposes.
- b. Purchase adequate signage and infrastructure for safe and successful WID station operation.

4. Containment and Control

- a. Initiate long-term containment program to prevent the spread of invasive mussels (and other AIS) to other water bodies via overland transport.
- b. Initiate internal ongoing evaluation of WID programming to identify areas of compliance, improvement, and redundancy.

5. Collaboration

- a. Conduct periodic preparedness exercises with regional partners and collaborators to identify areas for improvement.

- b. Work with regional water body managers to mirror and advance funding, reporting and containment recommendations.
- c. Work with county water body managers to foster prevention-to-containment processes that result in maintained recreational opportunities and self-water user abilities; serve as a model for other California affected water bodies and regions.
- d. Work with collaborators to better connect water use values with protection of the lake from invasive species.

6. Local ordinances

- a. Develop and adopt ordinance that requires sticker purchase by non-motorized boat owners.
- b. Develop and adopt ordinance that requires mandatory decontamination for motorized, non-motorized watercraft, and seaplanes upon exiting an infested waterbody.
- c. Propose changes to other ordinances as described in section [Recommended Amendments to Ordinances in Chapters 15 and 23 and other Code Ordinances](#) in this document.

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Appendices

Appendix A. List of Surface Water Systems that Draw from Clear Lake.

Appendix B. Clear Lake Marinas, Boat Rentals, Public Boat Launches.

Appendix C. Current Invasive Mussel Screening Locations.

Appendix D. California Regulations Pertaining to Dreissenids.

Appendix E. CDFW Quagga Mussel Observation Report Form.

Appendix F. Draft press release.

Appendix G. Potential Permit Considerations for a Clear Lake Dreissenid Control Action.

Appendix A. List of Surface Water Systems that Draw from Clear Lake.

Number	PWSID	System Name	Contact Person	Phone Number/ Email	Trt	Connecti on Count
1	CA1710011	Buckingham Park Water District	Ahimsah Wonderwheel	(707) 279-8568/ gm@buckinghamparkwater.us	T3	457
2	CA17100546	Clear Water Mutual Water Company	Michael Reust	(707) 349-0022 clearwtr.water@sbcglobal.net	T3	90
3	CA1710001	Clearlake Oaks County Water District	Dianna Mann	(707) 998-3322 d.mann@clocwd.org	T3	1,961
4	CA1700519	Crescent Bay Improvement Company	Mary Benson	(707) 994-1005 mary.benson.ca@gmail.com	T2	24
5	CA1710002	Golden State Water Company Clear Lake System	Keith Ahart	(707) 994-6035 kahart@gswater.com	T3	2,104
6	CA1700568	Harbor View Mutual Water Company	Jerimiah Fossa	(707) 994-9944 Jeremiahfossa@yahoo.com	T3	248
7	CA1710003	Highlands Mutual Water Company	Magen Estep	(707) 994-2393 magen@highlandswater.com	T4	2,877
8	CA1710006	Konocti County Water District	Frank Costner	(707) 994-2561 kcwd@mchsi.com	T4	1,796
9	NA - Private	Konocti Harbor Resort & Spa	Ken Lambert	(707) 461-9203 rhamel@konocioresort.com; klambert@konocioresort.com	T2	NA
10	CA1710022	Lake County CSA 20 (Soda Bay)	Scott Harter/ Scott Hornung	(707) 263-0119/ (707) 263-0119 scott.harter@lakecountycyca.gov scott.hornung@lakecountycyca.gov	T3	647
11	CA1710021	Lake County CSA 21 (North Lakeport)			T3	1,196

Number	PWSID	System Name	Contact Person	Phone Number/ Email	Trt	Connecti on Count
12	CA1710004	City of Lakeport	Paul Harris	(707) 263-5615 (ex 402) pharris@cityoflakeport.com	T4	2,232
13	CA1710005	California Water Service – Lucerne	Meaghann Tenuta	(530)433-8737 mtenuta@calwater.com	T4	1,209
14	CA1710014	Mt. Konocti Mutual Water Company	Alan Farr	(707) 277-7466 mkonocti@yahoo.com	T3	1,572
15	CA1710008	Nice Mutual Water Company	David Fultz	(707) 274-1149 nicemwmng@mchsi.com	T4	1,064
16	CA17100603	Richmond Park Resort	Carl Olson	(415)721-0772 cedolson@yahoo.com	T3	30
17	CA1700584	Westwind Mobile Home Park	Bill Lee	(503) 702-3955 billkimlee@comcast.net	T2	38

Appendix B. Clear Lake Marinas, Boat Rentals, Public Boat Launches, Marine Services, and Sailing Facilities.

Marina	Address	Facilities	Contact information
Braitto's Buckingham Marina	1555 Eastlake Drive Kelseyville, CA	Launch Ramp, Dock (covered and open slips, dry storage), facilities (boating repairs and accessories)	(707) 279-4868
Blue Fish Cove Resort	10573 East Highway 20, Clearlake Oaks, CA	Launch Ramp, Dock (slips), facilities (picnic area, fish cleaning stations, fishing pier, private swimming beach, lodging)	(707) 998-1769
Konocti Vista Casino Resort and Marina	2755 Mission Rancheria Rd Lakeport, CA	Launch Ramp (free for hotel guests), Dock (slips), facilities (gas, convenience store, parking for boats and trailers, casino, hotel)	http://www.kvcasino.com/
Clear Lake Cottages & Marina	138885 Lakeshore Drive Clearlake, CA	Launch Ramp, Dock (10-slip marina, \$10/night), facilities (trailer parking, electrical hookups at marina, swimming pool, WiFi, lodging)	(707) 995-5253
Clear Lake Vista Resort (formerly Ferndale Resort & Marina)	6190 Soda Bay Road Kelseyville, CA	Launch Ramp (free for resort guests, \$10 for others), dock (free to resort guests), facilities (fuel dock, store, restaurant, bait shop, lodging, kayak rentals)	http://www.kvcasino.com/
Boat Rentals	Address	Facilities	Contact information
Disney's Boat Rentals	401 S. Main St Lakeport, CA	Jetskis, kayaks, pedal boats, paddleboards, ski and touring boat, ski/wake boat w/tower, 115HP deluxe patio boat, fishing boat with trolling motor	(707) 263-0969

Clear Lake Public Boat Launch Ramps	Address	Facilities	Contact Information
Redbud Park (city park)	14655 Lakeshore Drive Clearlake, CA	Restrooms, fishing pier, park	(707) 994-8201, ext. 131
Clear Lake State Park (fees apply)	5300 Soda Bay Rd Kelseyville, CA	Docks, swimming, restrooms, picnic area, camping	(707) 279-2267
Library Park (3) (city park)	222 Park Street Lakeport, CA	Docks, swimming	(707) 263-3578 PWinfo@cityoflakeport.com
Lakeside County Park	1985 Park Street Lakeport, CA	Swimming, restrooms, picnic	(707) 262-1618
Lucerne Harbor (county park)	6225 E Hwy 20 Lucerne, CA	Fishing pier, picnic, restrooms	(707) 262-1618 parks@lakecountyca.gov
Rodman Slough County Park (undeveloped)	1005 Nice/Lucerne Cutoff Lakeport, CA	Primitive ramp, swimming, picnic	(707) 262-1618
Clearlake Oaks	12684 Island Dr Clearlake Oaks	Fishing pier, swimming, restrooms, picnic	
Nice Community Beach	647 Lakeshore Dr Nice, CA	Fishing pier, restrooms, swimming	(707) 262-1618
Keeling County Park	3000 Lakeshore Dr Nice, CA	Fishing pier, restrooms, picnic, swimming	(707) 262-1618 parks@lakecountyca.gov
Marine Services	Address	Contact	Contact information
Bayshore Marine Service	7723 Hwy 29 Kelseyville, CA	Marc Linscott	(707) 279-1094 support@bayshoremarineservice.net
McAtee's Marine Repair	90 Soda Bay RD Lakeport, CA	Garret and Debi McAtee	(707) 263-0440 mcateesmarine707@gmail.com
White & Sons Boatworks	Braitto's Buckingham Marina 1555 B Eastlake Dr Kelseyville, CA	Ryan and Pilar White	(707) 279-1325 ryan@wsboatworks.com

Sailing/Boat Tours	Address	Facilities	Contact information
Disney's Boat Rentals	401 S. Main St Lakeport, CA	Jetskis, kayaks, pedal boats, paddleboards, ski and touring boat, ski/wake boat w/tower, 115HP deluxe patio boat, fishing boat with trolling motor	(707) 263-0969
Konocti Bay Sailing Club	1555 Eastlake Dr Kelseyville, CA	Sponsors events at Clear Lake	(707) 572-KBSC
Clear Lake Sailing Charters	Lakeport, CA	Scott Bennett, Captain	(707) 349-2584
Lakeport Yacht Club	PO Box 313 Lakeport, CA	Promotes sailing and power boating; holds regattas and other boating events	(707) 263-5078

Appendix C. Current Invasive Mussel Screening Locations.

Entity	Address of Concern		Days/Hours Open	Phone
Indian Beach Resort	9945 Hwy 20	Clearlake Oaks	Everyday 7:00am- 6:00pm	707-998-3760
Limit Out Tackle	12607 E. Hwy 20	Clearlake Oaks	Mon-Sun 6:00am-5:00pm	707-998-1006
Clearlake Bait & Tackle	14699 Lakeshore Dr.	Clearlake	Mon-Thur 6:00am-5pm, Fri-Sat 6:30am-6pm Sun 6:30am-2pm	707-994-4399
Clear Lake Campground	7805 Cache Creek Way	Clearlake	1:00pm-4:00pm daily, by appointment	707-994-2236
McAtee's Marine Repair	3450 Hill Road	Lakeport	Mon-Fri 8:00am-5:00pm	707-263-0440
Hillside Powersports	460 S. Main St	Lakeport	Tues-Sat 9:00am-3:00pm	707-263-9000
Clearlake Outdoors	96 Soda Bay Rd.	Lakeport	Mon-Sat 7:00am-6:00pm, Sun 7:00am-5:00pm	707-262-5852
Lake County Chamber of Commerce	875 Lakeport Blvd.	Lakeport	Mon-Fri 9:00am-5:00pm	707-263-5092
Konocti Vista Casino Resort Marina	2755 Mission Rancheria Rd.	Lakeport	Seven days a week 7:00am-Midnight	707-262-1900
Skylark Shores	1120 N. Main St.	Lakeport	Seven days a week 8am-8pm	707-263-6151
Braitto's Marina	1555 East Lake Drive	Kelseyville	9:00am-4:00pm daily	707-279-4868
Clearlake State Park	5300 Soda Bay Road	Kelseyville	Sun - Fri 8:00am- 6:00pm, Sat- 9:00am- 5:00pm	707-279-4293
Kelseyville Lumber & Supply Co.	3555 N. Main Street	Kelseyville	Mon-Fri 7:00am-5:30pm, Sat 8:00am-5:30pm, Sun 8:00am-4:30pm	707-279-4297
Borenbega	9080 Soda Bay Road	Kelseyville	Please call, by appointment	707-530-4541
Clear Lake Vista Resort	6190 Soda Bay Road	Kelseyville	9:00am-5:00pm daily	707-289-4017

Entity	Address of Concern		Days/Hours Open	Phone
Lake Builders Supply	3694 Highway 20	Nice	Mon- Fri 7:30am- 5:30pm, Sat-Sun 8:00am- 5:00pm	707-274-6607
Narrows Resort	5690 Blue Lakes Rd	Blue Lakes	Call Ahead	707-477-8360
Konocti Bait Shop	6199 Hwy 20	Lucerne	Call Ahead	707-349-8963
Lake Pillsbury Resort	2756 Kapronos Rd	Potter Valley	Call for summer hours	707-743-9935
Soda Creek Store	26853 Elk Mountain Road	Potter Valley	Seven days a week 9:00am-9:00pm	707-743-2148
Suzanne L-B	Indian Valley Reservoir	Mobile	Call for Appointment	707-489-6792
Bob Sullivan Screening	Flexible	Mobile	Flexible, by appointment	707-337-0480
Conrad Clobandt	Flexible	Mobile	Call for Appointment	707-245-9181
Mark Holloway	Flexible	Mobile	Call for Appointment	707-295-9112
Robert Valdez	Flexible	Mobile - Lakeport / Kville	Call for Appointment	408-691-7726

Appendix D. California Regulations Pertaining to Dreissenids.

[California Aquatic Invasive Species Regulations](#) (updated 12/16/2022)

[California Aquatic Invasive Species Statutes](#) (updated 12/16/2022)

[Comparison of California's watercraft inspection and decontamination programs to the model legal framework](#) (2018)

[California Environmental Quality Act](#) (CEQA) (CA Public Resources Code 21000 et seq)—Requires public disclosure of all significant environmental effects of proposed discretionary projects. If a project is estimated to cause significant effects, documents must describe the mitigation measures and provide justifications for approval of the project with significant effects left unmitigated.

[California Porter-Cologne Water Quality Control Act](#) (CA Water Code 1300 et seq)—A report of any discharge of waste within a region that could affect the quality of waters of the state must be filed with the appropriate Regional Water Quality Control Board. The State Water Resources Control Board considers application of pesticides to control aquatic invasive species in waters of the state as discharge of a pollutant requiring an NPDES permit.

[Fish and Game Code and Title 14 of the California Code of Regulations](#)—

- Fish and Game Code Section [2301 and 2302](#)
- California Code of Regulations, Title 14 Section [672](#), [672.1](#) and [672.2](#)

The importation or interstate transport of zebra and quagga mussels is prohibited by the federal Lacey Act, 16 U.S.C. §§ 3371-3378 (for current list of injurious wildlife: https://www.fws.gov/injuriouswildlife/pdf_files/Current_Listed_IW.pdf).

Appendix E. CDFW Quagga Mussel Observation Report Form.

<https://wildlife.ca.gov/Conservation/Invasives/Quagga-Mussels/Observation-Report>

See the [Emergency Closures](#) page before visiting a CDFW office, facility or property.

California Department of Fish and Wildlife

Home Fishing Hunting Licensing Conservation Learning

Quagga Mussel Observation Report Form

Observer

Full Name

First Name

Last Name

Email

Phone

Phone Number

Would you like CDFW to follow up with you?
 Yes
 No

Would you like to receive an email summary of the citizen monitoring results?
 Yes
 No

Survey Details

Waterbody Name

County

Number of Sites

Site 1

Latitude

Longitude

Site name / description of geospecific location

Description of aquatic area surveyed

Approximate distance surveyed (feet)

Quagga / Zebra mussels observed?
 Yes
 No

Other aquatic invasive species observed?
 Yes
 No

If Yes, which species?

Photo Upload

(Max. combined file size: 10 MB)

Site 2

Site 3

Site 4

I'm not a robot

[Privacy](#) [Terms](#)



CDFW Invasive Species Program
 P.O. Box 944280
 Sacramento CA 95844-2990
invasives@wildlife.ca.gov

Invasive Species Program

- > What are invasive species?
- > Species profiles
- > Native discovery in California
- > Quagga / Zebra mussel management
 - Quagga Mussel Observation Report Form
 - 2017 Quagga / Zebra Mussel Water Agency Summit
 - Quagga / Zebra Mussels Incident Description
 - Quagga / Zebra Mussel Preventive Program Resources
- > New mussel infestations
- > How can I help?
- > Invasive Species Action Week
 - Youth Art Contest!
- > Don't Let It Loose!
- > Citizen science
- > Report a sighting
- > Eye on Invasives newsletter
- > California Aquatic Invasive Species Management Plan
- > Laws and regulations
- > Marine Invasive Species Monitoring Program

Fisheries Branch
 1030 Riverside Parkway, West Sacramento, CA 95605 | fisheries@wildlife.ca.gov

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[Fish and Game Commission](#)

Appendix F. SAMPLE Draft Press Release.

Contact: Angela DePalma-Dow, Water Resources Department, County of Lake, CA, 255 N. Forbes St. Lakeport, CA 95453, O: (707)263-2344, C: (530)304-1809

The Lake County Water Protection District (LCWPD) has declared Clear Lake a “suspect location” for infestation of invasive mussels. This report has been initially verified by California Department of Fish and Wildlife .

Efforts are underway to determine the extent of the invasive mussel infestation. This discovery is a serious environmental and economic concern for Clear Lake, Lake County water bodies, and Northern California. Invasive quagga and zebra mussels are small nonnative freshwater mollusks that have caused major problems in the United States after their introduction in the 1980s.

Officials have not yet determined how these mussels entered Clear Lake. Recreational boats are known to be a major vector of invasive mussel spread in the United States, and there are a number of past incidents where boats fouled by invasive mussels have been intercepted prior to launching in waters in the western states.

In preparation for an introduction of invasive mussels in Clear Lake, officials developed a rapid response and transition to containment plan outlining a set of actions to address the initial finding and monitor the situation long term.

Until additional surveys are conducted, the extent of the infestation is unknown. During this phase of rapid response, the LCWPD has closed all access to Clear Lake (through the Lake County Sheriff and use of Ordinance 31) to help prevent further potential dispersal of the invasive mussels. The public can help by avoiding Clear Lake and following general guidelines to prevent the spread of invasive mussels. Boaters should clean, drain and dry all boats, trailers, and other equipment after leaving a lake or stream and never release any live organisms into the wild.

LCWPD’s Angela DePalma Dow administers Clear Lake’s boat inspection program and commented on its importance. “We recognize the inconvenience to boaters and understand the need for additional sampling and identification to determine if this water body is positive for quagga mussels,” said DePalma-Dow. “Our staff will ensure that boats will go through the inspection process as efficiently as possible.”

Boaters can assist with the process by arriving at Clear Lake with a clean, drained and dry vessel. For more information, visit the LCWPD website at <https://www.nomussels.com/>.

##

Appendix G. Potential Permit Considerations for a Clear Lake Dreissenid Control Action.

Federal

- **National Pollutant Discharge Elimination System Permit**—Chemical control of dreissenid mussels at Clear Lake would require a National Pollutant Discharge Elimination System (NPDES) permit under Section 402 of the Clean Water Act. The U.S. Environmental Protection Agency has delegated to the State of California the NPDES Program through the State Water Resources Control Board and the nine Regional Water Quality Control Boards. Lake County falls within Region 5; the Regional Water Board NPDES Program Manager is Jim Marshall, Supervising Water Resource Control Engineer, james.marshall@waterboards.ca.gov, (916) 464-4772. California’s Aquatic Animal Invasive Species Control Permit covers the discharges of biological and residual chemical pesticide applications into waters of the United States for aquatic animal invasive species control. The current permit is [Statewide NPDES Permit No. CAG 990006](#); the permit contact is Gurgagn Chand, Gurgagn.Chand@waterboards.ca.gov, (916) 341-5780. The NPDES permit does not authorize any act that results in the taking of a threatened or endangered species under the California Endangered Species Act (CEQA) (Fish and Game Code sections 2050 et. seq) or the Federal Endangered Species Act (16 U.S.C.A. sections 1531 et. seq). An emergency exemption would be requested because potassium chloride is not registered as a molluscicide in the United States, or California.
- **Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)-Section 18 exemption**—Control actions to address dreissenids have been exempted from FIFRA if an emergency exemption is declared. Because potassium chloride is not registered for pesticide use, an Emergency Quarantine Exemption under Section 18 of FIFRA would be required.
- **National Historic Preservation Act permit**—Any dreissenid control project undertaken with federal funds requires an evaluation according to Section 106 of the National Historic Preservation Act (NHPA). California’s Office of Historic Preservation (OHP) would conduct the evaluation and determine whether historic properties are affected. The OHP assists local governments with meeting CEQA responsibilities with regard to historical resources.
- **Fish and Wildlife Service Section 7 Consultation**—The Endangered Species Act (ESA) directs federal agencies to conserve endangered and threatened species. Under Section 7 of the Act, federal agencies must consult with the U.S. Fish and Wildlife Service (USFWS) when an action the agency carries out, funds, or authorizes may affect a listed endangered or threatened species. Emergency consultation is an expedited consultation process that considers listed species while allowing an action agency to respond to an emergency situation. Even if a non-federal jurisdiction is leading a rapid response operation, an associated federal action may trigger a need for compliance with Section 7

of the ESA, such as actions that require a federal permit, or actions using federal funds. In general, state response actions involving emergency circumstances and take of listed species are likely to have a federal nexus that will facilitate take coverage under the emergency consultation providing of the implementation regulations for Section 7 of the ESA. Take is defined under the ESA to include: kill, harm, harass, capture, pursue, hunt, shoot, wound, trap, capture, or collect, or attempt to engage in such conduct. In addition, Section 6 of the ESA allows for the take of listed species by a state agency when it is either:

(a) an action carried out by the state agency (or its designated agent) that is signatory to a current and valid Section 6 cooperative agreement with the Service; is carried out for conservation purposes consistent with the cooperative agreement, a species' specific recovery plan, and the ESA; and is not reasonably anticipated to result in death, disabling, out-of-state removal, introduction outside of native range, or captivity exceeding 45 days of any federally-endangered species. See Appendix A for the underlying regulatory provision from 50 CFR § 17.21(c)(5).

(b) in accordance with a Section 10 permit issued by the Service.

Rapid response to eradicate an incipient introduction of zebra or quagga mussels would fall under the “conservation purposes” criterion in (a).

In emergency situations, consultation does not occur on the emergency; rather, consultation is conducted on the agency response to the emergency, and consultation is handled in an expedited manner. If a formal consultation is required, it is initiated as soon as practicable after the emergency is under control. Typically, when an emergency situation occurs, the Federal action agency (or its designee) contacts the USFWS Regional Ecological Services Office by telephone if an emergency event is determined to be in proximity to listed species or critical habitat and warrants Section 7 consultation. The ESA consultation process is further described here: <http://www.crbdirt.com/process>.

After containing the infestation and defining the extent of the infestation, Clear Lake authorities must define any threatened or endangered species and their critical habitats within the proposed action area as well as compile relevant information that would influence potential control actions (e.g., water depth, water quality information). Threatened or endangered species and their critical habitats are defined for the proposed action area using [IPAC](#). Then potential response actions are defined based on those species and habitats and any other relevant information about the proposed action area and its footprint. At this stage, local authorities should engage regional U.S. Fish and Wildlife Service staff to initiate an emergency consultation. The goal of this activity is to inform the federal agency of the detection and its estimated extent, describe the listed species and critical habitats within the potential action area, and discuss the suite of potential actions and the recommended action to control, or eradicate, the dreissenids. Even if no listed species and habitats are detected using IPAC, it is a good practice to

consult regional U.S. Fish and Wildlife Service staff as a check on local authority analyses and to discuss other native fish and wildlife considerations with the partner federal agency.

Note: At the time this plan was developed, the Clear Lake hitch (*Lavinia exilicauda chi*) and the Foothill Yellow-legged frog (*Rana boylei*) were state listed. In December of 2022, the Center for Biological Diversity requested an emergency listing for the Clear Lake Hitch, noting the fish was at significant risk of extinction. The Clear Lake hitch was designated a threatened species under the California's Endangered Species Action in 2014; the last documented successful spawning was observed in 2017, thus the 2023 spring spawning season is critical for continued survival of the species because of their six-year life span. A draft conservation strategy²² exists for the Clear Lake hitch. The strategy is intended to guide conservation actions to increase reproduction and recruitment, continue and expand monitoring efforts, continue water quality monitoring, develop and support research projects to inform adaptive management and success criteria for conservation actions, and expand outreach and education programs relating to the hitch. The U.S. Fish and Wildlife Service is scheduled to re-evaluate the status of the Clear Lake hitch in January of 2025.

State

California Department of Fish and Wildlife

- **California Environmental Quality Act (CEQA)**—CEQA requires state and local agencies to identify any significant environmental impacts of a project and if feasible, avoid or mitigate those impacts. Generally, CDFW acts as a responsible or trustee agency, supporting a lead agency in determining potentially significant environmental impacts. CDFW provides informal consultation and comments on CEQA documents. When CDFW is required to act as lead agency, the department may charge and collect a reasonable fee from the entity to recover its estimated CEQA-related costs ranging from \$7,500 to \$44,000 (in 2023). CEQA requires lead agencies to submit draft environmental impact reports (EIR), proposed negative declarations (ND), and proposed mitigated negative declarations (MND) to the State Clearinghouse (SCH) at the Office of Planning and Research. A future Clear Lake Dreissenid Control Plan may need to go through the CEQA process and conduct various studies and surveys to support the associated CEQA document. Depending on the scope of a proposed project, this process can be very time consuming, taking months or years.
- **California Department of Pesticide Regulation (CDPA)**—CDPA protects human health and the environment by regulating pesticide sales and use, and by fostering reduced-risk pest management.

²² <https://lakecountyca.gov/DocumentCenter/View/5951>

California Department of Fish and Wildlife 2023 CESA Fees for ITPs and CDs

Permit Type	Project Cost	Mitigate at CDFW-Approved Bank?	2022 Fee	2023 Fee
Consistency Determination	N/A	Yes	\$6,917.25	\$7,503.75
Consistency Determination	N/A	No	\$8,646.50	\$9,379.50
Incidental Take Permit	≤\$100,000.00	Yes	\$6,917.25	\$7,503.75
Incidental Take Permit	≤\$100,000.00	No	\$8,646.50	\$9,379.50
Incidental Take Permit	\$100,000.00-\$500,000.00	Yes	\$13,834.00	\$15,006.75
Incidental Take Permit	\$100,000.00-\$500,000.00	No	\$17,292.50	\$18,758.50
Incidental Take Permit	≥\$500,000.00	Yes	\$27,668.50	\$30,014.25
Incidental Take Permit	≥\$500,000.00	No	\$34,585.25	\$37,517.25
Incidental Take Permit Minor Amendment	N/A	N/A	\$8,646.50	\$9,379.50
Incidental Take Permit Major Amendment	N/A	N/A	\$17,292.50	\$18,758.50
Maximum Complexity Fee	N/A	N/A	\$11,528.50	\$12,505.75
Maximum Total Fee	N/A	N/A	\$40,349.50	\$43,770.25

*Voluntary restoration projects are not subject to CESA application fees.

- Specific use Scientific Collecting Permit (CDFW)**—Fish and Game Code (FGC) sections 1002, 1002.5 and 1003 authorize the California Department of Fish and Wildlife (Department) to issue permits for the take or possession of wildlife, including mammals, birds and the nests and eggs thereof, reptiles, amphibians, fish, certain plants and invertebrates for scientific, educational, and propagation purposes. The Department currently implements this authority through Section 650, Title 14, California Code of Regulations (CCR), by issuing Scientific Collecting Permits (SCP) to take or possess wildlife for such purposes. For more information on SCPs and the associated fee schedule please refer to the following link: [Scientific Collecting Permits](https://wildlife.ca.gov/Conservation/CESA/Permitting) (ca.gov).
- California Endangered Species Act (CESA) Permits**²³—A Clear Lake Dreissenid Control Action Plan may also include activities that would result in the take of one or more state listed species, including the Clear Lake Hitch (CLH), *Lavinia exilicauda chi*. If it is determined project activities included in the action plan will result in the take of CLH or other protected plant or animal species, an Incidental Take Permit (ITP) will be required by CDFW. If the proposed action plan has already acquired take authorization from a federal entity, a consistency determination (CD) can be obtained from CDFW instead of an ITP. The cost associated with ITPs and CDs can be found

²³ <https://wildlife.ca.gov/Conservation/CESA/Permitting>

at: [FileHandler.ashx \(ca.gov\)](https://filehandler.ashx.ca.gov). The timeline for acquiring these permits is contingent on the complexity of the project as well as how prepared the environmental documents are, therefore, early consultation with CDFW is highly recommended. Generally, 3–6 months is a reasonable timetable to complete the ITP process.

- **Lakebed Alteration Agreement (CDFW)**—A Clear Lake Dreissenid Control Action Plan may include activities that would require an LSA from CDFW. CDFW requires notification by an entity that proposes an activity that will substantially divert or obstruct the natural flow of any river, stream, or lake, substantially change or use any material from the bed, bank or channel of any river, stream, or lake, or deposit or dispose of material into any river, stream or lake. After submitting a notification, the department has 30 days to review the notification for completeness and an additional 60 days to provide a draft Agreement. There are costs associated with LSA Agreements can be found in the attached fee schedule. An additional attachment provides instructions on acquiring an LSA Agreement.

To obtain a streambed alteration agreement from CDFW using the Environmental Permit Information Management System (EPIMS):

Register with EPIMS for an external EPIMS account.

1. Go to <https://epims.wildlife.ca.gov/home.do> and click the "Register Here" link.
2. In the 'Person Information' section complete all required fields.
3. In the 'Organization Information' section add your business information if applicable.
4. In the 'Verify Submission' section select "I'm not a robot."
5. Click the "Register" link.
6. EPIMS will notify IT Support of the registration and you will receive a response within 24 hours of registration.

→ Submitting a Notification Application

1. When you have received the external user log in information, log into EPIMS.
2. From the Main Menu, click the "Help" link in the toolbar.
3. Follow ALL instructions under "Permitting Portal - Instructions for Submitting" to submit the notification application.

California Regional Water Quality Control Boards

- The State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCBs) are housed within the California Environmental Protection Agency. The SWRCB allocates the rights to the use of surface water, and the RWQCBs protect surface, ground, and coastal waters statewide. The RWQCBs also issue permits that govern and restrict the amount of pollutants that can be discharged into the ground or a water body.
- Any activities or discharges that affect California’s surface, coastal, or ground waters require a permit from the appropriate RWQCB. Dreissenid control activities would require an NPDES permit from the appropriate RWQCB (see NPDES permit information above).
- A report of Waste Discharge would be required to be completed to the local RWQCB.
- A Water Quality Certification would be required to be completed for discharges of dredged and fill materials. Under the Clean Water Act Section 401 Certification Rule, a “pre-filing meeting” is required with the appropriate Water Board at least 30 days prior to submitting an application for an individual Clean Water Act Section 401 Water Quality Certification. CentralValleySacramento@waterboards.ca.gov and Stephanie.Tadlock@waterboards.ca.gov

For more information on the Clean Water Act Section 401 Certification Rule, visit the [Environmental Protection Agency’s webpage](#).

- [Application for Water Quality Certification and/or Waste Discharge Requirements](#) - (MS Word)
- [Application for Water Quality Certification and/or Waste Discharge Requirements](#) - (PDF)
- [Dredge and Fill Fee Calculator](#) (*effective 11/28/2022*)
 - Application fees shall be based on the current fee schedule. After the certification has become effective, annual fees will be based on the fee schedule at the time of billing.
- [Application Information](#) - (updated 01/05/2021)
- General Orders
 - [Issued for Coverage under Federal Permits](#)
 - [Issued for Coverage under State Water Board initiatives](#)
- [More Information on the Water Quality Certificate Program](#)