LAKE COUNTY
Watershed Protection District

Lake County

Quagga and Zebra Mussel Prevention Plan

March 2019

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CALIFORNIA STATE PARKS BOATING AND WATERWAYS

CALIFORNIA DEPARTMENT OF FISH & WILDLIFE

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Purpose

This document was developed to guide the implementation and maintenance of the Lake County Quagga and Zebra (herein "Q/Z mussels") Invasive Mussel Program. The purpose of this program is to prevent the introduction and establishment of invasive mussels in Lake County waterbodies, including Clear Lake, Indian Valley Reservoir, Blue Lakes, Hidden Valley Lake, Highland Springs Reservoir, and Lake Pillsbury (herein "Lake County waterbodies") (Figure 1). These waterbodies are located within Lake County and are wholly or partially managed by the Lake County Watershed Protection District and their affiliated partners.

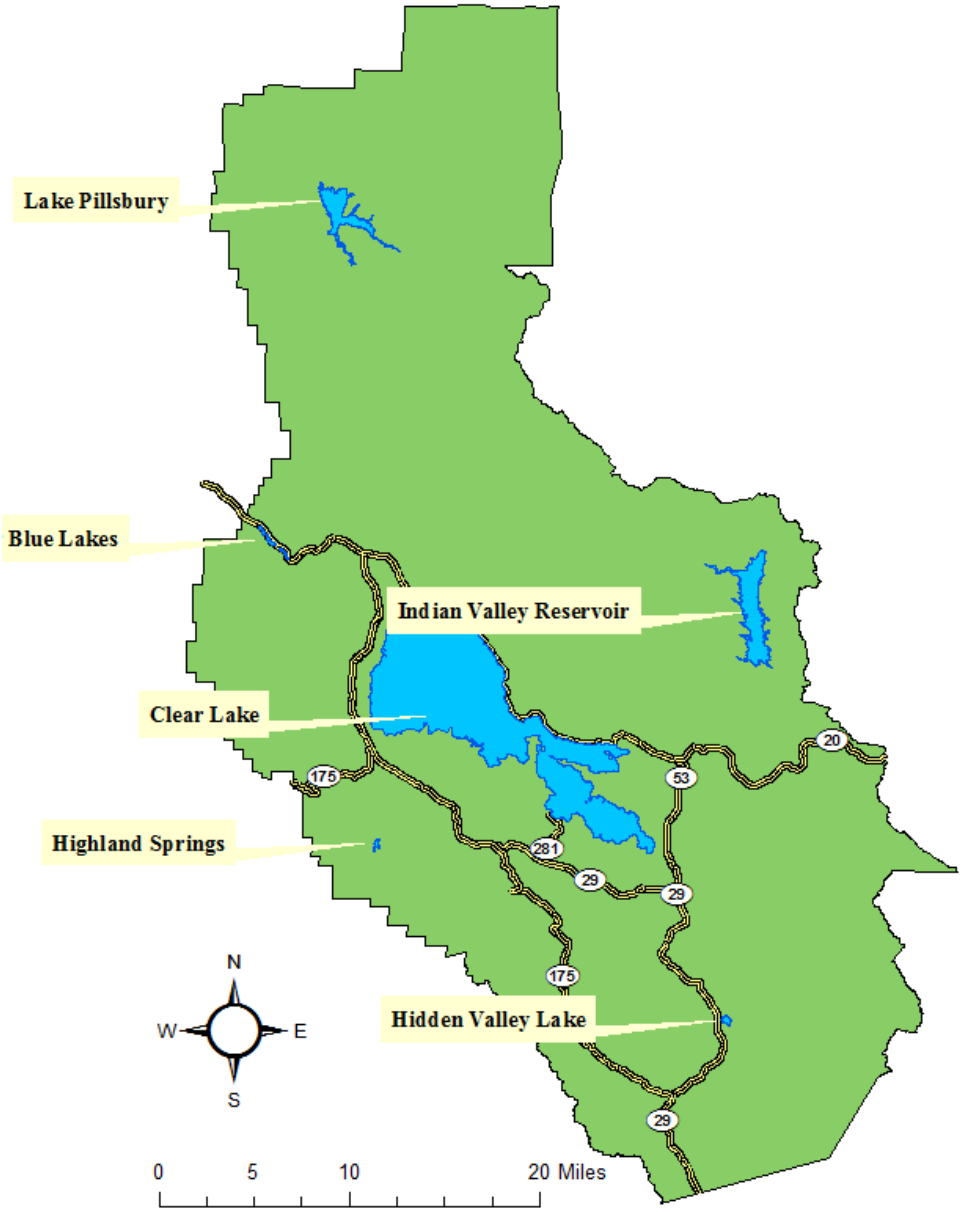

Figure 1 Lake County waterbodies included in some aspect of the Lake County Quagga and Zebra Mussel Prevention Plan.

Introduction

On January 6, 2007, quagga mussels (*Dreissena rostriformis bugensis*), a type of invasive mussel closely related to invasive zebra mussels (*Dreissena polymorpha*), and also referred to as "dreissenid mussels", were discovered in Lake Mead, Nevada. Since that time, quagga mussel infestations have been discovered in a growing number of western lakes and reservoirs, including 43 locations in California (CDFW January 2019). On January 16, 2008, zebra mussels were discovered in San Justo Reservoir, San Benito County, California.

Based on the most recent monthly monitoring surveys (October 2018), Clear Lake, Indian Valley Reservoir, and Lake Pillsbury, the three largest of Lake County's waterbodies with public access, currently have not had a positive detection of Q/Z mussels. However, if introduced, Q/Z mussels pose a major threat to all Lake County waterbodies. Experts fear that mussels could spread quickly through the watershed and potentially be transported and establish themselves in other water systems connected to Clear Lake, such as the Sacramento River Basin and eventually the San Joaquin Delta. If Q/Z mussels were to infest Clear Lake, they could:

- Disrupt the food chain and negatively impact Clear Lake fisheries
- Negatively impact infrastructure like docks and ramps
- Encrust boats and clog engines
- Litter beaches with sharp shells
- Decrease performance and increase maintenance costs when drinking water intake pipes and infrastructure are clogged, fouled, or contaminated.
- Lead to severe boating restrictions
- Lead to severe fishing contest restrictions

Q/Z mussels were first discovered in the Great Lakes in 1988 and 1989, respectively. Since that time, Q/Z mussels have spread at an alarming rate through much of the Eastern US and to the Western US, by moving with the flow of water and in or on water vessels. The USGS generates maps of known locations of known populations of Q/Z mussels in the United States and California. Current species information and distribution can be found at:

Quagga Mussels: https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=95

Zebra Mussels: https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=5

Figure 2 Quagga mussels at Lake Mead National Recreation Area, Photo taken in 2017.

Aquatic nuisance species, such as Q/Z mussels, present a growing worldwide problem. Impacts from aquatic nuisance species can be extreme and affect ecosystems, recreation, and economics. Aquatic nuisance species infestations are generally permanent; prevention is the best strategy to combat them. Education is a critical piece to prevention as aquatic nuisance species generally need humans to move anywhere but downstream.

The primary agency responsible for managing the Q/Z mussel program in Lake County is the Lake County Watershed Protection District ("District"). The Lake County Watershed Protection District, was originally created as the Lake County Flood Control and Water Conservation District as a political subdivision of the State of California established under the Lake County Flood Control and Water Conservation Act, of the State Water Code in 1951. The District is administered by the Director of Water Resources who reports to the County Board of Supervisors, which acts as its Board of Directors. The District functions to plan, manage, maintain, implement, evaluate, and expand all aquatic invasive species programs such as the Aquatic Plant Management Program and the Q/Z Mussel Prevention Program. The District relies on several partners to maintain the program. The California Department of Fish and Wildlife (CDFW) conducts veliger tows 2-3 times a year at multiple sites in Lake County including Clear Lake and Indian Valley Reservoir, with PG&E conducting tows in Lake Pillsbury. The District performs substrate monitoring in Blue Lakes, Lake Pillsbury, and Hidden Valley Lake. The California State Parks Division of Boating and Waterways provides Q/Z grant funds to support the County's boat ramp monitor network for Clear Lake, inspection training and equipment, and all essential educational materials.

Vulnerability Assessment and Risk Management

Lake County has always been especially susceptible to the risk of invasive mussel invasion because of Clear Lake, the largest natural freshwater lake located entirely within California. Clear Lake is open year-around with access for trailered vessels in all seasons, except extreme times of drought when the water level becomes extremely low. Clear Lake is a fishing destination, hosting more than 100 tournaments annually from local club contests to large-scale commercial events with over 1000 entries. The shallow, calm, and productive water along the littoral zone of Clear Lake attracts professional bass fishermen from all over the country and was rated within the top three best bass fishing lakes in the continental US by Bassmaster Magazine in 2016. The lake is also a water recreationists paradise, popular for tubing, swimming, sailing, kayaking, paddle boarding, water skiing, jet skiing, and leisure boating. Due to the popularity of Clear Lake, Lake County receives thousands of visitors -- and their watercraft -- annually. For example, during 2017, based on the County's Q/Z mussel mandatory boater sticker program, over 6,000 vessels on the water belonged to residents and approximately 9,000 vessels belonged to non-residents. Because invasive mussels are primarily spread by boaters, the probability of an invasive mussel introduction via one of at least 500 public or private boat ramps from a visiting vessel on the lake is high. Figure 2 provides eleven of the most popular public access boat ramps.

In addition, environmental conditions in Clear Lake and some other water bodies in Lake County, such as water temperature, calcium, pH, dissolved oxygen, turbidity, and salinity, are well within the ranges preferred by both Q/Z mussels. (*Pucherelli et al. 2016*, Whittier et al. 2008; *Cohen 2005*) (Table 1). The single most important water characteristic that indicates a high risk of colonization is a calcium level of 15 mg/L or greater. Clear Lake has an average 25 mg/L calcium level (DWR Water Data Library 2019). With preferable environmental conditions well-suited to an invasive mussel establishment, preventing and managing all vulnerable introduction pathways is going to be the best strategy for preventing an invasion.

Figure 3 Public launch areas as advertised through fishing guide services. Map provided by: http://www.clearlakeguideservice.com/clear-lake-fishing.php

The vulnerability of Clear Lake was assessed by evaluating the environmental conditions of the lake and the human activities that may serve as pathways by which dreissenid mussels may be introduced into the waterbody. Information used in this vulnerability assessment was gathered from a variety of sources, some are listed here:

a) A report by Andrew Cohen, San Francisco Estuary Institute, for the California Department of Fish and Wildlife, *Potential Distribution of Q/Z Mussels in California*, August 2007, found Clear Lake to be a medium priority waterbody for colonization by mussels. This report grouped lakes into four priority classes for management actions, Clear Lake was placed in class 2 (out of four).
b) A report by RNT Consulting for the CA Department of Water Resources, *Examination of Water Quality in Clear Lake, California for Dreissenid Mussel Suitability*, Jan 2012, found calcium and pH conditions suitable for supporting long-term dreissenid populations.
c) A report by the Lake County Fish and Wildlife Advisory Committee presented to the Board of Supervisors, February 10, 2009, addressed AB 2065 (Hancock). This legislation required every public reservoir in the state to complete a risk assessment for mussel invasion and to develop and implement a program to prevent mussel introduction. This report is available in Appendix 1 to this plan. The report states "Clear Lake is at a high risk of introduction of these exotic mussels due to (1) the lake's reputation as a blue ribbon warm water fishery; (2) its multiple, free, access points for visiting boaters and (3) the Lake's water chemistry which is highly favorable to both mussel species."

Identification of potential mussel-introduction routes, defined as pathways, include all movement of water and contact with the water, and are defined at a level of detail appropriate to identify actions necessary to avoid or mitigate the introduction of dreissenid mussels. The following Tables 2-7, identify each pathway, based on the specific waterbody, describes the features that influence risk level to Q/Z mussel introduction and identifies possible management actions that have been or can be taken to address them. Selected management actions that have been implemented within the County are identified in the section titled "Prevention Plan Components" located below the pathways tables.

Table 1 Average water quality measurements from Clear Lake and Indian Valley Reservoir (2016-2018) and parameter ranges shown to be suitable for the growth and establishment of (Adult) Q/Z mussels. All data is provided by A. Montalvo (CDFW) unless otherwise noted.

Year	Temp (ºC)	Conductivity (mS/cm)	pH	D.O. (mg/l)	Total Hardness[1] (mg/L CaCo3)	Salinity (ppm)	Total Calcium[1] (mg/L)
Clear Lake							
2016 May	22.3	0.4	8.7	6.6	173.0	0.2	30.0
2016, Nov	16.7	243.0	9.5	3	131.0	0.1	23.0
2017, April	14.4	0.3	8.3	1.2	113.0	0.1	21.0
2017, July	26.0	263.0	10	7.0	123.0	0.1	22.0
2017, Oct	17.4	257.1	9.1	2.9	127.0	0.1	23.0
2018, April	16.0	243.3	8.6	1.6	N/A	0.1	N/A
2018, Oct	18.5	304.9	7.5	6.2	N/A	0.2	N/A
Indian Valley Reservoir							
2016, Dec	10.7	0.3	7.9	10.1	N/A	0.2	N/A
2017, June	22.8	223.4	8.7	6.9	N/A	0.1	N/A
2017, Oct	18.9	222.5	8.4	3.5	N/A	0.1	N/A
2018, Oct	19.9	253.7	8.1	6.3	N/A	0.1	N/A
Preferred Range for Q/Z mussels	6-32[2]	>22µS/cm[3]	6.5-9.5[2]	>2-6[2]	100-420[2]	0-12[3]	>12[2]

[1] Data provided by DWR (Surface 0.5 m) Water Data Library http://wdl.water.ca.gov/waterdatalibrary/

[2] Data provided by *Pucherelli et al. 2016 (BLM)*

[3] Data provided by *Cohen 2005 (prepared for CDWR*)

Table 2 Pathway assessment for Clear Lake

Who:	The public
What:	Boaters come from throughout the continent for day-use boating, fishing, fishing derbies/tournaments, recreation, wildlife viewing; visitors renting properties on the lake, many lake-users are both non-residents and local residents.
Where:	Clear Lake, 500 public & private ramps, 10+ public parks, and at least 25 public and private beaches.
When:	Open for boating and fishing year-round; fishing visitation highest during March – September, based on tournament data and preliminary ramp surveys.
Current efforts to prevent or mitigate an introduction: • Lake County sticker program includes screening, inspection, and decontamination, if needed, of resident and visiting watercraft. Ramp monitors are established at the most popular ramps to check stickers and track usage. On-site AIS education and outreach is also provided by ramp Monitors.	
All current or proposed management options to prevent or mitigate an introduction: • Expand ramp monitor program (to an additional 5 ramps by 2021) to provide more coverage at more ramps during more times. • Expand participating sticker vendors within the county and in strategic locations in neighboring counties. • Radio PSAs are being distributed regionally during fishing seasons to promote the sticker / screening program and regulations in place in the County. • Perform inspections and decontaminations on appropriate boats based on determined risk-levels after screening. • Distribute requirements for all fishing tournaments to get boats stickered / inspected / decontaminated when applicable before start day of tournament, and most cases before pre-fishing occurs. • Distribute and enforce requirements for all vessels to get stickered / inspected / decontaminated.	
Current and proposed Education and outreach opportunities: • Conduct ramp surveys with all waterbody users to identify current level of AIS education. • Installation of FIVE AIS kiosks around Clear Lake to provide education & outreach (occurring in 2019) • Present to county schools about AIS and the AIS program. • Maintenance and replacement of signs along major roadways and highways coming into the county, (as needed). • Present to county schools about AIS and the Q/Z mussel prevention program.	

Table 3 Pathway assessment for Indian Valley Reservoir

Who:	The public
What:	Campers, fishers, and boaters come from throughout the region for day use, such as boating, fishing, recreation and wildlife viewing. No motor restrictions and water quality conditions make this waterbody highly susceptible to Q/Z mussel establishment, if introduced. The Bureau of Land Management and Berryessa Snow Mountain National Monument manage and maintain the land adjacent and surrounding Indian Valley and Yolo Irrigation District controls the dam and water levels of the reservoir.

Where:	Indian Valley with one developed boat ramp and 2 shoreline launch areas.
When:	Open year-round, however road access becomes restrictive during winter and storm seasons.
Current efforts to prevent or mitigate an introduction: • Motor restrictions (10mph or less) and remote access can help reduce likelihood of introduction. • Prominent signage at the road access off highway 20 and at water access point adjacent to ramp, provide outreach and education to any visitors using the lake or nearby grounds (Figure 4)	
All current or proposed management options to prevent or mitigate an introduction: • None at this time.	
Current and proposed Education and outreach opportunities: • Maintenance and replacement of signs along major roadways and highways coming into the county (as needed) and to raise awareness of Q/Z mussels and AIS to visiting water users.	

Table 4 Pathway assessment for Lake Pillsbury

Who:	The public
What:	Campers, fishers, and boaters come from throughout the region for day use such as boating, fishing, recreation and wildlife viewing. The lake and the water level are managed and regulated by PG&E and the surrounding land is managed by National Forest Service and several private resorts and campgrounds.
Where:	Lake Pillsbury has five trailered-boating access points, and 31 miles of shoreline accessible to kayaks and canoes.
When:	Open for fishing and boating year-round, most visitors are campers.
Current efforts to prevent or mitigate an introduction: • Two locations near the lake, a store and a resort, participate in the County Sticker program. • Ramp monitor/ screener lives nearby and is available on an on-call basis.	
All current or proposed management options to prevent or mitigate an introduction: • None at this time.	
Current and proposed Education and outreach opportunities: • Maintenance and replacement of signs along major roadways and highways coming into the county (as needed) and to raise awareness of Q/Z mussels and AIS to visiting campers / water users.	

Table 5 Pathway assessment for Blue Lakes

Who:	The public and resort visitors
What:	Boaters come from throughout the region for day use, quiet water activities such as kayaking, paddle boarding, or lounging. No public access and motor restrictions limit the number of visiting vessels gaining access to the lakes. Some fishing from boats, but mostly shore fishing occurs on the lake.

Where:	Blue Lakes with three (3) private ramps, and some unmonitored roadside access points.
When:	Highest visitation coincides with summer resort use, mostly May-September

Current efforts to prevent or mitigate an introduction:

- Currently no ramp monitors stations at Blue Lakes and not all resorts or businesses on or around the lake participate in the County sticker/screening program.
- Motor/horsepower restrictions (5 mph and no personal watercraft) on Blue Lakes do reduce the number of high-risk vessels visiting the lake.

All current or proposed management options to prevent or mitigate an introduction:

- Work with resort owners to get more AIS outreach materials to visitors and increased participation in county sticker / screening program.
- Perform inspections and decontaminations on appropriate boats based on screening.

Current and proposed Education and outreach opportunities:

- Work with lake visitors and business owners to report vessels in Blue Lakes without current mussel stickers, and to educate visitors about the sticker program and Q/Z mussel prevention program.
- Maintenance and replacement of signs along major roadways and highways coming into the county, including any additional locations near Blue Lakes.

Table 6 Pathway assessment for Hidden Valley Lake

Who:	The Hidden Valley Community and their visitors
What:	Boaters come from throughout the region for day use, quiet water activities such as kayaking, paddle boarding, swimming, or lounging. No public access and motor restrictions, and locked gate w/ residence access code limit the number of visiting vessels gaining access to the lakes. Some fishing occur from boats and shorelines.
Where:	Hidden Valley has one marina with attached ramp and two beach/ park areas.
When:	Highest use coincides with summer, mostly May-September, but some fishing occurs year around.

Current efforts to prevent or mitigate an introduction:

- Currently no ramp monitors station at Hidden Valley Lake.
- Small size and private nature of the lake make this a very-low risk to Q/Z mussel introduction from visiting vessels, although visitors to the area with residential access code can enter / exit the lake at their discretion and without detection.

All current or proposed management options to prevent or mitigate an introduction:

- None at this time, unless directed by the Hidden Valley Community Services District.

Current and proposed Education and outreach opportunities:

- None at this time, unless directed by the Hidden Valley Community Services District.

Table 7 Pathway assessment for Highlands Springs Reservoir

Who:	The Public
What:	Boaters come from throughout the region for day use, quiet water activities such as kayaking, paddle boarding, or lounging. Lake size and motor restrictions limit the number of visiting vessels using the lakes. Some fishing from trolling boats, but mostly shore fishing occurs on the lake.
Where:	Highland Springs has one undeveloped ramp access and one beach/ park area.
When:	Highest use coincides with summer, mostly May-September.
Current efforts to prevent or mitigate an introduction: • Motor restrictions (no motors) keeps visiting boaters at a minimum and introduction probability low. • Currently no ramp monitors stations at Highland Springs, however park caretaker lives adjacent to water access point. • Small size and private nature of the lake make this a very-low risk to Q/Z mussel introduction from visiting vessels.	
All current or proposed management options to prevent or mitigate an introduction: • None at this time.	
Current and proposed Education and outreach opportunities: • Additional Q/Z mussel and AIS educational materials will be added (2019) to the park kiosk located near the water access points.	

Figure 4 Signage present at Indian Valley Reservoir (left) at the entrance to the road turnoff of Hwy 20 and (right) near water access.

Monitoring Program for Adult and Juvenile Dreissenid Mussels

Monitoring efforts in Lake County is completed by a partnership between The District and the California Department of Fish and Wildlife (CDFW) and Pacific Gas and Power (PG&E). The monitoring program includes artificial substrate monitoring, infrastructure / surface structure surveys, and veliger tows (Table 8)

Water quality monitoring accompanies some of the sampling to identify environmental conditions of the waterbody. All monitoring protocols are provided by the CDFW and are available in the Appendix (2a, b, c) and online at:

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

Table 8 Type of trailered watercraft access and monitoring for Lake County waterbodies.

Lake Name	Vessel Accessibility Type (Public vs. Private)	Type of Q/Z Mussel Monitoring			
		Veliger Tows (CDFW or PG&E)	Artificial Substrate Monitoring Stations (LCWRD)	Infrastructure / Surface Monitoring	None
Blue Lakes	Private		✓		
Clear Lake	Public	✓ (CDFW)	✓	✓	
Hidden Valley Lake	Private		✓		
Highland Springs	Public*				✓**
Indian Valley	Public	✓ (CDFW)			
Lake Pillsbury	Public	✓ (PGE)			

*Restricted to 5mph/ non-personal watercraft vessels.
**Q/Z mussel signage is being added 2019 along with a substrate monitoring station.

a) Artificial Substrate Monitoring. The District performs monthly artificial substrate monitoring according to the methods and procedures provided by the CDFW (Appendix 2a). Artificial substrates are a series of submerged PVC plates suspended from a dock, bridge, or buoy (Figure 5). Placement of the substrates is based on proximity to a potential introduction pathway, mostly located near popular public ramps and access points, but also located in an area where they can remain undisturbed but also easily accessible for monitoring by staff. The district staff monitor and record results of artificial substrates monthly, except for the months of December and January, however the substrates remain in the water year-round. Current results of artificial substrate monitoring indicate that all substrates are clean and the county currently does not have any detections of invasive mussels established on artificial substrates (Table 9).

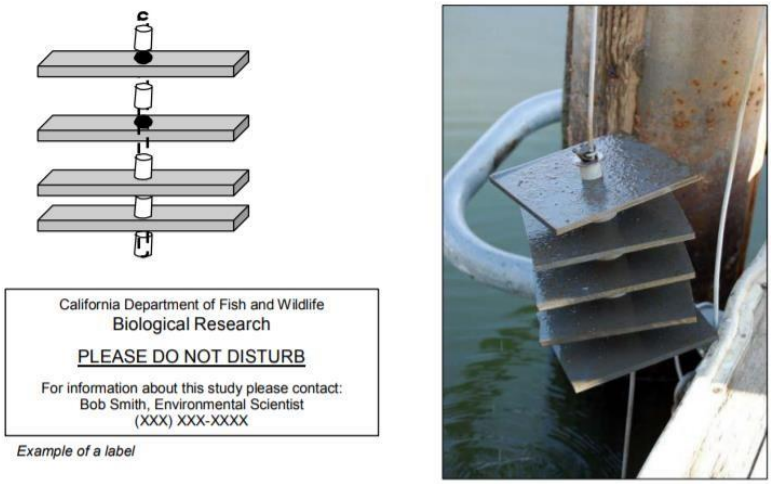

Figure 5 Artificial substrate example provided by the CDFW.

Table 9 Results of artificial substrate inspections – 2017 & 2018.

Waterbody	Site	Material	2017	2018
Clear Lake	3rd Street, Lakeport - new	Square plastic plates	Clean	Clean
	3rd Street, Lakeport	Concrete discs	Clean	Clean
	5th Street, Lakeport - new	Square plastic plates	Clean	Clean
	Redbud Launch ramp	Square plastic plates	Clean	Clean
	Redbud Launch ramp - new	Square plastic plates	Clean	Clean
	Clearlake Oaks	Concrete discs	Clean	Clean
	Clear Lake State Park	Square plastic plates	Clean	Clean
	Clear Lake State Park - new	Square plastic plates	Clean	Clean
	Keeling Park	Concrete discs	Clean	Clean
	Lakeside Park - new	Square plastic plates	Clean	Clean
	Konocti Vista Casino Resort	Concrete discs	Clean	Clean
	Braito's Marina	Concrete discs	Clean	Clean
	Lucerne Harbor	PVC pipe	Clean	Clean
Blue Lakes	Narrows Resort	Concrete discs	Clean	*
Lake Pillsbury	Pillsbury Resort	Square plastic plates	Clean	*
	Fullers campground	PVC pipe	Clean	*
Hidden Valley**	Fishing dock at Big Beach Pier	Square plastic plates	Clean	Clean
	Marina Rental Pier	Square plastic plates	Clean	Clean

*No Access to this site due to the Mendocino Complex Fire Event and resulting closure.
** Artificial substrate data collected by volunteer citizen scientist S. D'Agostini.

b) Infrastructure / Surface structure surveys are also performed by the District at the end of summer season when temporary docks and associated infrastructure are removed from Clear Lake and placed in dry, storage areas. Additional survey inspections have occurred when buoys have been removed from Grebe nesting areas in late summer. During this process, submerged chains and buoy bodies are inspected for any attached mussels. To date there have been no findings of invasive mussel presence or establishment from these surface surveys. Prior to 2019, the protocol for this monitoring did not follow the recommended CDFW protocols in regards to Minimum Sample size (page 3), however, starting in 2019, Lake County staff will be implementing a revised surface survey protocol that will match the CDFW requirements (Appendix 2b).

c) Veliger tows are performed by CDFW Region 2 Environmental Scientist Angie Montalvo. CDFW conducts Q/Z mussel veliger monitoring across the state according to the protocols outlined in Appendix 2c. CDFW started monitoring Clear Lake in 2007. Within Lake County, CDFW collects drag tows in Indian Valley Reservoir and Clear Lake. The veliger monitoring in Lake Pillsbury is completed by PG&E. Results from the most recent tow events are provided in Table 10. There are currently no positive detections for invasive mussel veligers in Lake County.

d) Special Districts Water intake monitoring. Lake County Special Districts operates or oversees approximately 17 water intakes on Clear Lake. Because fish screens in intake sites, and the intake themselves are constructed of materials that pose risk for colonization, Special Districts is aware of the importance of monitoring for maximized AIS prevention. Each water district has been alerted to the possibility of mussel's introduction and establishment and they monitor for any mussel presence when regular maintenance is performed on inlet pipes, screens and filters. Current contacts for special district includes Jan Coppinger at Janet.Coppinger@lakecountyca.gov or Will Evans at Will.Evans@lakecountyca.gov

Table 10 Results of veliger tows in Lake County waterbodies provided by CDFW (site results are aggregated)

Year	Waterbody	Month	Result
2016	Clear Lake	May	ND
		Nov	ND
	Indian Valley Reservoir	Dec	ND
	Lake Pillsbury	May	ND
		July	ND
2017	Clear Lake	April	ND
		July	ND
		October	ND
	Indian Valley Reservoir	June	ND
		August	ND
		October	ND
	Lake Pillsbury	May	ND
		July	ND
		September	ND
2018	Clear Lake	April	ND
		August	*
		September	ND
	Indian Valley Reservoir	June	*
		October	ND

*No sampling was conducted these months due to the Pawnee Fire (June 2018) and Mendocino Fire Complex (July – Sept, 2018)

Prevention Plan Components

This section will identify the specific management and prevention actions that are applied to each potential pathway where invasive mussels can be introduced into Lake County. Most of the listed components and related actions are currently in place and a part of the prevention program, but continued work and effort by The District is focused on maintaining and expanding these efforts and identifying additional ways where prevention can be effective, efficient, and maintained. Currently the Clear Lake Prevention Plan includes the following strategic components:

1. Public Education and Outreach
2. Physical Preventative Procedures
3. Special Interest and Stakeholder Notifications and Procedures
4. Adaptive Management and program readiness
5. Develop and preserve partnerships and collaborations
6. Reporting

1. Public Education and Outreach

Lake County and its partners continue to highlight the threat of Q/Z mussels with the media and its stakeholders at every available opportunity. Throughout the duration of the program, technology and outreach methods have evolved and the District attempts to keep up with any available tools that are helpful in distributing not only the message focused on AIS species prevention and management, but also the message about the ongoing efforts being conducted in the county to address the threat of invasive mussels.

There are multiple ways in which the District provides information through educational and outreach pathways. The District aims to broadcast the message, from websites and social media posts, to brochure distributions, presentations, and educational displays.

a) The below educational materials are available in hard copy at information counters at City of Lakeport, City of Clearlake, County courthouse in Lakeport, Visitors Center in Lucerne, Chambers of Commerce in Lakeport and Clearlake, Clear Lake State Park entrance, the Lakeport DMV, Real Estate and rental offices, all marinas and bait shops, motels and hotels, and Lakeport AAA. Invasive mussel information has been distributed by the Water Resources Department at the invasive species display for Kids-in-the- Creek, Boy Scouts, Sea Scouts, Cache Creek Watershed Forum, Heron Days at the Clear Lake State Park, Lake Pillsbury Homesites Annual Meeting, Hidden Valley Lake's "Opening Day on the Lake" event, Service Clubs, homeowners' associations and other events. It is also distributed at the County Fair booths, the State Fair, and the Sacramento Boat Show. They are also available as digital versions online or can be shared via email or social media. Some of these materials are listed below:

   i. The County uses the CDFW "Zap the Zebra Mussel" brochures, and "Quagga Mussel" cards in English and Spanish, and "Don't Move a Mussel" posters, and pdf versions of these and other outreach materials that can be reprinted as needed. These informative, full-color brochures, posters and cards have been distributed at locations throughout the county. The cards have been used as stuffers in the annual lakebed lease bill, and tax bills to lakefront property owners. All bait and tackle businesses and fishing license outlets including Wal-Mart, and lakeshore resorts have the outreach material for the public.

   ii. "It Only Takes One" mussel inspection training DVD's have been copied and distributed to businesses and organizations that need to educate employees, like businesses selling mussel stickers. More recently Lake County acquired a boat that had been submerged in Lake Mead. This boat was sealed and is now used as an educational tool to demonstrate the physical impact mussels can have on boating and recreation. The county applied for and was granted a Possession Permit (Form 1040) to possess and store the "quagga boat" and it is used within CDFW Regions 2 and 3 to raise awareness for QZM and other AIS prevention.

   iii. "Quashing the Quagga: Protecting Lake County from Invasive Quagga and Zebra Mussels" trifold, color, brochure produced by the Lake County Invasive Species Council distributed to all Lake County outlets servicing the tourist industry.

b) District staff provide any needed information and outreach for the media. Several front page and editorial articles have been printed in the Lake County Record Bee. The fishing correspondent of the Record Bee, Mr. Terry Knight, is very supportive of the County Mussel Prevention Program and writes articles mentioning the program regularly.

c) The District and partners have also installed informational signage at critical locations throughout the county. Attention grabbing signs are placed at road entrances into the county and at every major launch facility and many of the private boat launching facilities. The list provided in Table 11 provides an inventory of all the current signage locations. The signs are maintained and updated when necessary.

d) County web pages under the District direct persons to the exclusive Lake County mussel website www.nomussels.com . State Departments of Fish and Wildlife, and Parks and Recreation, Boating and Waterways, have links to the Lake County website. The website describes the Lake County Invasive Mussel Prevention Program for residents and visitors, has a list of the current locations for boaters to be screened by trained personnel, cleaning instructions for vessels that are not yet clean, drained and dry, and links to other websites such as the Wildlife Forever and 100th Meridian Initiative.

Table 11 Types and locations of AIS signage in Lake County

Major Roadway	Major Boat Ramps	Private / Minor boat ramps
Hwy 175 at Hwy 29 (Lakeport)	1st Street (Lakeport)	Clearlake Marina (Lakeport)
Hwy 29 at Grange Rd. (Middletown)	3rd Street (Lakeport)	Shady Acres Resort (Clearlake)
Hwy 20 East Bound Lake/Mendocino County Line (Blue Lakes)	5th Street (Lakeport)	Clearlake Resort (Clearlake)
Hwy 175 at Lake / Mendocino County Line	Clearlake Avenue at Skylark Motel (Lakeport)	Kono Tayee Association (Lucerne)
Hwy 29 North Bound at Napa / Lake County Line	Keeling Park (Nice)	World Mark Resort (Nice)
Hwy 20 West Bound Lake/ Colusa County Line	Holiday Harbor (Nice)	Fuller Launch Ramp (Lake Pillsbury)
Elk Mountain Road, north bound to Lake Pillsbury	Lucerne Harbor (Lucerne)	Numerous USFS camp ground ramps in Mendocino National Forest (Lake Pillsbury)
Potter Valley Road at Pillsbury Exit	Clear Lake Oaks Park (Clear Lake Oaks)	Pine Acres (Blue Lakes)
Walker Ridge Road at Hwy 20, to Indian Valley Reservoir	Redbud Park (Clearlake)	Blue Lake Lodge (Blue Lakes)
	Richmond Park (Clearlake)	Narrows Resort (Blue Lakes)
	Braito's Marina (Kelseyville)	Le Trianon (Blue Lakes)
	Clear Lake Vista Resort (Kelseyville)	
	Edgewater Resort (Kelseyville)	
	Clear Lake State Park (Kelseyville)	
	Lakeside County Park (Kelseyville)	
	Konocti Vista Casino (Lakeport)	
	Lake Pillsbury Resort (Pillsbury)	
	Hidden Valley Lake (Hidden Valley)	
	The Narrows, Blue Lakes (Blue Lakes)	
	Rodman Slough (North Lakeport)	
	Indian Valley Reservoir Boat Ramp	

e) Social Media has also provided additional methods for educational information to be shared. The District shares information via the Water Resources Department County Facebook Page. Social Media is a great way to interact with people that may or may not be currently located within the county or may not otherwise be aware of the mussel sticker program. The Facebook page also provides an additional outlet for the public to contact Project staff and gain access to informational links and other resources. Trends in some recent posting activity is provided in Table 12. The Facebook page can be found @lakecountywater or by searching for "Lake County Water Resources Department" on Facebook pages.

Table 12 Example of mussel-related posts on Water Resource Department Facebook page during summer 2018.

FACEBOOK POST TOPIC	DATE POSTED	REACH	ENGAGEMENTS	SHARES
Clean, Drain Dry	9/5/2018	61	9	2
Outreach Event Advert - Lake County Fair	8/31/2018	93	17	3
Clean Drain Dry sign post fire	8/17/2018	61	2	0

Lake County Invasive Mussels Prevention Program link to nomusssels.com	8/14/2018	81	15	2
Article on Idaho-bound barges with mussel infestations (From the Reader July 9th)	8/14/2018	148	26	2
Outreach event Advert - concert in the park	7/27/2018	156	57	5
Article from Record-Bee on the Clear Lake Mussel Prevention Program	7/13/2018	3739	288	6
Clean, Drain, Dry and link to nomussels.com	6/4/2018	35	2	0
Article about mussel sniffing dogs at Lake Mendocino	6/4/2018	30	3	0
Totals		**4404**	**419**	**20**
Grand Total (for period 6/1 – 9/5/2018)			**4843**	

2. Physical Preventative Procedures

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 2936 (2011), 2976 (2012), 2915 (2009), Appendix 3 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. The physical prevention program is a three-tiered system based on the risk level of the vessel for transporting invasive mussels to Lake County. The first tier is screening, the second tier is inspection, and the third is decontamination.

Screening

Employees of participating companies, shops, resorts and agencies in the County, called "screeners", are trained by county staff to determine the risk level of an incoming vessel. When properly trained by Certified County staff, "screeners" sign an agreement (Appendix 4) that upholds the intent of the ordinances.

Before launching, each vessel owner must fill out an application form (Appendix 5) that allows the "screener" to determine whether a vessel is at risk for harboring adult or the veliger forms of mussels. Risk assessment is made by reading the answers to the questions on the application form. Some of the responses to these questions indicating a high-risk level might include a vessel being in another body of water recently (<30 days) or from a county/state where invasive mussels are present. When a "screener" is confident that a vessel is of a low risk for transporting mussels to Lake County, the vessel owner is sold a set of stickers to identify the vessel as "low risk".

Resident boaters, who register, keep, or use their boat only within Lake County are granted an annual "resident" sticker, and not obligated to participate in the program unless they leave and return the county with their boat, and then they are required to an inspection and decontamination if applicable. Resident stickers are valid for the calendar year and traditionally are burgundy and gold. Owners of vessels not at risk who are visitors to Lake County can purchase a set of visitor stickers with a blue and white logo. Visitor stickers are valid for the calendar month. Stickers are sold in sets of three, two stickers are affixed to the boat on each side near the registration letters and numbers, the third sticker is affixed to the rear of the trailer.

Launching any vessel, excluding kayaks, canoes, rafts, float tubes, car-top boats, wind surfers/boards, boogey boards, non-motorized paddle boats, and non-motorized sail boats 8' or less in length, in any Lake County water body without a sticker is in violation of the Lake County Code with fines reaching up to

$1000. Vessel owners receive invasive mussel outreach material with their stickers with a request to let other people know of the Lake County invasive mussel program. In addition, they are given a factsheet about how to "clean equipment" that contains the latest agency- approved recommendations using hot water, completely drying, or freezing (Appendix 6).

Inspection

If a boat is found to be at risk by a screener then a hands-on inspection is required. Inspectors are trained and certified by Pacific States Marine Fisheries Commission and Western Region Panel on Aquatic Nuisance Species Watercraft Inspection Program and are capable of physically inspecting any water vessel. Inspections proceed only after obtaining the permission of the boat owner to board his/her boat. Inspections are recorded by the inspector by filling out an inspection form (Appendix 7). The inspector will determine whether a decontamination is required.

Decontamination

Lake County Water Resources have three mobile, self-contained decontamination units. Decontamination is free and is performed by The District personnel according to the protocols outlined in the Uniform Minimum Protocols and Standards for Watercraft Inspection and Decontamination Programs for Dreissenid Mussels in the Western United States. Decontamination is performed after the boat owner signs a hold harmless form for liability purposes, Appendix 8.

3. Special Interest and Stakeholder Notifications and Procedures

Lake County draws many annual special events to enjoy the many beneficial uses of the waterways such as sport fishing tournaments and water sport events. There are several boat racing events and at least 100 fishing tournaments on Clear Lake each year. Participating boaters entering the county are particularly susceptible to being contaminated because often they are involved in events all over the United States. Because there is especially high risk in launching out-of-state boats, additional monitoring by ramp monitors and more stringent decontamination requirements are sometimes a requirement for event organizers. All visiting watercraft for any special event must follow the County ordinances and follow all mussel prevention program requirements including acquiring stickers and any state-mandated requirements. District staff are available to provide guidance and assistance as needed to any event organizers during and prior to the event.

4. Adaptive Management and Program Readiness

The Lake County invasive mussel prevention program is intended to be flexible and adaptable. The program is intended to be capable of responding to new information, new issues, or new opportunities. While there are significant challenges, many avenues exist to respond to changing information or levels of capability. To be ready to respond to any situation that may arise, program coordinating staff stay current on new developments and technologies in aquatic invasive species management, prevention, education, and outreach. Additionally, the program staff strive to be kept abreast of the national and local movement of invasive mussels, and new State and Federal regulations, changes required to Lake County laws and procedures to keep up with any new research and changing dynamics of invasive mussels in CA. This is accomplished by:

a) Keeping WIT I, II, and III training current for all applicable program personnel
b) Maintaining regular contact and communication with the WIT trainer, "Quagga D" Davis
c) Subscription and review of relevant AIS news and information such as the Pacific State Marine Fisheries Commission Aquatic Invasive Species News monthly email blast and North American Lake Management Society Newsletters.
d) Attendance and participation in relevant societies and associations such as the Western Regional Panel on Aquatic Nuisance Species, California Lake Management Society, and Society for Freshwater Science.
e) Well-developed and maintained relationships with local stakeholders such as municipalities, drinking water departments and utilities, tribes, NGOs, boating and fishing communities, state and

federal agencies (see section 4: Partnerships and Collaborations).

5. Develop and Preserve Partnerships and Collaborations

Lake County works closely with partners: at California Department of Fish and Wildlife, California Department of Food and Agriculture, California Department of Water Resources, California Parks and Recreation Division of Boating and Waterways, surrounding counties, Westside Sacramento Integrated Regional Water Management Plan Committee, other states, the U.S. Fish and Wildlife Service, Bureau of Reclamation, and USGS. Local partners include Big Valley Band of Pomo Indians, Hebematolel Pomo of Upper Lake, Lake County Resource Conservation District, and the UC Davis Extension Lake County Office. In addition, this program relies on three valuable informational resources are the 100th meridian initiative at www.100thmeridian.org and Protect Your Waters at www.protectyourwaters.net and Stop Aquatic Hitchhikers at http://www.wildlifeforever.org/invasive-species.

6. Reporting

Several annual reports are required depending on the development, resource needs and funding sources of the program. For grant funding received by the California State Parks Division of Boating and Waterways Q/Z Mussel Prevention Program, quarterly progress reports, annual reports, final project summaries and final project reports. Program specifics can be found at the DBW Q/Z Mussel Infestation Prevention Grant Program webpage.

Additionally, an annual report will be submitted to CDFW by March 31 of each year. This is required by CCR Title 14 Section 672.1 (b)(5) to demonstrate the prevention program's implementation and identify any area of improvement. Reports for this requirement will follow the template provides on the CDFW Q/Z Mussel webpage.

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IDENTIFYING RISK FACTORS TO STRENGTHEN CURRENT STRATEGIES AIMED AT MINIMIZING THE INTRODUCTION OF QUAGGA AND ZEBRA MUSSELS TO LAKE COUNTY, CALIFORNIA.

A Report Prepared by the Lake County Fish and Wildlife Committee

January 2009

Lake County Fish and Wildlife Committee Membership

Gregory A. Giusti – Chair

Fred Gaul – Vice Chair

Jonathan Ambrose – Secretary

Victoria Brandon – Member

Diana Hershey – Member

Sandie Elliott – Member

Dennis Reynolds – Member

Doug Eastley – Member

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Summary

The Lake County Fish and Wildlife Committee have developed a risk assessment proposal regarding the current threat posed by both the quagga mussel (*Dreissena bugensis*) and zebra mussel (*D. polymorpha*). This report identifies a number of positive actions already undertaken by the County of Lake and encourages their continued support. Secondly, this report attempts to prioritize the various risk factors associated with each Lake County waterbody with public access, and provides organizational and management guidance to direct preventative measures against mussel introduction. Lastly, the Committee, through this report, is providing support and advice to assist the County in addressing AB 2065 (Hancock) which takes affect January 1, 2009. The newly passed legislation requires "all public reservoirs allowing recreation, boating and/or fishing to assess their vulnerability to mussel infestation and develop and implement a program to prevent their introduction".

Specifically this reports states:

1. Three primary locations exist within the boundaries of Lake County where mussels would significantly adversely affect the waters of California;
2. The large number of access points into Clear Lake presents numerous challenges to the development of an effectual prevention program. These challenges demands development of a systematic strategy that makes any program reasonable, manageable, and affordable;
3. Not all access points entering Clear Lake pose equal levels of risk for mussel introduction. A coordinated program that recognizes risk levels will assist in the prioritization of limited resources to address the threat;
4. The management of Lake Pillsbury and Indian Valley Reservoir will require close coordination and inclusion of the responsible land and facility management agencies if the County is to develop a comprehensive mussel planning and prevention program;
5. Any outreach effort to keep both the local citizenry and visitors engaged and informed must be on-going to minimizing a sense of complacency that the threat has been alleviated;

6. Improved and strengthened political efforts must be aimed at increasing broader statewide coordination. Coordination is necessary to minimize duplicated local efforts that are beyond the resource capabilities of Lake County; and
7. Finally, not all Clear Lake user-groups, points of access, and associated waters (Highland Springs and Adobe Spring Reservoirs) pose equal levels of risk for mussel introduction. Programs aimed at increasing boater awareness should recognize the risks associated with each group and site and use appropriate communication tools to improve transfer and transparency of program activities and goals.

Fig. 1. Free public boat access points on Clear Lake.

IDENTIFYING RISK FACTORS TO STRENGTHEN CURRENT STRATEGIES AIMED AT MINIMIZING THE INTRODUCTION OF QUAGGA AND ZEBRA MUSSELS TO LAKE COUNTY, CALIFORNIA.

Introduction

The recent finding of both quagga (*Dressenia bugensis*) and zebra (*D. polymorpha*) mussels in the western United States (and most importantly California) has created a sense of urgency among many interests groups to this threat of water resources. Both the public and private sectors have responded by trying to develop strategies that limit the spread of these very aggressive pest species. The threat to California business and environmental interests, measured both in terms of costs and adverse impacts, can not be overstated. The 2007 report entitled *California's Response to the Zebra/Quagga Mussel Invasion in the West* states:

> "Direct economic costs are on the order of $100 million a year in eastern North America; unquantified secondary and environmental costs could be substantially larger. Impacts in California and the West could be as great or greater than those in the East. California cities, industries and farms depend on the transport of huge quantities of water across very large distances through a complex and vulnerable system of canals, pipes, reservoirs and pumping stations. It is thus critical that aggressive, concerted efforts be undertaken immediately to *eradicate, contain and monitor* the zebra mussel infestation in the lower Colorado River system".

This report further argues that coordinated efforts between local, state and Federal programs, to ensure successful monitoring and prevention, are critical to preventing the mussel's spread.

Lastly, the Committee, through this report, is providing support and advice to assist the County in addressing AB 2065 (Hancock) which takes affect January 1, 2009. The newly passed legislation requires "all public reservoirs allowing recreation, boating and/or fishing to assess their vulnerability to mussel infestation and develop and implement a program to prevent their introduction".

Who and what is at risk?

Native to the Baltic region of Europe the mussels are thought to have been introduced into the Great Lakes via ballast water from trans-oceanic freighters. The resultant impacts to fisheries, water conveyance systems and recreation has been reported in the millions of dollars.

The mussel(s) threaten the water transport system that is vital to California's urban, residential and agricultural infrastructure. The additive co-concurrent threat to the recreational and ecological resources associated with California's waters suggests a worse case scenario for the State. Experience in the eastern United States has demonstrated that equipment important in the conveyance of water (*i.e.,* pumps, screens, pipes, *etc.*) can be negatively impacted by the mussels. Furthermore, the possibility of exorbitant numbers of mussels (a likely scenario in Clear Lake) in a small area can impact water clarity and quality and disrupt current ecological conditions.

Brief overview of quagga/zebra biology.

Both the quagga and zebra mussels are prolific breeders. Sexual reproduction occurs (male and female) with external fertilization. A fully mature female mussel is capable of producing up to one million eggs per season. After fertilization, free floating microscopic larvae, or veligers, develop within a few days. Free-swimming veligers drift with the currents for three to four weeks while trying to locate suitable substrate to settle and become secure. Depending on environmental conditions the time between fertilization to settlement can vary between 18 to 90 days. Young mussels can become reproductively active in their first year.

The mussels are filter feeders. Each adult mussel is capable of filtering one or more quarts of water each day, where they remove phytoplankton, zooplankton, algae, and even their own veligers. Any undesirable particulate matter is bound with mucus, known as pseudofeces, and ejected. This waste material is known to negatively impact water quality.

Overview of principle mechanisms of spread.

Since the larval stage of the both species are free floating forms they are easily transported in water. They can readily be taken up and spread by pumps; and transported in any vessel capable of holding water (*e.g.*, boats, bait boxes, bilges, live wells, ballast tanks, *etc.*). The adults have the ability to adhere to most solid objects and can be transported on boat hulls, trailers, motors, buoys, docks, barges, pontoons, *etc*. Both adults and veligers can readily be transported on or in containers holding live aquatic plants, fish or other sources of water coming from infested sites.

The opportunities for infestation are significant due to the large number of out-of-county boaters that enter the County. Clear Lake in particular is at a high risk of introduction of these exotic mussels due to (1) the Lake's reputation as a blue ribbon warm water fishery; (2) it multiple, free, access points for visiting boaters and (3) the Lake's water chemistry which is highly favorable to both mussel species. The potential from boaters arriving from infested waterways has been well documented since the County initiated its current program.

Locations of Concern for Lake County.

There currently exist three primary locations of concern located within the boundaries of Lake County where if established the mussels would significantly impact the waters of California.

1) **Clear Lake.** Because of its size and relative ease of access Clear Lake poses the biggest challenge to the County of Lake in their efforts to prevent the introduction of the mussels. The lake is open to boating year-round and accessible to trailered vessels in all seasons except in very rare and extreme periods of drought. The primary exit point of water leaving Clear Lake is through Cache Creek into the Sacramento River system. The Lake is known to have at least 523 privately owned lakeside parcels with boat ramps (this number does not include areas of Clear Lake Keys, Corinthian Bay, Lands End, Pier 1800 and Pier 1900 in Lakeport, Sunrise Shores and Cache Creek.) In addition to private access points

there also exists public boat ramps at Keeling Park in Nice, Lucerne Harbor in Lucerne, Clearlake Oaks Beach in Clearlake Oaks, Thompson Harbor (Redbud) in Clearlake, Clear Lake State Park in Kelseyville, Lakeside County Park in Kelseyville, Crystal Lake Way (Hamilton Park) in North Lakeport, and in the City of Lakeport First Street, Third Street, Fifth Street and Clear Lake Avenue.

2) **Lake Pillsbury.** Located in the Mendocino National Forest, Lake Pillsbury is a reservoir formed by Scott's Dam on the Middle Fork of the Eel River. Water is diverted downstream of Scott's dam through the Van Arsdale dam down Potter Valley and into the Russian River system. There are currently two public boat ramps on the lake. The boat ramps are managed by the Pacific Gas and Electric (PG&E) company. Both the Eel and Russian River systems are at risk if the mussels should become established in this lake.

3) **Indian Valley Reservoir.** This water body is found in the eastern portion of the County and drains through Cache Creek into the Sacramento River system. The Reservoir is located on lands managed by the USDI Bureau of Land Management but the lake is managed by the California Department of Fish and Game. There are currently two public boat ramps on the lake. The Sacramento River system is at risk if the mussels should be established in this reservoir.

Addressing risk associated with access points is key to program success.

1) Access Sites on Clear Lake. The large number of access points into Clear Lake demands that a systematic approach be considered as a means of assisting in the development of a strategy that makes any program reasonable, manageable and affordable. [Since Highland Springs and Adobe Spring reservoirs deposit water in Clear Lake they should be included in any considerations for protecting Clear Lake.]

2) Access to Lake Pillsbury and Indian Valley Reservoir. The management of these waterbodies require that the responsible land and facility management agencies be included in any County mussel planning and prevention efforts.

Understanding and Managing Risk-

Both Indian Valley and Lake Pillsbury posed little or no risk of infestation once their waters recede beyond access for trailered vessels late in the summer season. The primary seasons where infestation is a threat are the winter and spring seasons. The County has no direct responsibility on the management and access to these reservoirs, therefore it is critical the managers of these sites be included in any preventative plans adopted and implemented.

Clear Lake, being a natural lake, is a different matter. Because of year round access, the large size of the lake and the relative ease of access to the water, Clear Lake is at the highest risk of infestation of any of the at risk water bodies found within the county. The sheer number of access points warrants a discussion of risk factors associated with each type as a means to identify those potential access points that pose the highest risk of introduction and where limited resources can be targeted.

Clear Lake

1. **Public improved trailered vessel access.** Keeling Park in Nice, Lucerne Harbor in Lucerne, Clearlake Oaks Beach in Clearlake Oaks, Thompson Harbor (Redbud) in Clearlake, Clear Lake State Park in Kelseyville, Lakeside County Park in Kelseyville, Crystal Lake Way (Hamilton Park)* in North Lakeport, and in the City of Lakeport First Street*, Third Street, Fifth Street and Clear Lake Avenue*. These are the most heavily accessed points of entry into the Lake. Each facility (except for the Clear Lake State Park) provides free launch, with modern facilities and nearby parking. These sites are used most often by resident and non-resident anglers/boaters, whether as individuals or as part of an organized event. ***Without question, these sites pose the greatest risk for the introduction of mussels.*** (Table 1).

Table 1. Access Points and Risk Assessment of Each type on Clear Lake.

Public improved trailered vessel access.	**Public ramp access.**	**Private, improved trailer vessel access (resorts)**	**Private (homeowner) boat access**
Keeling Park in Nice; Lucerne Harbor in Lucerne; Clearlake Oaks Beach in Clearlake Oaks; Thompson Harbor (Redbud) in Clearlake; Clear Lake State Park in Kelseyville; Lakeside County Park in Kelseyville; Crystal Lake Way (Hamilton Park)* in North Lakeport; City of Lakeport First Street*; Third Street; Fifth Street; Clear Lake Avenue*.	Crystal Lake Way (Hamilton Park)* in North Lakeport, and in the City of Lakeport First Street*, and Clear Lake Avenue*	The total number of resort/business access points to the water is 66. Two launches in particular Konocti Spa & Resort and Konocti Vista Casino deserve special attention because between the two, they are host to the majority of the larger bass tournaments and other events and both allow public launch.	Though by far the most common type of access (457) these ramps/docks have very limited access to the general public.

2. ***Public ramp access.** The public access points at Crystal Lake Way (Hamilton Park)* in North Lakeport, and in the City of Lakeport First Street*, and Clear Lake Avenue* provide improved boat ramp access at the end of public streets. They are not monitored and lack the facilities to monitor their use. ***Except in those cases where a local business may be directly impacted, these points of access could be permanently***

barricaded and closed to trailered vessels to limit the points of public access to facilitate improved public access monitoring efforts.

3. **Private, improved trailer vessel access (resorts)** – The total number of resort/business access points to the water is 66 (this number includes Mobile home Parks, Homeowners Associations and Resorts). Access is limited to registered guests or guests who must pay a launch fee. These access points provide a readily available screening/inspection "choke point" for each vessel using their facility. Though a moderate risk exists from boats entering from out of the area, the facility owner/managers provide a controlled and monitored environment that can greatly reduce the chance of unchecked access. Two launches in particular Konocti Spa & Resort and Konocti Vista Casino deserve special attention because between the two, they are host to the majority of the larger bass tournaments and other events and both allow public launch. ***These facilities arguably pose a moderate risk of infestation and the owner/managers should be viewed as a key link in informing their guests of the requirements prior to boat launching.***
4. **Private (homeowner) boat access** – Though by far the most common type of access (approximately 457) these ramps/docks have very limited access to the general public. Typically, these points are accessed by residences that are already identified by County AP numbers that can receive mail and notices informing them about changes in policies or procedures regarding boat inspection programs. ***In most instances boats that are associated with these parcels are moored, trailed or stored on site and rarely leave the area posing little or no risk of introducing the mussels.***

Using Risk Factors to Direct Local, Regional and Statewide Outreach Programs.

Low vs. High Risk Audiences-

1) **Public improved trailered vessel access.** ***Without question, these sites pose the greatest risk for the introduction of mussels.***
2) **Public ramp access.** ***Except in those cases where a local business may be directly impacted, these points of access could be permanently barricaded and closed to trailered vessels to limit the points of public access to facilitate improved public access monitoring efforts***.
3) **Private, improved trailer vessel access (resorts).** ***These facilities arguably pose a moderate risk of infestation and the owner/managers should be viewed as a key link in informing their guests of the requirements prior to boat launching.***
4) **Private (homeowner) boat access.** ***In most instances boats that are associated with these parcels are moored, trailed or stored on site and rarely leave the area posing little or no risk of introducing the mussels.***

As discussed in the Introduction, the Interagency Science Report, states a collaborative effort will be needed to limit the spread of the mussels in a State as large and diverse as California. By identifying potential risks associated with each type of access point, Lake County can begin to effectively address the multifaceted approach needed to engage various user groups, agencies and members of the public in their attempt to minimize the likelihood of mussel introduction.

Who and what are the audiences to be identified?

- **Local efforts.** Recent efforts undertaken by Lake County's government and business interests have demonstrated strong vision and leadership. Their efforts have made it obvious that any successful effort to prevent the introduction of the mussels will require assistance from more than the good will of its local citizenry. Educational and outreach programs identifying local residents, though important, must be kept in context of the risk posed by local people. Local media has been very supportive in keeping the local populace informed of emerging policies and laws governing the use of the Lake. Though it is important to include local

residents, efforts to engage them should focus on low cost projects (*i.e*., using local media, using existing mechanisms of communications such as newsletters, *etc*.) to keep people informed and able to contact sources of information. Programs addressing local school children, service organizations *etc*., though important, are not delivering information to high risk constituents. As with any outreach effort care must be taken to keep the local citizenry engaged and informed on a regular basis in order to minimize a sense of complacency that the threat has been alleviated.

- **Regional vs. Statewide efforts.** Addressing non-resident individuals and groups pose both the greatest risk and greatest challenge for developing an effective outreach program. An effective outreach program must be aimed at increasing the awareness of non-residential users regarding the threat and engaging them to implement preventative measures. It is imperative that the County engage in collaborative efforts within existing programs and work to develop innovative new programs. The focus of these efforts requires outreach to the largest possible constituency of stakeholders to address outreach to potential non-residential visitors.

  Important considerations to insure the maximum amount of program acceptance and compliance should include:

  - Visible signage informing visitors of inspection programs and requirements;
  - Outreach to websites, out of area boating organizations, fishing organizations and associated media, to inform potential visitors prior to traveling into Lake County;
  - Contact information that provides timely sources of screening/inspection services on a 24/7/365 basis;
  - Contact information that provides timely information regarding the availability of screening/inspection stickers; and
  - Decontamination services for those boats requiring this service on a 24/7/365 basis.

- **User Group Risk Factors.** Just as certain types of access points pose varying levels of risk so do the various user groups. With an estimated 30-40,000 boats (≈100,000 user days) a year on Clear Lake, identifying high-risk user groups is imperative to preventative efforts.
    - **Organized Groups –** many groups that enjoy the benefits of Clear Lake are well organized. Tournament and Club anglers, Xtreme Sports enthusiasts, float-plane pilots, and other organized groups are easily identifiable and accessible through permitting processes, media outlets, internal news letters, web blogs, e-mail, *etc*. These groups need to be fully engaged in policy and procedure updates using communication tools commonly used by the group(s).
    - **Individuals –** by their very nature of not belonging to an organized group this vast and diverse group of Lake users pose the greatest risk and the greatest challenge when trying to engage them in screenings, re-inspections, and general outreach/educational efforts. This group is represented by those recreationalists who simply want to "enjoy" the Lake and may not be engaged in any discussions or interactions process that can transfer information among them.

- **Strategies to consider for various user groups-**
    - **Organized Groups –** most organized groups wishing to use the Lake are required to obtain a permit from an oversight organization. This obvious "choke point" provides an opportunity to get information in the hands of those individuals who can share it with their members. To date, the approach being used for the above mentioned groups seems to enjoy broad support as they have worked with the County to insure that their members/participants are aware of the threat posed by the mussel.
    - **Individuals –** this is the user group that is stretching the County beyond its organizational and financial capacities. It has proven nearly impossible for the County to re-inspect returning out-of-county boats once they have obtained an inspection sticker. It has become glaringly apparent, that in

the absence of an external system of assistance, the County's efforts at addressing this risk are inadequate.

- **Programs that appear to be working-**
  - The sticker program for local residents has proven successful. The only suggestion is to consider offering two stickers for each vessel to assist in ready identification of screened vessels.
  - The current system of the current border station inspections administered by the California Department of Food and Agriculture (CDFA) is a good example of the type of cooperative assistance that is needed to assist local efforts in indentifying and monitoring boats coming from outside the immediate area. Continued collaboration between County and State programs will be key to continued success.

- **Where Improvement is needed -**
  1) The out-of-county sticker program must be improved. Current challenges include:
     - Assuring re-inspection of returning visitors is nullified once a visitor is provided a permanent sticker;
     - many out-of-town boaters have repeatedly expressed their frustration in locating sources of sticker distribution centers upon arriving on a weekend; and
     - sticker distribution centers must keep a supply on-hand for timely distribution when a visitor needs one.
     - Owners, managers and users of minor water bodies need to be better incorporated into mussel prevention programs.

- **Suggestions for improvement -**
  1) As with other invasive species (medfly, gypsy moth, Hydrilla, pitch canker, sudden oak death and others) a statewide system of identifying zones of infestation has greatly assisted local efforts in their attempts

to focus their inspection programs. Establishing such zones would allow the development of a geographically appropriate vessel identification programs wherein registered boats and trailers in known areas of mussel occurrence can be identified at the source or within the zone vastly assisting local efforts identifying those vessels posing the greatest risk.

2) Limiting the days that an out-of-county sticker is valid will require returning visitors to obtain secondary screenings and a new sticker. This can be accomplished by:
   - designing a new temporary sticker/identification or;
   - simply using permanent ink and writing the date of issue and length of stay on the sticker a person would have to seek a re-inspection the next time the boat entered the county. The proposed system is similar to the system used by the State Park system for its visitors. Anyone found with an un-dated or out-of-date sticker would be out of compliance.

Needed programs outside of Lake County to support local efforts-

1. It is apparent to the Lake County Fish and Wildlife Advisory Committee that the magnitude of this threat is too complex, expansive and expensive for the State of California to expect counties to develop local programs while State efforts are limited to "providing guidance and technical assistance". However, this appears to be the approach currently advocated by the California Department of Fish and Game. Additionally, the current statewide strategy of expecting local jurisdictions to develop site-specific programs will lead to a highly disconnected, incoherent and disorganized system of individual programs. This uncoordinated approach will lead to criticism and cynicism by the public further degrading the good intentions of local groups and governments, and ultimately prove ineffective at spreading the invasion of these exotic species.

2. A statewide sticker (or other appropriate identification system) identifying vessels registered, located or moored in or near waters of known mussel populations is a first step in assisting local jurisdictions direct their limited resources. This can be implemented by using the "ZONE OF INFESTATION" approach discussed above. A permanent identification marker, widely known to interested groups/organizations would facilitate and focus inspection to high risk groups.

3. A State lead agency must be established. Though the Department of Fish and Game has proven to be accessible, supportive and cooperative, experience has demonstrated that their resources and capacity to address these highly invasive species are very limited. Nonetheless, State agencies are better equipped to address the multifaceted complexities of managing an effective prevention program (as they have demonstrated on other food or water issues) In light of the risk factors that have been identified in this report, the Committee suggests that the role of the Department of Fish and Game as "Lead Agency" be re-evaluated to ensure that the Department has the necessary capacity to address this threat at numerous locations throughout the State.

Need for Collaborative Efforts-

4. The County's Quagga Mussel Task Force is a positive start. However, this committee report identifies other state and Federal groups that need to become included its activities. Specifically, the US Forest Service and PG &E (Lake Pillsbury) and the DFG (Indian Valley Reservoir) should be included to ensure a comprehensive and coordinated approach to addressing all of the major boating waterbodies.

5. The County has made a sincere effort in communicating with all the various interest and business groups potentially impacted. These activities should continue and be strengthened where needed, particularly in the direction of high risk groups (non-resident users).

6. Interagency discussions need to expand beyond the County and DFG. A dialog should take place between the County, DFG, CDFA and the Department of Motor Vehicles (DMV) to explore the possibility of developing a recognizable identification program that assist local jurisdictions in focusing inspections on those vessels coming from areas of highest risk.

7. Similarly, regular discussions/updates between state, Federal and local jurisdictions involved in mussel quarantine programs should be included as part of the Quagga Task Force meetings.

8. Political efforts should be targeting improved and increased levels of State and Federal financial support to continue and expand local preventative efforts. The magnitude of the threat is too great for Lake County to address effectively.

Sources of Information

Cal Dept. of Fish and Game http://www.dfg.ca.gov/invasives/quaggamussel/

U.S. Geological Survey http://nas.er.usgs.gov/taxgroup/mollusks/zebramussel/

100th Meridian Initiative http://www.100thmeridian.org/zebras.asp

Southern Nevada Water Authority http://www.snwa.com/html/env_quagga_mussel.html

Quagga/Zebra Mussel Artificial Substrate Monitoring Protocol*
California Department of Fish and Wildlife

*This protocol was adapted from the California Department of Water Resources *Monitoring Instructions for Zebra/Quagga Mussel Plate Samplers,* April 2, 2008.

Description of Quagga and Zebra Mussels

The quagga mussel, *Dreissena rostriformis bugensis*, and the zebra mussel, *Dreissena polymorpha*, are small mussels found only in freshwater. They look very similar to each other. They commonly have alternating light and dark brown stripes, but can also be solid light brown or dark brown. They have 2 smooth shells that are shaped a little bit like the letter "D". These mussels are usually less than 2 inches in length. In new populations, most mussels are young and therefore very small (under ¼ -inch long).

Quagga Mussel
Dreissena bugensis

- Shell: D-shaped and triangular; thin, fragile; smooth or shallowly ridged; solid light to dark brown or dark concentric rings; paler near hinge
- Attaches to hard and soft surfaces

Zebra Mussel
Dreissena polymorpha

- Shell: D-shaped and triangular; thin, fragile; smooth or shallowly ridged; solid light to dark brown or striped
- Attaches to hard surfaces

Color variation in quagga and zebra mussels

Quagga and zebra mussels are freshwater mussels that can physically attach onto hard substrates. Like the mussels found clinging to the rocks along the California coastline, quagga and zebra mussels attach onto hard surfaces (e.g. pipes, screens, rock, logs, boats, etc.). They form colonies made up of many individuals attached onto an object and even onto each other. Small newly settled mussels feel like gritty sandpaper when attached to a smooth surface. Larger mussels will feel coarser (like a small pebble or sunflower seed) or be visually apparent.

Other Organisms Mistaken for Quagga/Zebra Mussels

Asian clam, Corbicula fluminea
People often mistake the very common Asian clam (also introduced) for quagga or zebra mussels. The Asian clam is widespread and abundant in California. It is brown and has ridges in concentric rings on its shells. The shells of older clams or of dead clams are white at the hinge (where the two shells join together). These clams do not attach onto surfaces. They live in mud or sand.


Asian clam

Snails and Freshwater Limpets
Small snails and freshwater limpets cling to hard substrates and can be mistaken for small juvenile mussels. They are similar in color and size to small quagga and zebra mussels. Snails have a spiral shape. Limpets have one shell and are flat. Quagga and zebra mussels attach on the edge of their shell and stick up and away from the surface.


Snail


Snails


Limpets

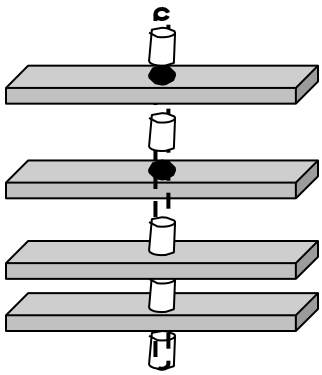
Artificial Substrate Construction and Assembly

To construct the artificial substrate you will need the following materials cut to size:

(4) 6” x 6” x 0.25” black/grey PVC with 1” hole through center
(5) 1.5” x 1.375” (35mm) exterior diameter PVC or ABS tube
(1) 8.5” x 0.8125” (21 mm) exterior diameter PVC or ABS tube

~25 ft plastic coated cable or rope
Some form of attachment to keep plates from floating up
Weight
Laminated label with your contact information

To assemble the substrate, run the cable or rope through the 8.5” tube and secure at one end. From the loose end of the rope string on the remaining pieces, alternating between the short segments of tube and the plates, beginning and ending with the short tubes (see figure). Secure the top tube to the rope to prevent the pieces from floating up. If necessary, attach a weight to the bottom of the assembly. Attach the label to the cable where the cable is secured to the structure.



California Department of Fish and Wildlife
Biological Research

PLEASE DO NOT DISTURB

For information about this study please contact:
Bob Smith, Environmental Scientist
(XXX) XXX-XXXX

Example of a label

Selection of Monitoring Site

Quagga and zebra mussels are transported between waterbodies by watercraft (e.g., boats, wave runners, etc.), water diversions, and the natural downstream flow of a river system. Monitoring sites are selected with these factors in mind. Prime sites are areas with high boat traffic and downstream of source water. If you are sampling at a waterbody that allows boating, select a site that has a lot of boat traffic. Examples are boat ramps, gas docks or dockside marina stores. Then find a location with low flow and protection from vandalism. Marinas often offer all of these features. Within a marina, find a location with restricted public access. Avoid placing the artificial substrate at unsupervised boat ramps because of tampering by the general public and entanglement with the dock cabling system when the water level changes or the ramp is moved. If these types of structures are not available, find a site downstream of the boat traffic that offers as much protection from vandalism as possible. Examples include water quality monitoring stations or towers and government agency boathouses. Always ask for permission before attaching artificial substrates to structures. Again, find a location that

offers protection from vandalism and has low flow.

Deployment and Inspection of the Artificial Substrate

Depending on water clarity and depth, the artificial substrate should be set below the euphotic zone (below the depth of light penetration) or 6 feet, whichever is deeper, and at least two few feet above the bottom. One to two substrates are deployed per site. If the site is shallower than 2 m, then raise the substrate about 0.5 m (2 ft) off of the bottom. Record the actual sampling depth. At sites that are deep and have little vertical mixing, a second substrate is installed at a depth of approximately 15 meters (50 feet) below the surface (or 1 meter off the bottom if the depth is less than 15 meters).

A visual and tactile examination of the artificial substrate is conducted every month for attached quagga and zebra mussels. When mussels first attach they are very small (invisible to the naked eye) and are very delicate (shells are thin and easily crushed). A single mussel may feel like a grain of sand. If many mussels cover a surface, the surface feels gritty like sandpaper. In approximately 1 to 2 months a mussel grows large enough (1/4 inch) to be seen upon close inspection, but the shell is still very delicate. At this size it feels like a small pebble or sunflower seed.

To check an artificial substrate, first carefully lift it out of the water and place it in a large plastic tub (the tub will capture any mussels that fall off). Avoid knocking the substrate as you pull it out of the water because you may dislodge or crush any attached mussels. First visually inspect each plate (top, bottom, and sides), the spacers, the cable and the weight. After looking closely, attempt to gently push any attached organism that might be a mussel. Freshwater limpets and snails easily move or slide across the plate. Quagga and zebra mussels stick in place or are more securely attached. In all cases, if in doubt, bag it.

If no mussels are detected, lower the substrate back into the water and check again in a month. Quagga and zebra mussels are more likely to attach to a substrate that has some algal growth, however if the substrate becomes too heavily coated it may be unsuitable for mussel settlement. As necessary, gently remove heavy accumulations of algae to maintain suitable conditions for settlement.

Specimen Collection

If you suspect you have found a mussel immediately contact the appropriate CDFW regional mussel contact. To aid identification, first take a close-up digital photograph of each specimen. Next, collect the specimen(s) and place in a vial with 70% ethanol. Label the vial with location, date, and name of collector. If ethanol is not available, place the sample in a rigid container (to prevent crushing) without water, label, and refrigerate. E-mail the photos to the CDFW contact and they will attempt to

identify the specimens from the photographs, but may request the actual specimen(s) to make a positive identification.

If the entire artificial substrate needs to be retained for laboratory processing, place the entire unit in a large Ziplock bag or small garbage bag and keep it in a cooler with ice while in the field. Store the substrate in the freezer until ready to mail. Mail it "overnight delivery" on ice.

Replacement of Artificial Substrate

Replace a missing or broken artificial substrate with a new one. If the substrate is repeatedly lost or damaged look for a new deployment site that offers more protection. Report any incidents and the action(s) taken.

To prevent any possibility of contamination between monitoring sites (should mussels be present and not yet detected), never take a substrate from one site and place it at a different site (even within a single waterbody).

Data Recording and Reporting

Every time an artificial substrate is checked the data must be recorded on a datasheet before leaving the field. Absence data is as important to document as presence, so complete and submit a datasheet even if no mussels were found. Send datasheets to the appropriate CDFW regional contact. All data will be entered into a data reporting system and the datasheets will be retained on-site.

CDFW Regional Scientist Contacts

For the current list of CDFW's Regional Quagga/Zebra Mussel Scientists and their contact information, please visit CDFW's quagga/zebra mussel webpage at www.wildlife.ca.gov/mussels, or download the contact list here: http://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=4955.

Artificial Substrate Datasheet

California Department of Fish and Wildlife

(One datasheet for each artificial substrate)

Collection Information	
Date:	
Waterbody:	
Substrate location (GPS or site description):	
Substrate depth (meters):	
Collector(s):	Affiliation:
Contact information (email or phone # if not CDFW):	
Substrate	
Substrate (circle one): Present Missing	
Condition (circle one): Intact Damaged	
Comments:	
Mussels	
Mussels (circle one): Present Absent	Species (circle one): Quagga Zebra Unknown
Where (circle all that apply): Plate surface Plate edge Spacers Rope (depth _____) Other (_____)	Total # of mussels on each part of substrate _____ _____ _____ _____ _____
Plate dimensions (units): _____ x _____(__)	Plate area (multiply plate dimensions):

Plates:	Number of mussels	Density (# of mussels ÷ area)
Side 1 (top side of top plate)		
Side 2 (bottom side of top plate)		
Side 3 (top side of second plate)		
Side 4 (bottom side of second plate)		
Side 5 (top side of third plate)		
Side 6 (bottom side of third plate)		
Side 7 (top side of bottom plate)		
Side 8 (bottom side of bottom plate)		

Additional Information
Other organisms present:
Comments:

Return completed datasheets to the appropriate California Department of Fish and Wildlife Regional office.

Quagga/Zebra Mussel Surface Survey Protocol*
California Department of Fish and Wildlife

*This protocol was adapted from the California Department of Water Resources *Zebra/Quagga Mussel Surface Survey Protocol*.

Description of Quagga and Zebra Mussels

The quagga mussel, *Dreissena rostriformis bugensis*, and the zebra mussel, *Dreissena polymorpha*, are small mussels found only in freshwater. They look very similar to each other. They commonly have alternating light and dark brown stripes, but can also be solid light brown or dark brown. They have 2 smooth shells that are shaped a little bit like the letter "D". These mussels are usually less than 2 inches in length. In new populations, most mussels are young and therefore very small (under ¼ inch long).

Quagga Mussel *Dreissena bugensis*	**Zebra Mussel** *Dreissena polymorpha*
	
• Shell: D-shaped and triangular; thin, fragile; smooth or shallowly ridged; solid light to dark brown or dark concentric rings; paler near hinge • Attaches to hard and soft surfaces	• Shell: D-shaped and triangular; thin, fragile; smooth or shallowly ridged; solid light to dark brown or striped • Attaches to hard surfaces


Color variation in quagga and zebra mussels

Quagga and zebra mussels are freshwater mussels that can physically attach onto hard substrates. Like the mussels found clinging to the rocks along the California coastline, quagga and zebra mussels attach onto hard surfaces (e.g. pipes, screens, rock, logs, boats, etc.). They form colonies made up of many individuals attached onto an object and even onto each other. Small newly settled mussels feel like gritty sandpaper when attached to a smooth surface. Larger mussels will feel coarser (like a small pebble or sunflower seed) or be visually apparent.

Other Organisms Mistaken for Quagga/Zebra Mussels

Asian clam, Corbicula fluminea
People often mistake the very common Asian clam (also introduced) for quagga or zebra mussels. The Asian clam is widespread and abundant in California. It is brown and has ridges in concentric rings on its shells. The shells of older clams or of dead clams are white at the hinge (where the two shells join together). These clams do not attach onto surfaces. They live in mud or sand.


Asian clam

Snails and Freshwater Limpets
Small snails and freshwater limpets cling to hard substrates and can be mistaken for small juvenile mussels. They are similar in color and size to small quagga and zebra mussels. Snails have a spiral shape. Limpets have one shell and are flat. Quagga and zebra mussels attach on the edge of their shell and stick up and away from the surface.


Snail


Snails


Limpets

Visual and Tactile Search for Quagga and Zebra Mussels

Gently run fingers over smooth surfaces, checking for gritty feeling or small “seed-like” or “pebble-like” objects. Areas likely to harbor mussels, if they are present, include:

- Dock flotation, buoys, mooring line, cables, rocks, concrete, logs/drift wood, vegetation, and anything that has been in the water for a long time.

- Pull up and inspect any substrate that is under water.
- Trap lines and any line or cable hanging in water.

Visually inspect all hard and soft substrates. Fan areas covered with silt to expose mussels.

Inspect dark areas (dark substrates and low light/shaded areas). Do not disturb private vessels or property.

Prime Areas to Search

Quagga and zebra mussels prefer dark substrates and low light/dark areas. They prefer concrete over other substrates. Search areas at or near boat ramps, gas dock, dock near marina store, other docks in high traffic areas, all concrete structures, and low flow areas.

Minimum Sample Size

The minimum number of linear feet to be searched per substrate is defined below. You can stop before meeting the minimum linear feet if quagga/zebra mussels are found in 3 or more locations within the survey location, or if all available substrate has been searched.

- Boat ramp bottom – 100ft if the ramp is at a marina, 200ft if the ramp is the only structure at the survey location.
- Shoreline - 100ft if at a marina, 200ft if at a survey location with only a boat ramp
- Dock - 200ft
- Mooring/dock lines (portion hanging in water) - 200ft
- Anchor/dock cable or chain (portion under water) - 100ft
- Concrete structures - 100ft
- Logs and woody debris – 100ft
- All accessible buoys

Make a notation in “Comments” section if minimum sample size requirements could not be met.

If Mussels are Found

Record the lat/long (in decimal degrees and use WSG 84) of the mussels’ location(s) and mark/describe location(s) on the back of the datasheet. Record the type of substrate(s) the mussel(s) was found on (for example, concrete, plastic, rope, chain, buoy, etc).

Make counts of mussels at up to 3 locations within the survey site. If more locations are found, make a note in the “Comments” section.

At each of the 3 mussel locations, take density estimates using one or both methods:

- Petri dish: place Petri dish over surface. Count all mussels within circle.
- Ruler: place ruler adjacent to mussels. Count all mussels within one inch of ruler.
- If you cannot see the mussels, count the mussels using touch. If entire ruler cannot be placed on surface, record the length of the ruler used.
- Collect 5 density estimates per mussel location.

Collect specimens (4-5). Place in Ziploc bag with label. Label should include location, lat/long, date, and name of collector. Seal and keep dry or put in freezer. Do not put water in the bag.

If other species of clams or mussels are found, collect specimens (1-2) and place in bag with collection label. Seal and keep dry or put in freezer. Do not put water in the bag.

Data Recording and Reporting

Datasheets are available at:
https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=4949

If mussels are found, immediately contact the appropriate CDFW regional mussel contact.

Every time a survey is made the data must be recorded on a datasheet before leaving the field. Absence information is as important to document as presence, so complete and submit a datasheet even if no mussels were found. Send datasheets to the appropriate CDFW regional contact. All data will be entered into a data reporting system and the datasheets will be retained on-site.

CDFW Regional Scientist Contacts

For the current list of CDFW's Regional Quagga/Zebra Mussel Scientists and their contact information, please visit CDFW's quagga/zebra mussel webpage at www.wildlife.ca.gov/mussels, or download the contact list here: http://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=4955.

Quagga/Zebra Mussel Surface Survey Data Sheet

(Use Pencil Only)

Waterbody _____ **Date** __ __ / __ __ / __ __

Location _____ **Crew** [ ]

GPS _____ **(Decimal Degrees, WSG 84)**

Secchi Depth [ ][ ][ ] **Wave Chop** [ ]

 # Linear Meters of:

Boat Ramp Bottom (30 m at marina, 60 m at ramp only)	[ ][ ][ ]	**Shoreline** (30 m at marina, 60 m at ramp only)	[ ][ ][ ]
Dock (60 m)	[ ][ ][ ]	**Concrete Structures** (30 m)	[ ][ ][ ]
Mooring Line (60 m)	[ ][ ][ ]	**Logs/Woody Debris** (30 m)	[ ][ ][ ]
Anchor/Dock Cable (30 m)	[ ][ ][ ]	**Other** _____	[ ][ ][ ]

% of Dock/Marina/Boat Ramp Searched [ ]

Quagga/Zebra Mussels Present? Y / N **Specimens Collected?** Y / N

	Exact GPS Location (if isolated occurrences):	**Mussel Density** (# of mussels):	**Method** (circle one):
1	[ ]	[ ][ ][ ][ ][ ]	Ruler / Petri
	Ruler Length (if < 0.5 m)	_____ _____ _____ _____ _____	
	Substrate Type	[ ]	
2	[ ]	[ ][ ][ ][ ][ ]	Ruler / Petri
	Ruler Length (if < 0.5 m)	_____ _____ _____ _____ _____	
	Substrate Type	[ ]	
3	[ ]	[ ][ ][ ][ ][ ]	Ruler / Petri
	Ruler Length (if < 0.5 m)	_____ _____ _____ _____ _____	
	Substrate Type	[ ]	

Corbicula Clams Present? Y / N **Snails Present?** Y / N

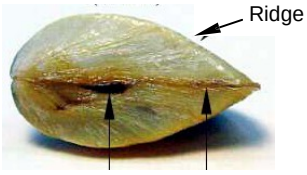
Other Mussel/Clam Species Present? Y / N **Specimens Collected?** Y / N

Quagga Mussel
Dreissena rostriformis bugensis

• Shell: D-shaped and triangular; thin, fragile; smooth or shallowly ridged; solid light to dark brown or dark concentric rings; paler near hinge
• Attaches to hard and soft surfaces

Zebra Mussel
Dreissena polymorpha

• Shell: D-shaped and triangular; thin, fragile; smooth or shallowly ridged; solid light to dark brown or striped
• Attaches to hard surfaces



Asian Clam
Corbicula fluminea

• Shell: fan-shaped and symmetrical; thick, hard; deep ridges; solid light to dark brown; may have a white patch near hinge
• Burrows into sand or mud; never attaches to structures
• Dead shells often found along shoreline

Map of sampling location:

Place empty circles (◯) in areas that were surveyed but no mussels were found. Place circles with plus sign (⊕) where mussels were found, and number 1, 2, or 3 to correspond to GPS coordinates.

Did weather conditions negatively affect sampling conditions? Y / N

Comments _____

_____

_____

California Department of Fish and Wildlife

Quagga/Zebra Mussel Plankton Tow Sampling Protocol

Purpose of Sampling:

Plankton tow sampling is a form of early-detection monitoring for quagga and/or zebra mussel veligers, the planktonic, larval life stage, whereby small organisms (plankton) are collected by pulling a fine-mesh net through the water column (referred to as a “tow”). The plankton collected is then analyzed in a laboratory for the presence of veligers using cross-polarized light microscopy (CPLM) and/or DNA using polymerase chain reaction (PCR) analysis. To optimize the potential for detecting veligers, if present, plankton tows should follow a standardized sampling method, sample a large volume of water, and target the months (water temperatures) and locations where veligers are most likely to occur. Of equal importance, samples must be preserved and handled properly in order to maintain their integrity so analysis yields accurate results.

To enhance early-detection, monitoring for adult mussels should be conducted along with plankton tow sampling. Monitoring for adult mussels can be conducted through monthly inspections of artificial substrate samplers and by surveying surfaces of shoreline, multiple habitat types, and structures located in high use areas. Separate protocols for these methods are available at www.wildlife.ca.gov/mussels.

When and Where to Sample:

Water Temperature

Plankton monitoring is typically conducted when water temperatures are between 9°C - 18°C (48°F - 64°F), when spawning is occurring. In warmer regions, where water temperatures remain within this range throughout the year, mussels can spawn year round. It is recommended tows be conducted monthly when temperatures are conducive to spawning.

Locations

Veliger distribution can be highly localized; therefore sampling should occur at multiple sites throughout the waterbody to increase the potential for detection. Sampling sites should include areas of high use and likely sites of mussel introductions, such as around docks, boat launch ramps, floating restrooms, marinas, at inlets and outlets of the waterbody (mouths of tributaries; dams), and in downwind areas and eddies (which can be identified by accumulation of leaves, pollen, and debris on the surface of the water).

Depth

To increase the probability of capturing veligers if they are present, tows from depths of 15 meters are recommended.

Number of Sites and Number of Tows

The number of sites within a waterbody should be based on the size of the waterbody, but a minimum of three sites is recommended. A **minimum** total volume of 1000 liters of water should be filtered through the net per site. Therefore, the number of tows needed at each site should be determined by the diameter of the net used and the depth of each tow. Based on the diameter of the net, corresponding plankton net area (m^2) (Table 1, Appendix B), and the depth of each tow, the number of tows needed per site to filter 1000 liters can be calculated using the equation provided in Appendix B.

Summary of Sampling Recommendations

Parameter	Recommendation
Water temperature	9°C - 18°C (48°F - 64°F)
Locations	Around floating structures, marinas, inlets and outlets, coves, down-wind areas and eddies
Depth	0 – 15 m (0 – 50')
Number of sampling sites per waterbody	Variable; based on size of waterbody, minimum of 3
Number of tows per sampling site	Variable; based on depth and net size
Total volume sampled	Minimum 1000 liters (264 gallons) per site

Disclaimer: recommendations of equipment and supplies by brand or vendor are made only for the convenience of the user. Recommendations are not an endorsement and equipment or supply items of other brands that are offered by vendors may work just as well.

Equipment and Supplies:

- Plankton tow net – 63 or 64 micron mesh size
  - 8 inch diameter (WildCo part number 426-A28 recommended)
  - 12 inch diameter (Aquatic Research Instruments simple plankton net recommended)
- Tow rope – 100 foot minimum with 1 or 5 meter graduation marks
- Ballast weight – optional, use if needed
- Collection/sample bottles – plastic wide mouth 250 or 500 mL capacity
- Sample labels – Environmental Sampling Supply 2 X 3 inches, part no. 0203-5000 recommended (labels are sometimes provided with a bottle order)
- Ink pen/pencil
- Plankton Sample Datasheets; Appendix D (for internal data collection/management)
- CDFW Shellfish Health Lab sample submission/chain of custody (COC) form; Appendix E (for samples being submitted CDFW's Shellfish Health Lab)
- Notebook/ notepad
- Sharpie-type marker
- Hand calculator
- Spool for tow rope
- Carabineer
- Eighteen (18) gallon Rubbermaid tote with lid – 23.9 X 15.9 X 16.5 inch
- White vinegar (approximately 5% acetic acid)
- Household bleach (approximately 6% hypochloride)
- Spray bottle 32 oz. (grey Spraymaster type recommended)
- Measuring cup with graduations for milliliters or ounces
- Zip lock bags – 1 gallon
- Ruler with 1 mm graduations
- Non-denatured ethanol (200 proof)
- Baking soda, 4% solution in distilled water (W/V)
- pH paper (Whatman type CF pH range 4.5 – 10 recommended)
- Blue ice or gel packs
- Cooler – large enough to retain all samples
- Boat

Optional Equipment and Supplies:

- ☐ Bucket, 1-5 gallons
- ☐ Tools and tool box
- ☐ Camera
- ☐ Depth finder
- ☐ Multi-parameter water quality meter
- ☐ GPS unit
- ☐ Write-in-the-rain paper
- ☐ Clip board
- ☐ Cell phone
- ☐ Personal floatation devices
- ☐ First aid kit
- ☐ Fire extinguisher
- ☐ Batteries, all size

Equipment Preparation Prior to Collection

1. Decontaminate nets and related equipment before use. The decontamination protocol is provided in Appendix A.
2. If necessary affix a ballast weight to the net assembly.
3. Options for marking the tow rope:
    A. Measure the tow rope in 1 or 5 meter intervals
    B. Using a Sharpie type marker or labeling tape mark the rope at 1 or 5 meter intervals (markers can bleed or run during the decontamination process).
    C. Or, electrical shrink wrap can be used to mark the rope at 1 or 5 meter intervals.
        a. To do this obtain electrical shrink wrap slightly larger than the rope's diameter
        b. Cut the shrink wrap in inch segments
        c. Measure and mark the rope with a pen at 1 or 5 meter intervals
        d. Slide the appropriate number of shrink wrap segments on the rope
        e. Place one over each marked meter
        f. Heat the shrink wrap with a blow torch or hair dryer (the heat will shrink the wrap in place)
4. It is highly recommended that the tow rope be loaded onto a spool.
5. Blue ice / gel packs need to be frozen.
6. A refrigerator must be available for storage after collection.
7. Prepare 4% baking soda solution per Appendix B.

Vertical Tow Protocol

Note: A minimum of 1000 liters should be filtered from a given site. See Appendix B for example calculations.

1. If using a net with a valve, make sure the valve is closed; lower the net off the side of the boat perpendicular to the surface of the water.
   - Lower the net 15 meters or 1 meter above the bottom, whichever is deeper.
2. Count the graduation marks and record the depth of the net. Depth distance information is needed to determine the volume of water sampled.
3. **Do not allow the net to contact the bottom of the water body.** Touching the bottom will clog the net. If this happens, draw the net back up to the surface and thoroughly wash all of the material off. Do not dispense any of the bottom material into the sample bottle.
4. Pull the net up at a rate of about ½ meter per second. Pulling at a faster rate will create a wave in front of the net that will reduce filtering efficiency and may also damage veligers.
5. As the net is drawn towards the surface, maintain vertical alignment so that the center axis of the net is perpendicular to the surface of the water.
6. After the net is drawn above the water line slowly dip the net in and out of the water several times while maintaining vertical alignment to wash any material clinging to the inner surface of the net into the cod end. Do not submerge the bridle ring while dipping the net.
7. Depending on how the cod end is configured, dispense or decant the tow material into the sample bottle.

   Repeat steps 1-7 until a minimum of 1000 liters of water has been filtered through the net.
8. Label the bottle with the waterbody, site name, date/time and name of collector, preservation type, analysis type, and agency.
9. Complete the Plankton Sample Datasheet in Appendix D for internal collection/maintenance of field data.
10. Complete the Lab Submission Form located at the end of Appendix E for all samples being submitting to CDFW's Shellfish Health Lab. This form is not required for samples submitted to external labs.
11. Place the bottle in a cooler with gel packs or blue ice.
12. Continue to the next site.

Samples must remain chilled to prevent degradation. Samples should be preserved in the parking lot per the preservation protocol found in Appendix C.

Horizontal Tows

Vertical tows are preferred over horizontal tows. However, horizontal tows may be required when sampling shallow water.

1. If the water is stagnant or the flow rate is slow, the net can be pulled in a horizontal direction with the net below the surface. A ballast weight may have to be attached to keep the net submerged.
2. The total length of the tow can be determined using the graduation marks on the tow rope.
3. See Appendix B for example calculations.
4. Complete the Plankton Sample Datasheet in Appendix D for internal collection/maintenance of field data.
5. Complete the Lab Submission Form located at the end of Appendix E for all samples being submitting to CDFW's Shellfish Health Lab. This form is not required for samples submitted to external labs.

Sample Identification

1. Samples need to be marked for identification when received at the Shellfish Health Lab. Adhesive labels should be used and information should be recorded with permanent ink. Ethanol used for preservation will cause ink to run; therefore, ethanol must be kept off any labels or identification markings. It is recommended that bottles be marked with a waterbody and site name (use of abbreviations is ok), preserved, and then have the label, with more detail, placed on each bottle.
2. **Include a lab sample submission/chain of custody (COC) form with all shipments and deliveries.**
   A copy of the CDFW Shellfish Health Lab submission form is included in this document at the end of Appendix E. Important information to include is: date of collection, the collector's name, waterbody name, description of locations, GPS data or waypoint, total tow depth, water depth, net hoop diameter, time and means of preservation, and both storage condition and storage location prior to shipment.

CDFW Regional Scientist Contacts

For the current list of CDFW's Regional Quagga/Zebra Mussel Scientists and their contact information, please visit CDFW's quagga/zebra mussel webpage at www.wildlife.ca.gov/mussels, or download the contact list here: http://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=4955.

Appendices

A. **Decontamination protocol for equipment used to collect plankton samples for quagga and zebra mussel larvae detection analysis**

B. **Reagent preparation and plankton tow calculations**

C. **Plankton tow preservation protocol for the detection of quagga and zebra mussel veliger larvae**

D. **Plankton sample datasheet**

E. **Sample submission guidelines and sample submission form**

Appendix A

Decontamination protocol for equipment used to collect plankton tow samples for quagga and zebra mussel larvae detection analysis

After the tow samples have been collected from a water body all equipment coming into contact with the water must be decontaminated prior to use elsewhere. For thorough decontamination, equipment will have to be soaked in an acetic acid solution (vinegar) and then sprayed with a 10% bleach solution. The vinegar dissolves the veliger's shell but will not denature DNA. The bleach will denature DNA but will not dissolve shells. Therefore, the vinegar must be used before the bleach so DNA will be exposed to the denaturing bleach. Vinegar and bleach can present safety hazards if not used properly. Material Safety Data Sheets (MSDS) are included at the end of this appendix for both vinegar and bleach. Heed all MSDS precautions and follow all MSDS procedures, practices, safeguards and requirements when using vinegar and bleach.

Protocol:

1. Place items to be decontaminated in the 18 gallon Rubbermaid tote.
2. Fill the tote with enough household vinegar to completely cover all of the items.
3. Soak the items in vinegar for a minimum of 2 hours (24 hours is preferred).
4. After soaking in vinegar thoroughly rinse the items in tap water.
5. Spray the items with a 10% bleach solution and allow the items to sit for 15 minutes.
6. Alternatively, a 10% bleach solution can be prepared in a Rubbermaid tote or a similar type of container and used to soak items for 15 minutes following the vinegar soak.
7. After the bleach treatment, thoroughly rinse all of the items off with tap water and allow them to air dry.

The vinegar can be reused multiple times. It's recommended that vinegar be poured back into the original container for storage. The vinegar should be periodically checked with pH test strips to make sure the pH level remains at approximately 2 to 3.

The Clorox Company
1221 Broadway
Oakland, CA 94612
Tel. (510) 271-7000

Material Safety Data Sheet

I Product:

CLOROX REGULAR-BLEACH

Description:

CLEAR, LIGHT YELLOW LIQUID WITH A CHARACTERISTIC CHLORINE ODOR

Other Designations	Distributor	Emergency Telephone Nos.
Clorox Bleach EPA Reg. No. 5813-50	Clorox Sales Company 1221 Broadway Oakland, CA 94612	For Medical Emergencies call: (800) 446-1014 For Transportation Emergencies Chemtrec (800) 424-9300

II Health Hazard Data

DANGER: CORROSIVE. May cause severe irritation or damage to eyes and skin. Vapor or mist may irritate. Harmful if swallowed. Keep out of reach of children.

Some clinical reports suggest a low potential for sensitization upon exaggerated exposure to sodium hypochlorite if skin damage (e.g., irritation) occurs during exposure. Under normal consumer use conditions the likelihood of any adverse health effects are low.

Medical conditions that may be aggravated by exposure to high concentrations of vapor or mist: heart conditions or chronic respiratory problems such as asthma, emphysema, chronic bronchitis or obstructive lung disease.

FIRST AID:

Eye Contact: Hold eye open and rinse with water for 15-20 minutes. Remove contact lenses, after first 5 minutes. Continue rinsing eye. Call a physician.

Skin Contact: Wash skin with water for 15-20 minutes. If irritation develops, call a physician.

Ingestion: Do not induce vomiting. Drink a glassful of water. If irritation develops, call a physician. Do not give anything by mouth to an unconscious person.

Inhalation: Remove to fresh air. If breathing is affected, call a physician.

III Hazardous Ingredients

Ingredient	Concentration	Exposure Limit
Sodium hypochlorite CAS# 7681-52-9	5 - 10%	Not established
Sodium hydroxide CAS# 1310-73-2	<1%	2 mg/m[1] 2 mg/m[2]

[1]ACGIH Threshold Limit Value (TLV) - Ceiling

[2]OHSA Permissible Exposure Limit (PEL) – Time Weighted Average (TWA)

None of the ingredients in this product are on the IARC, NTP or OSHA carcinogen lists.

IV Special Protection and Precautions

No special protection or precautions have been identified for using this product under directed consumer use conditions. The following recommendations are given for production facilities and for other conditions and situations where there is increased potential for accidental, large-scale or prolonged exposure.

Hygienic Practices: Avoid contact with eyes, skin and clothing. Wash hands after direct contact. Do not wear product-contaminated clothing for prolonged periods.

Engineering Controls: Use general ventilation to minimize exposure to vapor or mist.

Personal Protective Equipment: Wear safety goggles. Use rubber or nitrile gloves if in contact liquid, especially for prolonged periods.

KEEP OUT OF REACH OF CHILDREN

V Transportation and Regulatory Data

DOT/IMDG/IATA - Not restricted.

EPA - SARA TITLE III/CERCLA: Bottled product is not reportable under Sections 311/312 and contains no chemicals reportable under Section 313. This product does contain chemicals (sodium hydroxide <0.2% and sodium hypochlorite <7.35%) that are regulated under Section 304/CERCLA.

TSCA/DSL STATUS: All components of this product are on the U.S. TSCA Inventory and Canadian DSL.

VI Spill Procedures/Waste Disposal

Spill Procedures: Control spill. Containerize liquid and use absorbents on residual liquid; dispose appropriately. Wash area and let dry. For spills of multiple products, responders should evaluate the MSDS's of the products for incompatibility with sodium hypochlorite. Breathing protection should be worn in enclosed, and/or poorly ventilated areas until hazard assessment is complete.

Waste Disposal: Dispose of in accordance with all applicable federal, state, and local regulations.

VII Reactivity Data

Stable under normal use and storage conditions. Strong oxidizing agent. Reacts with other household chemicals such as toilet bowl cleaners, rust removers, vinegar, acids or ammonia containing products to produce hazardous gases, such as chlorine and other chlorinated species. Prolonged contact with metal may cause pitting or discoloration.

VIII Fire and Explosion Data

Flash Point: None

Special Firefighting Procedures: None

Unusual Fire/Explosion Hazards: None. Not flammable or explosive. Product does not ignite when exposed to open flame.

IX Physical Data

Boiling point.....approx. 212°F/100°C
Specific Gravity (H_2O=1) ..... ~ 1.1 at 70°F
Solubility in Water.....complete
pH ..... ~11.9

DATA SUPPLIED IS FOR USE ONLY IN CONNECTION WITH OCCUPATIONAL SAFETY AND HEALTH DATE PREPARED 08/09

Fisher Science Education
6771 Silver Crest Road, Nazareth, PA 18064 (800) 955-1177
Emergency Number: (800) 255-3924

Material Safety Data Sheet

Section 1 – Chemical Product and Company Identification

Catalog Numbers: S25623
Product Identity: Distilled White vinegar 5%

Chemical Family: Not Applicable
Synonyms: No Information Available
Recommended Use: Laboratory chemicals

Manufacturer's Name: AquaPhoenix Scientific, Inc., 9 Barnhart Dr., Hanover, PA 17331, (866) 632-1291
Emergency Contact Number (24hr): Chemtel (800) 255-3924

Issue Date: 01/03/07
Revision Date: 02/19/12, 08/03/12

Section 2 – Hazard Identification

Emergency Overview: If ingested give large quantities of water. Get medical attention. Wash areas of contact for at least 15 minutes.
Appearance: Clear, colorless liquid **Odor:** Vinegar-like
Target Organs: Eyes, skin, respiratory system, teeth.
Potential Health Effects/ Routes of Exposure:
Eyes: Causes irritation, redness, pain, tearing.
Skin: Causes irritation, redness and pain.
Ingestion: May cause irritation of the digestive tract.
Inhalation: Not likely to be a hazard by inhalation.
Chronic Effect / Carcinogenicity: None (IARC, NTP, OSHA)
Aggravated Medical Conditions No information Available.
These chemicals are considered hazardous by OSHA.
See section 11 for toxicological information. See section 12 for potential environmental effects.

Section 3 – Composition, Information on Ingredients

Acetic Acid, CAS# 64-19-7, 5% v/v
Water, purified, CAS# 7732-18-5, 95% w/v

Section 4 – First Aid

Eyes: Immediately flush eyes with water for at least 15 minutes. Get medical assistance immediately.
Skin: Flush with water for 15 minutes. Get medical assistance if irritation develops.
Ingestion: DO NOT induce vomiting. Dilute with water or milk. Get medical assistance.
Inhalation: Remove to fresh air. Give artificial respiration if necessary. If breathing is difficult, give oxygen.
Notes to Physician Treat symptomatically.

Section 5 – Fire Fighting Measures

Flash Point: No information Available **Autoignition Temperature:** No information Available
Explosion Limits Upper No Information Available **Lower** No Information Available

Extinguishing Media: Any means suitable for extinguishing surrounding fire.
Unsuitable Extinguishing Media: No information available
Fire & Explosion Hazards: Not considered to be a fire or explosion hazard
Fire Fighting Instructions / Equipment: Use normal procedures. Use protective clothing. Use NIOSH-approved breathing equipment.
Hazardous Combustion Products: No information Available.
Sensitivity to mechanical impact No information available.
Sensitivity to static discharge No information available.
Specific Hazards Arising from the Chemical: No information available
NFPA Rating: (estimated) Health: 2; Flammable: 0; Reactivity: 0

Section 6 – Accidental Release Measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation. Avoid contact with skin, eyes and clothing. Remove from all sources of ignition.
Environmental Precautions Should not be released into environment.
Methods for Containment and Clean Up Soak with inert material. Keep in suitable and closed containers for disposal. Always obey local regulations.

Section 7 – Handling and Storage

Handling: Wash hands after handling. Avoid contact with skin and eyes. Wear personal protective equipment.
Storage: Keep container tightly closed. Store in a cool, dry, well-ventilated area. Protect from freezing.

Section 8 – Exposure Controls, Personal Protection

Acetic Acid, CAS# 64-19-7, ACGIH TLV: 25mg/m3, OSHA PEL: 25mg/m3
Water, purified, CAS# 7732-18-5, ACGIH TLV: NA, OSHA PEL: NA
Engineering Measures/ General Hygiene: Normal ventilation is adequate
Personal Protection Equipment: Skin Protection: Chemical resistant gloves.
Eye/Face Protection: Safety Glasses or goggles. **Respiratory Protection:** Normal ventilation is adequate

Section 9 – Physical and Chemical Properties

Appearance/Physical State: Clear, colorless liquid
Odor: Vinegar-like
Boiling Point: 117-118C
Melting Point: 16.6C
Vapor Density: 2.07
Evaporation Rate: No information Available
pH: Acidic
Flammability: No Information Available
Solubility: Infinite
Relative Density: No Information Available
% Volatility: No Information Available
Specific Gravity: No Information Available
Vapor Pressure: No Information Available
Flash Point: No information Available
Coefficient of water/oil distribution: Not Available
Odor Threshold: Not Available
Decomposition Temperature: No Information Available
Partition Coefficient n-octanol/water: Not Available
Molecular Weight: 60.05

Section 10 – Stability and Reactivity

Chemical Stability: Stable under normal conditions of use and storage.
Incompatible Materials: Strong bases
Conditions to Avoid: No information Available
Hazardous Decomposition Products: irritating fumes
Hazardous Polymerization: Does not occur
Hazardous Reactions: None under normal processing.

Section 11 – Toxicological Information

Routes of Exposure/Symptoms/Corrosiveness – See Section 2
LD50 orl-rat: 3310 mg/kg (Acetic Acid)
LC50 inhalation-rat: 5620 ppm/ 1hr. (Acetic Acid)
Irritation: No information Available

Toxicologically Synergistic: No Information Available

Chronic Exposure

Carcinogenicity No known carcinogenic chemicals.
Sensitization No information available.
Mutagenic Effects not mutagenic in AMES test.
Reproductive Effects Experiments have shown reproductive toxicity effects on laboratory animals for acetic acid.
Developmental Effects (Immediate/Delayed) No information available.
Teratogenicity No information available.
Other Adverse Effects No information available.
Endocrine Disruptor Information No information available.

Section 12 – Ecological Information

Ecotoxicity: Acetic Acid has high biochemical oxygen demand, and a potential to cause oxygen depletion in aquatic systems.
Persistence and Degradability: Expected to be biodegradable **Mobility:** No Information Available
Bioaccumulation/ Accumulation: No Information Available

Section 13 – Disposal Considerations

Chemical waste generates must determine whether a discarded chemical is classified as a hazardous waste. Comply with all local, state, and federal regulations.

Section 14 – Transport Information

DOT – Not Regulated

Section 15 – Regulatory Information (not meant to be all inclusive)

OSHA Status: These chemicals are considered hazardous by OSHA.
Canada DSL: This chemical is listed on Canada's DSL list.
TSCA: These chemicals are listed on the TSCA Inventory.
SARA Title III Section 313: Not Applicable
RCRA Status: Not Applicable
CERCLA Reportable Quantity: Acetic Acid – 5000lbs.
WHMIS: Not-controlled

Section 16 – Additional Information

Disclaimer: The information on this MSDS applies to this specific material as supplied. It may not be valid for this material if it is used in combination with any other materials. It is the user's responsibility to determine the suitability and completeness of this information for his own particular use. No warranty is implied regarding the accuracy of the data or the results to be obtained form the products use.

Appendix B

Reagent preparation and plankton tow calculations

A. Conversions

- To convert feet to meters multiply by 0.3048
- To convert inches to centimeters multiply by 2.54
- To convert cubic meters to liters multiply by 1000
- Conversions if a measuring cup is used:
  - 1 ounce = approximately 30 milliliters
  - 1 cup = 8 ounces
  - 1 cup = approximately 250 milliliters

B. Preparation of a 4% baking soda (sodium bicarbonate) solution

- Use the following formula to prepare a 4 % by weight (W/V) solution:

desired volume in ml x 0.04 g baking soda = grams of baking soda to add

- Example: to make a 1 liter solution of 4% baking soda solution, add 40 grams of baking soda to 1000 milliliters (1 L) of deionized water. A standard 28 mm soda bottle cap holds about 5 grams of baking soda and ½ teaspoon of baking soda is about 3 grams. These values can be used to prepare a solution that is approximately 4% baking soda. For example, adding a level soda bottle capful of baking soda to a 250 ml Nalgene container that is approximate ½ full with water would provide a solution of baking soda close enough to 4% that it could be used to adjust the pH of plankton tow samples per the protocol described in Appendix A.

C. Preparation of a 10% bleach (sodium hypochlorite) solution

- Use the following formula to prepare a 10% bleach solution

total volume of solution desired x 1.1 = volume of bleach to add

- Example: Add 50 milliliters of bleach to 450 milliliters to prepare a 10% bleach solution (V/V). A measuring cup can be used to measure the bleach and water at a 1:10 proportion. It's recommended that the bleach solution be prepared in a 32 oz. Spraymaster (gray) spray bottle. The gray bottle will help protect the bleach from degradation.

D. Determination of a vertical tow volume in liters

- To determine a vertical tow volume multiply the area of the plankton net hoop by the total depth of all the tows in the sample bottle and then multiply by 1000. Round the value to 2 significant figures.

Area of the net hoop (m^2) x tow depth (m) x 1000 liters/m^3 = total tow volume (L)

Table 1. Plankton net diameter and the corresponding area (m^2) of the net hoop, used to determine the minimum tow depth required to achieve a 1000 liter tow volume.

Net Diameter	Area of Plankton Net Hoop (m^2)	Minimum Tow Depth to get 1000 Liters Total Volume
5 inches (13 cm)	0.01square meters	100 meters
8 inches (20 cm)	0.03 square meters	33.4 meters
12 inches (30 cm)	0.07 square meters	14.3 meters
20 inches (50 cm)	0.20 square meters	5.3 meters

- Example: A 30 cm net is used to collect 3 x 20 meter tows. All 3 of the tows are dispensed into the sample collection bottle.

0.07 m^2 x 60 m x 1000 L/m^3 = 4200 liters of source water represented in the bottle

E. Determination of horizontal tow volume in liters

- It is difficult to determine horizontal volume. An estimate can be made in the same way vertical tow volume is calculated. That is, the length of the tow in meters multiplied by the hoop area in square meters then multiplied by 1000 L/m^3.

Horizontal tows do not account for veliger depth distribution and there is often a lot of sediment in horizontal tows. For these reasons horizontal tows are discouraged.

Appendix C

Plankton tow preservation protocol for the detection of quagga and zebra mussel veliger larvae

Objective: Preserve the integrity of veliger shells and tissues in plankton tow samples so that veligers are amenable to PCR and CPLM analyses.

Summary: Add 5 ml of a 4% (W/V) baking soda solution per 100 ml plankton tow sample then bring the volume to 20% absolute ethanol (V/V).

Protocol:

1. After tows have been poured into the collection bottle, mark the level with a Sharpie and measure the height of the liquid using a ruler with millimeter graduations.
2. Divide the height measurement by 0.95
3. The quotient is the level to which the 4% baking soda solution is added. This will be a relatively small quantity. A small cup should be used to pour the solution into the tow.
4. Divide the measurement in step 1 by 0.76.
5. The quotient is the level to which absolute ethanol is added.
6. The sample is now preserved. Store the sample under refrigeration conditions until shipping.

Note: After the addition of baking soda and ethanol the pH of the sample should be 8.0 or slightly higher. The pH can be measured in the field with pH test strips. If the pH is below 8.0, add more baking soda solution. The pH of the sample will also be measured in the laboratory at the time of analysis and reported with results. A pH below 8.0 at the time of analysis means that more baking soda solution should be added at the time of preservation.

Example preservation calculations:

Tow samples are collected and dispensed into a 250 ml Nalgene container. The tow sample level is measured at 65 mm.

65 mm / 0.95 = 68.4 mm (~ 68 mm)
mark 68 mm on the bottle and add the baking soda solution to this level.

65 mm / 0.76 = 85.5 mm (~ 86 mm)
mark 86 mm on the bottle and add absolute ethanol to this level.

Note: Samples must remain chilled. All samples should be placed in a cooler with gel or blue ice packs immediately after collection so they do not warm up and begin to degrade. Do not freeze the samples. Freezing damages shells and reduces detection sensitivity. Samples need to be preserved as soon as possible after collection (no more than 3 hours after collection).

Appendix D
Plankton Sample Datasheet

Collection Information

Waterbody: Date: Collector:

Collector Affiliation: Phone #:

Net Information

Mesh Size (µm): Net Diameter (cm): Net #: Reel #:

Calculations for volume: V = (area of net)(total depth in m)(1000L/m^3) feet to meter x .3048

8in net V= (.03m^2)(total depth in m)(1000L/m^3) 12in net V= (.07m^2)(total depth in m)(1000L/m^3)

Tows

Sample ID: ____________ Total # of Tows: ______________________________ Preservation: pH Buffer: ____/.95 = ______

Ethanol:____/.76 =

Total Depth of Tows: Volume = Time: ______

Location Description	V/H Tow	Tow Depth (m)	Water Q. Depth (m)	Temp °C	pH	HDO %	HDO mg/l	Turb. NTU	Sp. Cond. (µS/cm)

Sample ID: ____________ Total # of Tows: ______________________________ Preservation: pH Buffer: ____/.95 = ______

Ethanol:____/.76 =

Total Depth of Tows: Volume = Time: ______

Location Description	V/H Tow	Tow Depth (m)	Water Q. Depth (m)	Temp °C	pH	HDO %	HDO mg/l	Turb. NTU	Sp. Cond. (µS/cm)

Sample ID: ____________ Total # of Tows: ______________________________ Preservation: pH Buffer: ____/.95 = ______

Ethanol:____/.76 =

Total Depth of Tows: Volume = Time: ______

Location Description	V/H Tow	Tow Depth (m)	Water Q. Depth (m)	Temp °C	pH	HDO %	HDO mg/l	Turb. NTU	Sp. Cond. (µS/cm)

Samples preserved to 20% with 200 proof non-denatured ethanol, buffered with 5 ml of a 4% baking soda solution per 100 ml ☐ Time:__________

Appendix E

Sample submission guidelines and submission form

Note: The California Department of Fish and Wildlife (CDFW) Shellfish Health Laboratory (SHL) is located at the UC Davis Bodega Marine Laboratory. As per the instructions below, samples need to be mailed to the Bodega Marine Laboratory where they will be routed to the Shellfish Health Laboratory. Samples may also be hand delivered to the Shellfish Health Lab per the instructions below.

Authorized Submissions:

Samples submitted to the Bodega Marine Laboratory SHL are usually collected by CDFW personnel or individuals working with CDFW personnel. The SHL accepts samples from any California State, out-of-state, or federal personnel qualified to collect samples. The SHL will also accept samples from water management personnel and academic institutions. Laboratory capacity is limited. First priority will be given to CDFW submissions. Compromised samples will not be tested. It is recommended that sample collection follow the **CDFW Quagga/Zebra Mussel Plankton Tow Sampling Protocol.**

Sample Delivery Options:

Properly preserved and maintained plankton tow samples collected for lab analysis may be either hand delivered or shipped to the SHL. Include a sample submission form with each set of samples. Make sure samples are clearly marked for identification. Samples should be delivered or shipped to the SHL within 1 week of collection.

Contact Information:

Contact Jim Snider at the SHL for any questions regarding quagga/zebra mussel testing.
Phone: (707) 785-2066
Email: James.Snider@wildlife.ca.gov

Hand Delivered Samples:

Hand delivered samples should be transported in a cooler and maintained at refrigeration temperature during transport. Samples may be hand delivered during normal business hours; Monday through Friday, 9:00 am to 5:00 pm. The lab is closed on weekends and holidays. Call Jim Snider prior to delivery to make sure personnel will be available to receive samples. Arrangements may be made for afterhours deliveries, contact Jim Snider for arrangements.

Shipping Samples:

Shipped samples should be packaged in a styrofoam packer (or a similar type cold packer) contained secondarily in a cardboard box. Use gel packs to keep samples chilled. Do not use wet ice. The Bodega Marine Lab (BML) shipping and receiving department is open Monday through Thursday and closed on Fridays, weekends, and holidays. All freight must be received no later than Thursday in any given week. Samples should be shipped for next day delivery. Samples that are held over the weekend by the courier service will be considered compromised and will not be tested. Samples collected late in the week may be held over the weekend if properly preserved and refrigerated and shipped the following week.

Location:

The location of the BML can be found at:

http://maps.google.com/maps/myplaces?hl=en&ll=38.31905,-123.055509&spn=0.090101,0.153637&ctz=420&t=m&z=13

The CDFW Shellfish Health Lab is located in rooms N307 and N310. Entrance to the BML is gated. The gate closes at 5:00 pm.

Shipping Address:

Bodega Marine Laboratory
Shellfish Health
Attention: Jim Snider
2099 Westside Road
Bodega Bay, CA 94923

Reporting Results:

Results will be reported in letter or memo format and will be emailed to designated contacts.

Laboratory Fees:

Currently there is no fee for quagga/zebra mussel plankton tow testing at the SHL.

CDFW Shellfish Health Laboratory Submission Form
Quagga/Zebra Mussel Plankton Tows

Name: _____

Agency: _____ Title: _____

Phone #: _____ Email: _____

Mailing Address: _____

Waterbody: _____

Site Location: _____

Was the sample preserved at the time of collection with baking soda and 20% absolute ethanol and stored at refrigeration temperature as per Appendix A: Plankton tow preservation protocol for the detection of quagga and zebra mussel veliger larvae in this document?

☐ Yes ☐ No If no, please specify the preservation method used:

Plankton Net Diameter (include units): _____

Plankton Net Mesh Size (include units):

Sample No.	Collection Date	Sample Description	Indicate Horizontal or Vertical Tow (H or V)	Total Tow Depth in Container (indicate feet or meters)

BOARD OF SUPERVISORS, COUNTY OF LAKE, STATE OF CALIFORNIA

ORDINANCE NO. 2936

AN ORDINANCE AMENDING ARTICLE IX TO CHAPTER 15 OF THE LAKE COUNTY CODE ESTABLISHING A FEE-BASED INSPECTION PROGRAM FOR ALL WATER VESSELS LAUNCHED IN THE COUNTY OF LAKE

THE BOARD OF SUPERVISORS OF THE COUNTY OF LAKE ORDAINS AS FOLLOWS:

Section 1: Article IX of Chapter 15 of the Lake County Code is hereby amended to read as follows:

"ARTICLE IX. WATER VESSEL INSPECTION PROGRAM

Sec. 15-52. Findings.

52.1 The County of Lake holds the waters of Clear Lake in trust for the benefit of all citizens pursuant to legislation enacted in 1973 which conveyed in trust to the County of Lake the submerged lands of Clear Lake for the furtherance of navigation, commerce, fishery, recreation, and wherever possible and appropriate, preservation of the land and waters in their natural state. Clear Lake, as well as all other water bodies within the County of Lake represent a significant environmental resource to our citizens and are interrelated to the distribution systems of the County's water purveyors.

52.2 The aquatic invasive species of Dreissenid mussels such as Quagga and Zebra mussels pose a significant and imminent threat to the water bodies within the County of Lake. Dreissenid mussels have already created serious and irreparable harm to bodies of water located in other locations in the United States and California. Once introduced into a water body, these mussels proliferate at an alarming rate, drastically altering the ecosystem of that water body, harming and/or consuming native species and food resources within the ecosystems they infest. Dreissenid mussels additionally pose a significant and imminent threat to the water distribution systems of Lake County which draw water from Clear Lake and other water bodies within the County. These mussels attach to inside water treatment intake structures, pipes, and facilities to such a significant degree that the ability to distribute water through the County's existing, and in some cases, antiquated infrastructure, will be severely compromised.

52.3 Presently, it does not appear that any water body in Lake County has been infested with Dreissenid mussels. However, Water Vessels entering Lake County from other areas of the state and country may have recently been launched in infested counties or waters, making those vessels at high risk to carry mussels (adults and larvae) into Lake County waters.

52.4 A screening and inspection program is integral to the preservation of the water bodies and water distribution systems within the County of Lake, and to the drainages from Lake County.

52.5 This Ordinance is enacted under the police power of the County pursuant to Article XI, Section 7 of the California Constitution which authorizes the County to adopt and enforce regulations for the protection of the public health, safety, and welfare that are not in conflict with general laws.

Sec. 15-53. Definitions.

53.1 For purposes of this Article, the following words and phrases shall have the following meanings:

(a) "Affidavit of Compliance" means a declaration to be executed by all Water Vessel owners and operators who wish to launch said vessels in a water body in the County of Lake which attests to the responsibility of that owner/operator to ensure that his/her Water Vessel is properly screened and, if necessary, inspected and/or decontaminated prior to launching.

(b) "Authorized Screener" means an individual authorized by the Lake County Department of Water Resources to conduct the screening process necessary to determine whether a Water Vessel is at high risk to carry any Dreissenid mussel such as Quagga and Zebra and any other aquatic, non-native invasive species.

(c) "Authorized Inspector" means an individual who has received the necessary training approved by the Lake County Department of Water Resources to conduct inspections of Water Vessels for the purpose of determining whether said vessels are contaminated with any Dreissenid mussel such as Quagga and Zebra and any other aquatic, non-native invasive species.

(d) "Launch" means the introduction or placing of any trailered Water Vessel into a water body within the County of Lake.

(e) "Live bait" means any fish, or other organisms used in conjunction with fishing the waters of Lake County.

(f) "Mussel Sticker" means the stickers issued by an Authorized Screener/ Inspector evincing the fact that the vessel to which the stickers are affixed has been screened and found to be at low risk to carry any Dreissenid mussel such as Quagga and Zebra and any other aquatic, Non-native invasive species.

(g) "Non-native invasive species" means species identified by the State of California that establish and reproduce rapidly and which may threaten native species through competition, predation, parasitism, introduction of pathogens, or physically or chemically alter the habitat. Such species include, but are not limited to, New Zealand Mud Snails and non-native aquatic plants as defined in Chapter 26A of the Lake County Code.

(h) "Non-resident water vessel" means a vessel that does not meet the definition of a Resident water vessel.

(i) "Resident water vessel" means:

1. A vessel that has been issued a DMV registration that identifies its owner as being physically located within the borders of Lake County.

2. A vessel whose owner can demonstrate that it is moored or stored at a commercial facility located in Lake County.

3. Any other means deemed acceptable by the Director of Water Resources as to proof of residency in Lake County providing that the vessel is on the Lake County Assessor's current unsecured taxroll for boats.

(j) "Screening and Inspection Program" means the program of screening and inspection required by this Ordinance to ensure that all Water Vessels launching into water bodies in Lake County are free from contamination from adult and larval Dreissenid mussels and other aquatic, non-native invasive species.

(k) "Water Vessel" means any trailered watercraft, or jet ski, or float plane capable of being launched into a water body within the County of Lake except as specifically exempted herein. Canoes, kayaks, car-top boats, float tubes, rafts, wind surfers/boards, boogey boards, nonmotorized paddle boats, and nonmotorized sail boats that are eight feet or less in length are not considered water vessels for purposes of this ordinance and are thereby exempt from the provisions herein.

(l) "Water Vessel Inspection" means a physical inspection, using the training approved by the Lake County Department of Water Resources, of a vessel known or suspected to have been in water in an infested county or which bears a DMV registration in a county, either within or outside the State of California, which is known to be infested with Dreissenid mussels and other aquatic, non-native, invasive species.

(m) "Water Vessel Screening" means the process used to verify that a vessel and its trailer have not been in contact with a body of water in a county infested with Dreissenid mussels and/or is registered in a county, either within or outside the State of California, which is known to be infested with Dressenid mussels and other non-native, invasive species.

Sec. 15-54. Applicability.

This Ordinance shall be applicable to any trailered Water Vessel intending to launch in a water body within the County of Lake.

Sec. 15-55. Mussel Stickers for Resident Water Vessels.

Because the weight of scientific evidence presently available strongly indicates, the greatest risk of contamination to our water bodies is by Water Vessels entering Lake County from other jurisdictions, the following program shall be applicable to all Resident Water Vessels:

55.1 Owners and operators of Resident Water Vessels, having submitted to screening and inspection, as applicable, shall receive Resident Mussel Stickers designating the vessel as a Resident Water Vessel and absent an event necessitating re-screening and/or re-inspection as specified in 15-57.1, these Mussel Stickers shall expire at the end of each calendar year.

55.2 Every Resident Water Vessel and its trailer must be affixed with Resident Mussel Stickers prior to launching that vessel in any water body in the County of Lake.

55.3 Resident Mussel Stickers shall be issued according to a color code that will change annually.

55.4 Upon expiration of the annual Resident Mussel Stickers, at the end of the calendar year, the resident vessel must undergo the necessary screening/inspection requirements to obtain next year's valid Mussel Stickers.

Sec. 15-56. Mussel Stickers for Non-resident Water Vessels.

56.1 All Non-resident Water Vessels and their trailers must be affixed with color-coded, monthly, Non-resident Mussel Stickers after screening and prior to launch in any water body in the County of Lake. Stickers are not transferable between vessels.

56.2 Non-resident Mussel Stickers shall be issued according to a color-code that will change monthly.

56.3 Upon expiration of the Non-resident Mussel Stickers, the Non-resident Water Vessel must undergo the necessary screening/inspection requirements to obtain valid Mussel Stickers for the next calendar month.

Sec. 15-57. Screening/Inspection Requirements.

57.1 Screening Requirements.

Screening shall be required of:

(a) All Resident trailered Water Vessels prior to their first launch in every calendar year, or

(b) All Non-resident trailered Water Vessels prior to their first launch in every calendar month, or

(c) All trailered Water Vessels, Resident or Non-resident, that have been launched in a body of water outside of the County of Lake pursuant to the executed Affadivit of Compliance.

57.2 Screening Process.

(a) The screening process shall be conducted by an Authorized Screener or Authorized Inspector and shall consist of:

(1) A series of questions concerning the past location of the Water Vessel prior to launching in a water body in the County of Lake, designed to determine whether said past location constitutes an appreciable risk that said Water Vessel may be infested with Dreissenid mussels. Said questions shall be answered on the County of Lake Screening Application Invasive Species Inspection Program form, and

(2) May require a visual verification by the Authorized Screener that the Water Vessel and trailer are clean, drained and dry.

(b) Water Vessels which, as a result of the screening process, are found to be clean, drained and dry, and do not pose an appreciable risk to the water bodies of Lake County shall be affixed with Mussel Stickers in a location as designated in the instructions accompanying the Mussel Stickers which signifies that the vessel may be launched into a water body in the County.

(c) Water Vessels which, as a result of the screening process, are not clean, drained and dry, or do appear to pose an appreciable risk to the water bodies of Lake County shall be required to undergo an inspection by an Authorized Inspector. The County of Lake Screening Application Invasive Species Inspection Program form shall identify that vessel as requiring authorized inspection.

(d) Affidavit of Compliance: At the time of the screening, the vessel owner/operator shall be required to execute an affidavit which attests to the responsibility of that owner/operator to ensure that his/her Water Vessel is clean, drained and dry and properly screened, re-screened, inspected, and, if necessary, decontaminated prior to launching in a water body in the County of Lake. The Affidavit shall be signed under penalty of perjury.

(e) If the Screening Application Form is filled out falsely this shall be a violation of this Ordinance.

(f) A Water Vessel owner or operator may refuse to consent to said screening. If the Water Vessel owner or operator refuses to consent to screening, that Water Vessel shall not be allowed to launch in any water body within the County of Lake and shall be in violation of this Ordinance if he/she should nonetheless attempt to do so.

57.3 Inspection Requirements

(a) All Water Vessels determined as a result of the screening process to constitute an appreciable risk of contamination due to the possible presence of Dreissenid mussels shall submit to an inspection by an Authorized Inspector prior to launching in a water body in the County of Lake.

(b) Said inspection shall consist of a thorough search of the exterior and interior of the Water Vessel, including but not limited to bilge pumps, motors, and live wells, bait wells, ballast tanks, bladders, and all areas of standing water.

(c) A Water Vessel owner or operator may refuse to consent to said inspection. If the Water Vessel owner or operator refuses to consent to inspection, that Water Vessel shall not be allowed to launch in any water body within the County of Lake and shall be in violation of this Ordinance if he/she should nonetheless attempt to do so.

(d) At the time of the inspection, if any Water Vessel is found to contain other aquatic, non-native invasive species, the Water Vessel owner or operator shall be required to remove said invasive species prior to launching in a water body within the County of Lake.

(e) If, pursuant to the required inspection, a Water Vessel is found to be clean, drained and dry, and free of any possible Dreissenid mussel infestation and any other aquatic, non-native invasive species is either not found or removed from the Water Vessel, the Authorized Inspector shall certify that the Water Vessel can be launched in Lake County after receiving the appropriate Mussel Stickers from an Authorized Screener.

(f) Affidavit of Compliance: At the time of the inspection, the vessel owner/operator shall be required to execute an affidavit which attests to the responsibility of that owner/operator to ensure that his/her Water Vessel is properly inspected and, if necessary, decontaminated prior to launching in a water body in the County of Lake. The Affidavit shall be signed under penalty of perjury.

(g) If, pursuant to the required inspection, a Water Vessel is found to be infested with adult Dreissenid mussels, the vessel owner shall be informed that his/her Water Vessel shall be quarantined by the California Department of Fish and Game. If the vessel is found to possibly be infested with Dreissenid mussels, the vessel owner may not launch his/her vessel until such time as that vessel has been decontaminated and re-inspected by an Authorized Inspector. The vessel owner shall be directed to a decontamination station where the vessel will undergo a decontamination process. Once the vessel has been decontaminated, reinspected and found to be at no risk of contaminating Lake County waters, the vessel can be affixed with Mussel Stickers as described hereinabove.

57.4 Decontamination

Decontamination stations shall be operated by the County of Lake, Department of Water Resources. Said stations shall be open to all owner/operators of Water Vessels. There shall be

no fee associated with decontamination.

Decontamination shall be required of all vessels that have been determined to be at high risk of being infested with Dreissenid mussels. Such determination shall be made if the vessel is not clean , drained and dry, OR was last in the water of an infested county, less than 30 days ago.

Sec. 15-58. Screening/Inspection Stations.

58.1 Designated locations are available within the County. The current list of Authorized screeners is available at www.co.lake.ca.us/mussels.

58.2 Inspections shall be carried out by County personnel at any time. Vessel owners shall be referred to the nearest Authorized Inspector when required. Inspections may be scheduled by calling the Department of Water Resources, (707) 263-2344.

58.3 Nothing in this Ordinance precludes screening and/or inspections at other locations within the County which may be offered by private persons and/or organizations if such screenings are performed by Authorized Screeners and such inspections are performed by Authorized Inspectors.

Sec. 15-59: Fees.

The following fees are hereby established for County-operated screening and inspection services:

(a) The fee for each screening and/or inspection performed by the County of Lake shall be ten dollars ($10.00).

(b) Fees collected for screening and /or inspection, that are not otherwise encumbered, shall be used to fund the Water Vessel Inspection Program.

Sec. 15-60. Disposing of Live Bait into a Water Body in Lake County is Prohibited.

It shall be unlawful to dispose of any live bait and/or any liquid containing live bait or any liquid which previously contained live bait in a water body in Lake County.

Sec. 15-61. Criminal Penalties.

(a) Any person violating any provision of this Ordinance shall be guilty of a misdemeanor. Such individual shall be deemed guilty of a separate offense for each launch in a water body in the County of Lake.

(b) Any individual convicted of a violation of this chapter shall be punishable by a fine of not less than one thousand dollars ($1,000.00) and/or up to six months in the county jail or both.

(c) A Water Vessel unlawfully launched in a water body in the County of Lake shall be subject to impound if, pursuant to a misdemeanor arrest for violation of this Ordinance, a law enforcement officer determines that circumstances necessitate law enforcement custody of the Water Vessel.

(d) Payment of any penalty herein shall not relieve any individual from the responsibility of correcting the violations as found by the law enforcement officer.

(e) Any person found not in compliance with this ordinance is subject to citation, shall be escorted off the water body, and shall be subject to any other legal action as deemed necessary by the enforcement officer including but not limited to detaining said person and water vessel until inspected as required under this chapter.

(f) Fines collected as a result of violating this Ordinance, that are not otherwise encumbered, shall be used to fund the Water Vessel Inspection Program.

Sec. 15-62. Public Nuisance Declaration.

Any violation of this chapter is hereby declared to be unlawful and a public health nuisance and may be abated by authorized County personnel, irrespective of any other remedy provided in this Ordinance.

Section 2: It can be seen with certainty that there is no possibility that this Ordinance may have a significant effect on the environment. However, even if the proposed action is determined to be a "project", the proposed action would be categorically exempt from CEQA under CEQA Guidelines Section 15307 as a Class 7 Categorical Exemption which, "consists of actions taken by regulatory agencies as authorized by State law or local ordinance to assure the maintenance, restoration

or enhancement of a natural resource where the regulatory process involves procedures for protection of the environment."

Section 3: All ordinances or parts of ordinances in conflict herewith are hereby repealed to the extent of such conflict and no further.

Section 4: This Ordinance shall take effect on the 24th day of February, 2011, and before the expiration of fifteen (15) days after its passage, it shall be published at least once in a newspaper of general circulation printed and published in the County of Lake.

The foregoing ordinance was introduced before the Board of Supervisors on the 18th day of January, 2011, and passed by the following vote on the 25th day of January, 2011.

AYES: Supervisors Smith, Rushing, Farrington, Brown and Comstock

NOES: None

ABSENT OR NOT VOTING: None

COUNTY OF LAKE

Chair, Board of Supervisors

ATTEST: KELLY F. COX
Clerk of the Board of Supervisors

By: Deputy

APPROVED AS TO FORM:
ANITA L. GRANT

By:

BOARD OF SUPERVISORS LAKE COUNTY, CAL

AGREEMENT TO PARTICIPATE IN THE WATER VESSEL SCREENING/INSPECTION PROGRAM

This Agreement is hereby entered into between the County of Lake, by and through the Department of Water Resources, hereinafter referred to as "COUNTY", and _____, hereinafter referred to as "PARTICIPANT".

RECITALS

In order to protect the water bodies within the County of Lake from aquatic invasive species which pose a significant and imminent threat to the water bodies within the County of Lake, the County has enacted an ordinance requiring all Water Vessels launching into water bodies in Lake County be affixed with screening stickers prior to launching that vessel in any water body in the County of Lake.

WHEREAS, PARTICIPANT desires to assist in ensuring the success of the above-described mussel prevention program by conducting screening and/or inspection services at PARTICIPANT's business location which practice PARTICIPANT acknowledges will also provide an economic benefit to PARTICIPANT ; and

WHEREAS, COUNTY wishes to secure the services of private organizations such as PARTICIPANT in order that the screening/inspection program is readily accessible by persons wishing to launch water vessels in water bodies in the County of Lake; and

WHEREAS, in order to effectuate this public and private partnership in furtherance of the goals of the mussel prevention program, the COUNTY will agree to advance screening stickers to PARTICIPANT to be provided for those water vessels which upon screening and/or inspection are determined to be eligible under Lake County Ordinance No. 2936 to receive them; and

WHEREAS, the COUNTY's willingness to advance these screening stickers is predicated upon PARTICIPANT's agreement to each and every condition enumerated herein below.

NOW THEREFORE, in recognition of the foregoing, the parties agree as follows:

1. Receipt of Screening Stickers

Upon receipt, PARTICIPANT shall reimburse the COUNTY at COUNTY's cost for all screening stickers advanced to PARTICIPANT pursuant to this agreement.

2. Screening and Inspection Requirements

All screenings and/or inspections shall be conducted in accordance with Lake County Ordinance No. 2936 and all County procedures developed in regard to the implementation of said ordinance.

Only an Authorized Screener, as defined in Lake County Ordinance No. 2936, shall conduct screenings at a PARTICIPANT's location.

Only an Authorized Inspector, as defined in Lake County Ordinance No. 2936, shall conduct screenings and/or inspections at a PARTICIPANT's location.

Screening stickers shall be issued only by such an Authorized Screener or Authorized Inspector.

3. Recordkeeping

PARTICIPANT shall be required to maintain the following records:

Original, complete, signed, Screening Application Form.

Such forms will be returned to COUNTY at regular intervals.

4. Monitoring

COUNTY reserves the right to monitor and inspect PARTICIPANT's screening/inspection operation at any reasonable time to insure compliance with Ordinance No. 2936 and COUNTY procedures.

COUNTY will review each completed Screening Application Form for accuracy and compliance with Ordinance No. 2936.

5. Independent Contractor Status

It is specifically understood and agreed that, in the making and performance of this Agreement, PARTICIPANT is an independent contractor and is not an employee, agent, or servant of COUNTY. PARTICIPANT is solely responsible for the payment of all federal, state, and local taxes, charges, and fees, or contributions required or resulting from PARTICIPANT's employees and agents engaging in the performance of the screening and inspections described in this Agreement (including without limitation, unemployment insurance, social security, and payroll tax withholding).

6. Insurance Requirements

PARTICIPANT attests and agrees that it maintains and shall continue to maintain insurance coverage of the following types during the time PARTICIPANT engages in the above-described screening and inspections:

Compensation Insurance. PARTICIPANT shall procure and maintain as applicable, at its own expense during the term hereof, Workers' Compensation Insurance and Employer's Liability Insurance as required by the State of California, for all employees to be engaged in work. In any case of such work sublet, Participant shall require subcontractor similarly to provide Employer's Liability Insurance and Workers' Compensation Insurance for all of the latter's employees to be engaged in such work, unless such employees are covered by the protection afforded by Contractor's Workers' Compensation Insurance and Employer's Liability Insurance. Employer's Liability Insurance shall be in an amount not less than One Million Dollars ($1,000,000.00) per occurrence.

Commercial General Liability. PARTICIPANT shall procure and maintain, at its own expense during the term hereof, upon itself and its employees at all times during the course of this Agreement, Commercial General Liability Insurance (Occurrence Form CG 0001) for bodily injury, personal injury, and broad form property damage, in an amount of not more than One Million dollars ($1,000,000.00) combined single limit coverage per occurrence, including but not limited to endorsements for the following coverages: Personal and advertising injury, Premises-operations, Products and completed operations, Blanket contractual, and Independent contractor's liability.

7. Indemnification/Hold Harmless

PARTICIPANT shall indemnify and hold harmless COUNTY from any and all claims, demands, actions, liability or loss which may arise from or be incurred as a result of the negligent performance of this Agreement by PARTICIPANT.

8. Termination

This Agreement may be terminated by either party upon written notice thereof.

At the time the Agreement is terminated, PARTICIPANT shall return all unissued screening stickers and all Screening Forms (completed and otherwise) to COUNTY pursuant to its operation.

SIGNATURES

THIS AGREEMENT was executed on _____, _____, in Lake County, California.

PARTICIPANT

I have read and understand the above paragraphs.

_____ Date: _____
Signature

Printed Name

Address

COUNTY OF LAKE
Department of Water Resources

By: _____ Date: _____
Water Resources Director

APPROVED AS TO FORM

ANITA L. GRANT
County Counsel

By:_____

W:/Quagga Mussel Program/Agreements/ 2013 Agreement.doc

County of Lake Screening Application
Invasive Species Prevention Program

Note: Shaded areas for office use only.
4/20/18

Screener	Inspection required
_____ Date issued: _____	☐ Yes ☐ No
_____ Date re-screened: _____	☐ Yes ☐ No
_____ Date re-screened: _____	☐ Yes ☐ No
_____ Date re-screened: _____	☐ Yes ☐ No
_____ Date re-screened: _____	☐ Yes ☐ No
_____ Date re-screened: _____	☐ Yes ☐ No
_____ Date re-screened: _____	☐ Yes ☐ No

- All vessels must be **CLEAN, DRAINED and DRY** for screening.
- All vessels must display mussel screening stickers **prior** to launching.
- Disposal of live bait and/or bait waters into Lake County waters is **strictly prohibited**.
- Copy of this application **MUST BE KEPT ON BOARD VESSEL**.

INFORMATION AT WWW.NOMUSSELS.COM

VESSEL OWNER/OPERATOR INFORMATION

Last Name: _____ **First Name:** _____
Mailing Address: _____ **Telephone:** _____
City: _____ **State:** ___ **Zip:** _____ **E-mail Address:** _____

VESSEL 1: **What county and state is vessel kept?** _____

Registration # (CF#): _____ County where registered: _____
Date last in water (mm/dd/yyyy): _____ Waterbody: _____ County: _____
Does vessel have ballast tank/bladder? ☐ Yes ☐ No Does vessel have live/bait well(s)? ☐ Yes ☐ No

Sticker no.
☐ Resident ☐ Visitor

VESSEL 2: **What county and state is vessel kept?** _____

Registration # (CF#): _____ County where registered: _____
Date last in water (mm/dd/yyyy): _____ Waterbody: _____ County: _____
Does vessel have ballast tank/bladder? ☐ Yes ☐ No Does vessel have live/bait well(s)? ☐ Yes ☐ No

Sticker no.
☐ Resident ☐ Visitor

Please read then check the box

1) **As a boat owner I understand that mussels can travel on and in boats.** ☐
2) **I know that mussels can harm wildlife, and ruin docks, ramps, water pumps and intakes.** ☐
3) **Wet vessels can be transporting the microscopic larval form of mussels.** ☐
4) **When I take my boat to an out-of-county lake I need to have it re-screened before I launch in Lake County.** ☐
5) **I understand that cleaning, draining and drying my boat between launches is the best safeguard against transporting mussels and other invasive species.** ☐
6) **I understand that the introduction of these mussels would be devastating to the county's economy.** ☐
7) **As a boat owner I want to do my part to keep Lake County "mussel free".** ☐
8) **I understand that the stickers are good only for the calendar month and/or year specified** ☐

- I, hereby, swear that the information I provide in the screening process is true. I understand that if my vessel is found to be responsible for such invasive species entering Lake County waters, I will be held legally and financially responsible to the full extent of the law. By signing this and displaying the required stickers on my watercraft, I agree to the statements above, and agree to follow all required procedures prior to using any Lake County waterways.

Signature of Vessel Owner/Operator: _____ **Date:** _____

Location Issuing Stickers: _____ Signature of Screener: _____

California Department of Fish and Wildlife
Aquatic Invasive Species Decontamination Protocol

The California Department of Fish and Wildlife (CDFW) is committed to protecting the state's diverse fish, wildlife, and plant resources, and the habitats upon which they depend. Preventing the spread of aquatic invasive species (AIS) in both CDFW's activities, as well as those activities CDFW permits others to conduct is important to achieving this goal. The protocols outlined below are a mandatory condition of your CDFW authorization to work in aquatic habitats. They are intended to prevent the spread of AIS, including New Zealand mudsnail (*Potamopyrgus antipodarum*), quagga mussel (*Dreissena rostriformis bugensis*) and zebra mussel (*Dreissena polymorpha*). Information about New Zealand mudsnails and quagga and zebra mussels is summarized in Attachments A and B. For complete information on the threats of AIS and aids to their identification, please visit the Department's Invasive Species Program webpage at www.dfg.ca.gov/invasives or call (866) 440-9530.

Many AIS are difficult, if not impossible to see in the environment and can be unknowingly transported to new locations on equipment. Therefore, decontamination is necessary to prevent the spread of AIS between collection locations. Equipment shall be decontaminated between each use in different waterbodies. All equipment, including but not limited to, wading equipment, dive equipment, sampling equipment (e.g., water quality probes, nets, substrate samples, etc.), and watercraft, must be decontaminated using one or more of the protocols listed below. As an alternative to decontaminating on-site, you may wish to have separate equipment for each site and to decontaminate it all at the end of the day. Listed below are three options for equipment decontamination. Use your judgment and field sampling needs to select the method(s) that are appropriate for your equipment and schedule. **Because there are currently no molluscicides registered with the California Department of Pesticide Regulation that have been demonstrated to be effective for these three species, CDFW cannot recommend chemical decontamination.** If you would like training on implementing these protocols please contact the Invasive Species Hotline at (866) 440-9530 or e-mail invasives@wildlife.ca.gov

General field procedures to prevent the spread of AIS:

- If decontamination is not done on site, transport contaminated equipment in sealed plastic bags and keep separate from clean gear.
- When practical, in flowing water begin work upstream and work downstream. This avoids transporting AIS to non-infested upstream areas.
- For locations know to be infested with AIS, use dedicated equipment that is only used in infested waters. Store this equipment separately.

Equipment Decontamination Methods

Option 1: Dry

- Scrub gear with a stiff-bristled brush to remove all organisms. Thoroughly brush small crevices such as boot laces, seams, net corners, etc.
- Allow equipment to thoroughly dry (i.e., until there is complete absence of moisture), preferably in the sun. Keep dry for a minimum of 48 hours to ensure any organisms are desiccated.

Option 2: Hot water soak

- Scrub gear with a stiff-bristled brush to remove all organisms. Thoroughly brush small crevices such as boot laces, seams, net corners, etc.
- Immerse equipment in 140° F or hotter water. If necessary, weigh it down to ensure it remains immersed.
- Soak in 140° F or hotter water for a minimum of five minutes.

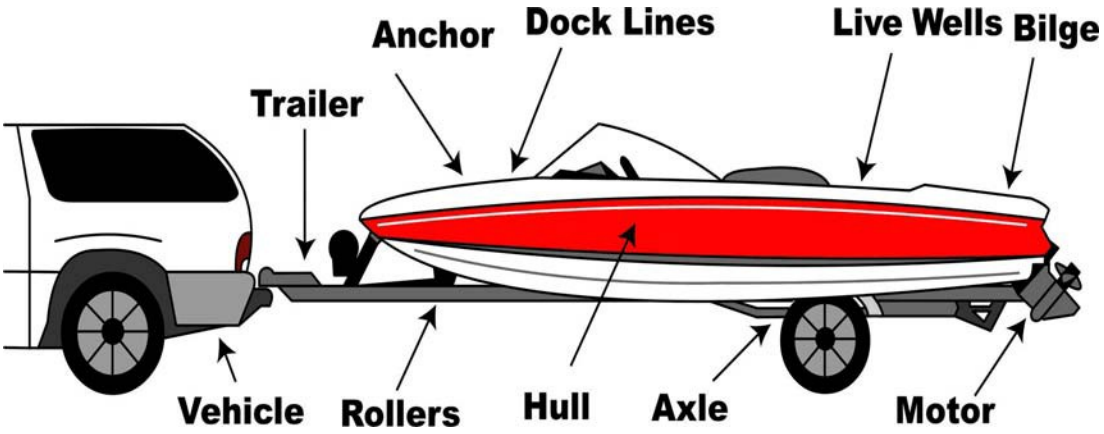
Option 3: Freeze

- Scrub gear with a stiff-bristled brush to remove all organisms. Thoroughly brush small crevices such as boot laces, seams, net corners, etc.
- Place in a freezer 32°F or colder for a minimum of eight hours.

Watercraft Decontamination

- Prior to leaving the launch area, remove all plants and mud from your watercraft, trailer, and equipment. Dispose of all material in the trash.
- Prior to leaving the launch area drain all water from your watercraft and dry all areas, including motor, motor cooling system, live wells, bilges, and lower end unit.
- Upon return to base facilities, pressure wash the watercraft and trailer with 140° F water*, including all of the boat equipment (i.e. ropes, anchors, etc.) that came into contact with the water.
- Flush the engine with 140° F water for at least 10 minutes and run 140° F water through the live wells, bilges, and all other areas that could contain water.

*To ensure 100% mortality the water needs to be 140° F at the point of contact or 155° F at the nozzle.



Reporting Aquatic Invasive Species

If you suspect you have found New Zealand mudsnail, quagga and zebra mussels, or other AIS, please immediately notify the CDFW Invasive Species Program at (866) 440-9530 or e-mail invasives@wildlife.ca.gov. Please provide your contact information, specific location of discovery, and digital photographs of the organisms (if possible).

Attachment A

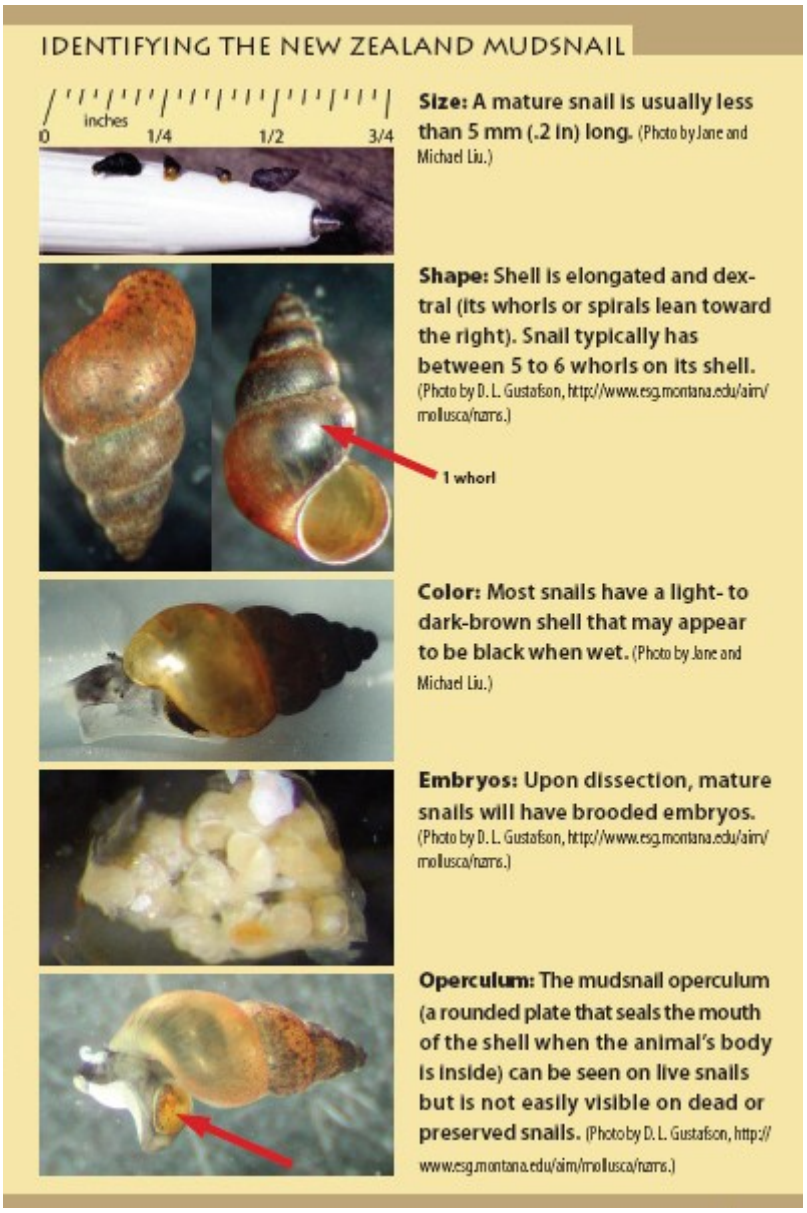
New Zealand Mudsnail

The threat posed by New Zealand mudsnails (NZMS):

- NZMS reproduce asexually therefore it only takes a single NZMS to colonize a new location.
- NZMS are prolific, and a single NZMS can give rise to 40 million snails in one year.
- Densities of over 750,000 NZMS per square meter have been documented.
- NZMS out-compete and replace native invertebrates that are the preferred foods of many fish species and alter the food web of streams and lakes.

Identifying NZMS:

- NZMS average 1/8 inch in length, but young snails may be as small as a grain of sand. Adults bear live young.
- See the photos, below, for assistance identifying NZMS. Expert identification will be necessary to confirm identification.



NZMS Habitat:

- NZMS can live in most aquatic habitats, including silted river bottoms, clear mountain streams, reservoirs, lakes and estuaries.
- NZMS have a temperature tolerance of 32-77° F.
- NZMS can survive out of water for more than 25 days in cool, moist environments, and have been found over 40 feet from water.

Current known locations of NZMS in California can be found at http://nas.er.usgs.gov/taxgroup/mollusks/newzealandmudsnaildistribution.aspx

Attachment B

Quagga and Zebra Mussels

The threat posed by quagga and zebra mussels (Dreissenid mussels):

- Dreissenid mussels multiply quickly and out-compete other species for food and space.
- Their presence can alter food webs and alter environments, negatively affecting native and game fish species.
- Dreissenid mussels attach to hard and soft surfaces, and negatively impact water delivery systems, hydroelectric facilities, agriculture, recreational boating and fishing.
- Adults can survive up to 30 days out of water in cool, humid conditions.
- Produce microscopic larvae that can be unknowingly transported in water, including live-wells, bilges, and motors.

Identifying Dreissenid mussels:

- Typically the same size as a fingernail but can grow up to about 2 inches long.
- Variable, usually dark and light alternating stripes. May also be solid cream, brown, or black.

Dreissenid mussel habitat:

- Variable, including both hard and soft surfaces in freshwater.
- From surface depth to more than 400 feet in depth.

Current known locations of Dreissenid mussels in California can be found http://nas.er.usgs.gov/taxgroup/mollusks/zebramussel/maps/CaliforniaDreissenaMap.jpg

Invasive Species Boat Inspection Report

Please DO NOT remove any species until photographed

Please print clearly

Date:	Time:	Location:	Inspector:
CF #		Owner:	
Last Time in the Water:			
Where: State:	City:		County:
Water Body:			
Conditions Vessel has been in since last removed from water: Check all that apply			
Wet ☐	Moist ☐	Dry ☐	Hot ☐ Cold (Freezing) ☐
Overall Appearance: Polished ☐	Clean ☐	Encrusted ☐	Covered in Weeds ☐
DETAILED INSPECTION:			
☐ INTERIOR COMPARTMENTS: Bilge, Bait & Live Well, Lockers, Anchor, Cushions, Skis & Ropes, PFDs & Toys, Interior Ballast Tanks (ask owner to activate all pumps?) ANY WATER FOUND			
FINDINGS:			
☐ VESSEL EXTERIOR: Hull, Transom, Motor Well, Trim Tabs, Transducers, Recessed Bolts, Cavitation Plates, Pilot tubes, Lights, Water Intake Ports, ALL Through Hull Fittings			
FINDINGS:			
☐ MOTOR: Exterior Housing, Mounting Assembly, Propeller Shaft & Assembly, Lower Unit, Water Intake/Output Ports, and Propulsion System other than Prop. (Jet drive) ASK OWNER TO LOWER MOTOR			
FINDINGS:			
☐ TRAILER: Rollers, Bunks Pads, Trailer Springs, Fenders, Lights, Wiring, Axels, Wheels & Tires, License Plate			
FINDINGS:			
☐ Vessel Thoroughly Drained?			
☐ Plant Fragments?			
ADDITIONAL COMMENTS:			
Is Decontamination Necessary?			

COUNTY OF LAKE
WATER RESOURCES DEPARTMENT
255 North Forbes Street
Lakeport, California 95453
Telephone 707/263-2344
Fax 707/263-1965

David Cowan
Water Resources Director

DECONTAMINATION AGREEMENT

Date: _____

Vessel registration number:_____

This Agreement, made this _____ day of _____, 2019, between _____, et al, hereinafter referred to as "OWNER" and the Lake County Department of Water Resources, hereinafter referred to as the "COUNTY." In consideration of the covenants and conditions hereinafter written, the OWNER agrees to allow the COUNTY access to the above-referenced vessel for the purpose of decontaminating this vessel to eliminate quagga and zebra mussels from the vessel.

COUNTY agrees to use accepted mussel decontamination procedures including application of heated water to kill mussels in all parts of the vessel and the addition of Potassium Chloride solution to waters within any confined spaces within the vessel including any bilges and/or bladders and/or bait or holding wells. Only a COUNTY employee who has been specifically trained for this type of decontamination shall operate the decontamination equipment.

After decontamination, OWNER shall receive a copy of this document as proof of the decontamination service. This decontamination service is voided if the vessel is moved from Lake County. This vessel must be re-screened for mussels if it leaves Lake County and then returns.

In addition, OWNER and COUNTY agree as follows:

INDEMNIFICATION-HOLD HARMLESS AGREEMENT

1. COUNTY agrees to indemnify OWNER against loss or damage caused by any wrongful, negligent act or omission of COUNTY, its agents or employees in the course of their employment as may be provided for in the California Entity Tort Claims Act.

2. COUNTY further indemnifies and holds harmless OWNER from any and all claims, lawsuits, losses and damages, brought for, or on account of, injuries to or death of any person or persons, arising out of, or alleged to arise out of, or resulting from, the decontamination procedure by COUNTY, its agents or employees on the vessel referenced herein, provided, however, that the active negligence of OWNER, its agents or employees is excluded from this indemnity and hold harmless agreement.

This Agreement is part of the Lake County Invasive Species Program and Ordinance No. 2936, an Ordinance Amending Article IX to Chapter 15 of the Lake County Code Establishing a Fee-based Inspection Program for all Water Vessels launched in the County of Lake that protects all Lake County water bodies from infestation by quagga and zebra mussels.

By:_____ _____

Vessel Owner Department of Water Resources