

# Clear Lake Invasive Mussel Preparedness and Resilience Virtual Exercise After Action Report



**June 20–21, 2023**



**Document prepared by:**

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Cover photos: Clear Lake (Adobe Stock image) and metal encrusted with quagga mussels (Lake County).

## Executive Summary

Clear Lake, the largest freshwater lake wholly within the State of California, supports significant ecological, economic, and recreational resources for the region. Lake County currently operates a successful invasive mussel prevention program, including waterbody monitoring, training, watercraft inspection and decontamination, and education and outreach.

Preparing for a detection of invasive mussels requires an understanding of the roles and responsibilities of managing entities as well as an understanding of potential responses for communication, control, and containment of a mussel infestation. The development of a rapid response plan and associated interactive exercise in June 2023 to explore elements of the draft plan are two proactive steps to improve the overall preparedness for Lake County partners. The discussion-based exercise resulted in the identification of various management actions that can both strengthen existing prevention efforts as well as the rapid response plan under development. Multiple suggestions were made by participants to strengthen the preparedness for Clear Lake managers and partners, including:

- a. Increase the robustness of the current Clear Lake Prevention Plan to increase operational capacity.
- b. Create an investment funding pathway to prepare a savings plan to afford a response.
- c. Expand baseline dreissenid sampling locations.
- d. Identify suitable communication pathways for reporting detections of dreissenid mussels for “on-hours” and “after-hours” situations.
- e. Update all regional waterbody manager contact information.
- f. Compile and update a list of self-supplied water purveyors on Clear Lake.
- g. Develop a standard communication to individual water purveyors.
- h. Work in advance to create or strengthen communications for future operations, including law enforcement, regulatory agencies, tribal nations, and Office of Emergency Services.
- i. Compile a resource list of tools across Lake County that may be available for response circumstances.
- j. Develop a monitoring strategy for post detection.
- k. Convene stakeholders to assess pros/cons of various biological and chemical treatments associated with ecosystem and human health risk assessments.

## Introduction

Preparing for a detection of invasive mussels requires an understanding of the roles and responsibilities of managing entities as well as an understanding of potential responses for communication, control, and containment of a mussel infestation. The development of a rapid response plan and associated interactive exercise in June 2023 to explore elements of the draft plan are two proactive steps to improve the overall preparedness for Lake County partners.

On June 20–21, 2023, stakeholders and partners gathered virtually for a rapid response exercise to discuss preparedness dynamics in the event that invasive dreissenid mussels are detected in Clear Lake. This exercise was part of a broader effort to inform and prepare Lake County for a response to dreissenid mussels and includes the completion of a rapid response plan, information sharing via a comprehensive website at [www.clearlakemusselprevention.org](http://www.clearlakemusselprevention.org), the development of an invasive mussel containment strategy, and a watercraft decontamination station suitability study. All components of the project build on Lake County preparedness capabilities and enhance the ability to respond swiftly and successfully to the presence of dreissenid mussels.

The exercise was entirely virtual. Throughout the exercise participants were encouraged to provide feedback on specific information and provide input into the rapid response plan content. Virtual participation was enhanced with the use of Mentimeter software, which created opportunities for consistent feedback by participants throughout the exercise.



*Figure 1. County staff applying mussel sticker to watercraft. Credit: Lake County.*



## Exercise Goal and Objectives

**Goal:** Conduct a discussion-based exercise that will allow contributors to examine jurisdictions, roles and responsibilities, capabilities, triggers, notifications, resources, and possible actions to a realistic scenario of dreissenid mussel discovery in Clear Lake, California.

**Core Capabilities:** An exploration of the skills, equipment, resources, authorities, and accessibility of local capabilities under the scenario. Various areas will focus on use and execution of whole community interactions during the exercise.

- Evaluation: Identification of methods to determine if capabilities have been met.

### Prevention and Planning

Objective 1: Successfully convene Lake County partners to examine and refine a dreissenid mussel response process in 2023.

- Evaluation: Execute exercise. All contributors complete post-evaluation survey that identifies strengths and challenges, and informs the *Lake County Integrated Preparedness and Resilience Plan for Dreissenid Mussel Management* actions.

### Communication and Public Information

Objective 1: Effectively engage media to foster increased awareness of preparedness.

- Evaluation: Press engagement results in adequate coverage that raises awareness of the need for dreissenid mussel preparedness.

Objective 2: Raise awareness of the potential for an introduction of invasive mussels in Clear Lake, their potential effects on community and natural resources, and likely responses to a potential introduction (e.g., water treatment, mandatory watercraft inspections, etc.).

- Evaluation: Local community members have increased awareness about the potential for an introduction of invasive mussels and their likely effects.

### Operational Coordination

Objective 1: Harmonize roles and responsibilities of major contributing entities for effective response.

- Evaluation: Solutions are suggested to build capacity; Agreement is determined, MOU created between entities, unresolved issues are documented for follow-up.

### Interdiction and Disruption

Objective 1: Confirm and refine effective methods, tools, and prioritization techniques to prevent the spread of dreissenid mussels in Lake County.

- Evaluation: A suite of solutions is suggested to address response possibilities that influence long-term containment.

## Exercise Invitees and Participation

Numerous entities were invited to participate in the 2-day exercise including:

- Big Valley Band of Pomo Indians
- City of Clear Lake
- City of Lakeport
- California Department of Fish and Wildlife
- California Rural Water
- California State Parks
- California Waterboard East Bay Regional Parks
- Elem Indian Colony
- Habematolel Pomo Upper Lake
- Lake County Water Resources
- Lake County RCDS
- Lake County CSA
- Robinson Rancheria Water
- Solano Irrigation District
- Sonoma County Water Agency
- US Army Corps of Engineers
- Yolo County Flood Control and Water Conservation District

A complete list of the individuals that attended the exercise and their contact email can be found in Appendix A.



Figure 2. Clear Lake boaters. Credit: Lake County.

## Suggestions for Dreissenid Preparedness

Throughout the 2-day exercise, many ideas were captured that directly address the exercise objectives (see page 4), including the following:

### **Prevention and Planning**

- Enhance the robustness of the current Clear Lake Prevention Plan to increase operational capacity. All entities that own or manage a reservoir where recreational, boating, or fishing activities are permitted must implement a dreissenid mussel prevention program as per California Code of Regulations, Title 14 Section 672.1. Additional strategies could be included in a revised prevention plan (i.e., enhanced watercraft decontamination operations).
- Create an investment funding pathway to prepare a savings plan to afford a response. Funding a response will require significant funding beyond normal operations. One strategy may be to save funding for future use. An exploration of what techniques might be available and by whom could be examined.
- Expand baseline monitoring sampling locations.

### **Communication and Public Information**

- Identify suitable communication pathways for reporting detections of dreissenid mussels for “on-hours” and “after-hours” situations. Currently a majority of Lake County, or California Department of Fish and Wildlife, staff are available Monday through Friday, 8 am–5 pm. Identification of after-hours communication pathways could enhance response time.
- Update all regional waterbody manager contact information. Maintaining accurate information for nearby waterbodies within Lake County would help expedite information sharing at critical times.
- Compile and update a list of self-supplied water purveyors on Clear Lake. There are an unknown number of individual self-supplied water purveyors on Clear Lake that would benefit from specific information about the impacts of invasive mussels on water delivery. Further, updated purveyor information would be essential in a response situation.
- Develop a standard communication to individual water purveyors. Information could be shared from a prevention and containment perspective with these entities.

### **Operational Coordination**

- Create or strengthen communications for future operations. The community of involvement with a response is broad and includes multiple entities.
- Conduct outreach to local law enforcement and agencies.
- Engage partners and regulatory agencies for a response.
- Conduct outreach to tribal nations.
- Articulate how the Office of Emergency Services would be involved if an infestation would occur.

## Interdiction and Disruption

- Compile a resource list of tools across Lake County that may be available for response circumstances (i.e., additional sampling equipment, additional decontamination units). Understanding what additional resources could be accessed in a response situation would be valuable for streamlining response operations.
- Develop a monitoring strategy for post detection. Confirming the detection of invasive mussels will require expanded monitoring. Considering the possible needs, methods, and resources in advance would help guide potential actions during a response.
- Convene stakeholders to assess pros and cons of various biological and chemical treatments associated with ecosystem and human health risk assessments.



Figure 3. Lake County staff monitoring Clear Lake. Credit: Lake County.



## Exploration of Scenarios and Response

Describing different scenarios for a potential detection of an invasive mussel gave participants an opportunity to contribute knowledge and perspectives as well as brainstorm strategies that may be applicable to response steps. The primary steps of a rapid response following a detection often follow these sometimes step-wise and overlapping phases:

- Confirmation
- Notification
- Delineation
- Communication to various entities
- Potential Delegation of Emergency
- Appropriate and feasible response actions.

Participants discussed the responses and resources required under different scenario conditions involving a Lake County employee, CDFW staff, and different members of the public. All situations will require confirmation and subsequent notification to a CDFW regional biologist before proceeding with any response steps.

### SCENARIO A: Observation of adult invasive mussel (attached or not – 2 different scenarios) at Lakeport launch site by a county employee trained to conduct boat inspections.

#### Response Steps:

- **Confirmation:** Lake County staff, Mussel Dogs, and regional CDFW scientists confirm immediately and take a photo.
- **Notification:** The CDFW Regional Biologist is notified immediately, and the photo and details of the observation are shared.
- **Delineation:** The area is surveyed for adults; boats are inspected using boat ramp monitors and mussel dogs as soon as possible, and ramps and parking lots are checked. Additional funds would need to be available to support expanded use of mussel dogs and increases in staff effort. Other resources needed included boats for samples, and potentially a verbal quarantine band issued by CDFW.
- **Internal Communication:** The initial detection is communicated internally with CDFW wardens, city staff, and ramp monitors asap.
- **External Communication:** Within a few days, all residents and visitors to Lake County are aware of the detection, a press release is issued, and Lakeport is “controlled” for accidental information leaks.
- **Designate Emergency:** An emergency would not be designated until invasive mussels were confirmed through collaboration with CDFW.
- **Response:** A monitoring protocol would be developed using focused resources.
- **Additional thoughts:** “Normal on-hour pathway” and “off-hour pathway” for communication should be described in plan.

## SCENARIO B: Observation of an adult invasive mussel on mid-lake settling plate by CDFW employee.

### Response Steps:

- **Confirmation:** CDFW confirms the existence of an adult mussel on a settling plate as soon as possible.
- **Notification:** CDFW notifies Lake County staff of the detection.
- **Delineation:** There is an “all hands-on deck” response by Lake County asap. The plate is scraped for larvae and all other plates are examined. Docks, buoy lines, and all other infrastructure are inspected. Photos are taken of the adult mussel, veliger tows occur in the area of the infested settling plates, and extensive monitoring is conducted in zones.
- **Internal Communication:** The initial detection is communicated internally with County staff, and marinas and water purveyors are notified and engaged to serve as volunteers to assist.
- **External Communication:** As soon as possible, County staff are notified, and the County Board is informed of the discovery. Monitoring efforts are expanded, a potential outreach campaign is launched, and other water body managers in the region are notified.
- **Designate Emergency:** An emergency would not be designated until invasive mussels were confirmed through collaboration with CDFW.
- **Additional thoughts:**
  - An emergency would only be declared if veligers were discovered, and if additional adults were found and likely would be found on property owners’ infrastructure.
  - Update all regional water body contacts and include in latest version of the plan.
  - Take inventory of what everyone has in terms of resources and equipment).

## SCENARIO C: Observation by a local resident of an adult mussel on a boat at a Lakeport gas station.

### Response Steps:

- **Confirmation:** The resident calls the County, City, Sheriff, or CDFW; take picture of license of vehicle and trailer, CF#.
- **Notification:** CDFW is notified and quarantines the vessel.
- **External Communication:** Signs are erected at boat ramps and gas stations on who to call; ads at gas station electronic kiosks (\$\$\$\$); billboards.
- **Designate Emergency:** An emergency would not be designated until invasive mussels were confirmed through collaboration with CDFW.

## SCENARIO D: Observation by a fishing tournament participant of a boat with adult mussels attached in the water (during the tournament).

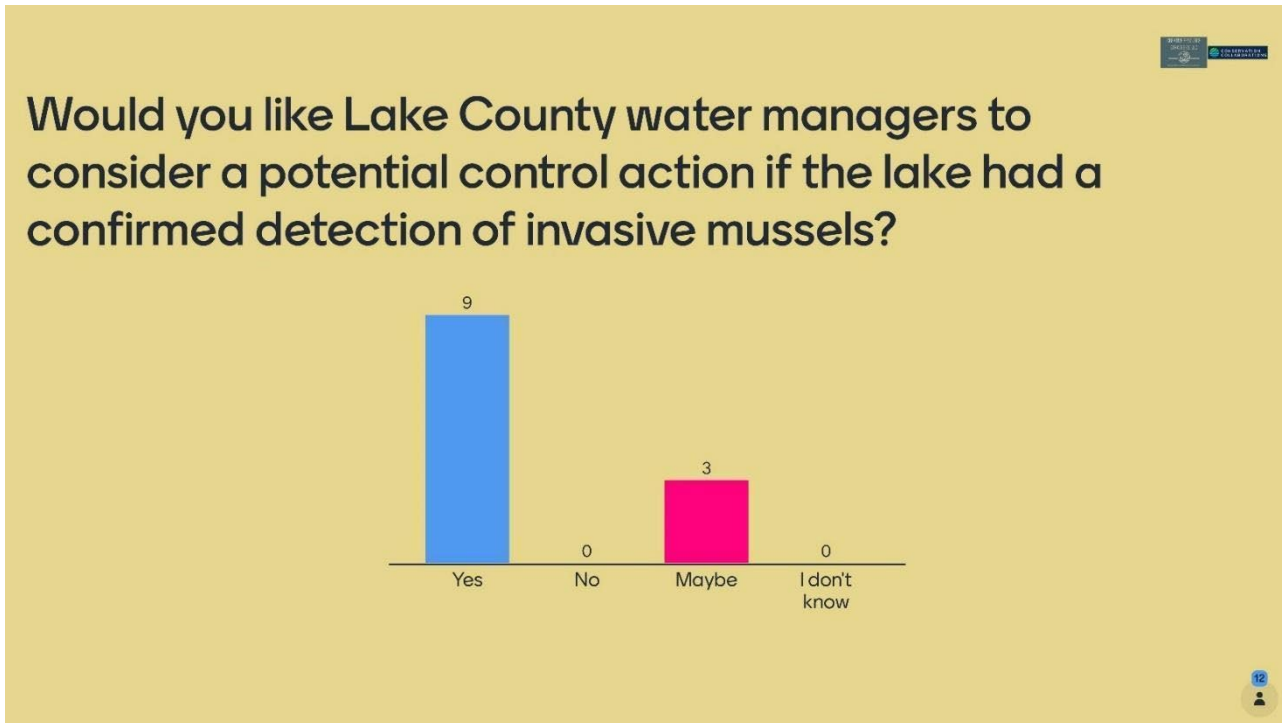
### Response Steps:

- **Confirmation:** Fishing tournament participant notifies CDFW immediately.
- **Notification:** The CDFW Regional Biologist is notified immediately, and the photo and details of the observation are shared.
- **Additional thoughts:**
  - Is liability for tournament directors built into local ordinances? Liability lies with the individual who purchased the sticker. Tournament directors and participants are liable.
  - Fishing tournament participants must launch at designated boat ramps – CDFW will issue a violation letter if these protocols are violated.

## Engagement by Participants

The exercise was designed to share information on all aspects of rapid response and gain feedback. Below is a sample of the type of questions posed to participants. The slide deck of all information and questions/answers can be accessed in Appendix C.

Potential options for invasive mussel control includes a suite of ecological, cultural, economic, and legal considerations. The question below allowed participants to share feedback that can play a valuable role in future decision making and information gathering.



## Appendices

Appendix A. Exercise attendees

Appendix B. Exercise agenda

Appendix C. Exercise slide deck

Appendix D. Mentimeter survey results from the June 20-21, 2023 Clear Lake virtual exercise

Appendix E. Post-exercise survey results



## Appendix A. Exercise Attendees

<b>Affiliation</b>	<b>Attendee</b>	<b>Email address</b>
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Solano County Water Agency	Alexandra Fox	<a href="mailto:afox@scwa2.com">afox@scwa2.com</a>
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State Water Resources Control Board	Allyson Bricker	<a href="mailto:info5@waterboards.ca.gov">info5@waterboards.ca.gov</a>
Sonoma Water	Hailey Norman	<a href="mailto:hailey.norman@scwa.ca.gov">hailey.norman@scwa.ca.gov</a>
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Harbor View Mutual Water Company	Jeremiah Fossa	<a href="mailto:jeremiahfossa@yahoo.com">jeremiahfossa@yahoo.com</a>
Division of Boating and Waterways	Michael Rodriguez	<a href="mailto:Michael.rodriguez@parks.ca.gov">Michael.rodriguez@parks.ca.gov</a>

# Clear Lake

## Invasive Mussel Preparedness and Resilience Plan

Lake County, California - June 20-21, 2023 **VIRTUAL**

**Please join my meeting from your computer, tablet or smartphone.**

<https://meet.goto.com/createstrat/clearlakeinvasivemusselpreparedness>

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**Goal:** Conduct a discussion-based event that will allow contributors to examine jurisdictions, roles and responsibilities, capabilities, triggers, notifications, resources, and possible actions to a realistic scenario of dreissenid mussel discovery in Clear Lake, California.

**Core Capabilities:** An exploration of the skills, equipment, resources, authorities, and accessibility of local capabilities under the scenario. Various areas will focus on use and execution of whole community interactions during the exercise. **Evaluation:** Identification of methods to determine if capabilities have been met.

- **Prevention and Planning**
  - **Objective 1:** Successfully convene Lake County partners to examine and refine a dreissenid mussel response process in 2023.
    - **Evaluation:** Execute exercise. All contributors complete a post-evaluation survey that identifies strengths and challenges, and informs the *Lake County Integrated Preparedness and Resilience Plan for Dreissenid Mussel Management* actions.
- **Communication and Public Information**
  - **Objective 1:** Effectively engage media to foster increased awareness of preparedness.
    - **Evaluation:** Press engagement results in adequate coverage that raises awareness of the need for dreissenid mussel preparedness.
  - **Objective 2:** Raise awareness of the potential for an introduction of invasive mussels in Clear Lake, their potential effects on community and natural resources, and likely responses to a potential introduction (e.g., water treatment, mandatory watercraft inspections, etc.).
    - **Evaluation:** Local community members have increased awareness about the potential for an introduction of invasive mussels and their likely effects.
- **Operational Coordination**
  - **Objective 1:** Harmonize roles and responsibilities of major contributing entities for effective response.
    - **Evaluation:** Solutions are suggested to build capacity; Agreement is determined, MOU created between entities, unresolved issues are documented for follow-up.
- **Interdiction and Disruption**

- Objective 1: Confirm and refine effective methods, tools, and prioritization techniques to prevent the spread of dreissenid mussels in Lake County.
  - Evaluation: A suite of solutions is suggested to address response possibilities that influence long-term containment.

**Whole community participation** (entities that should be responsible for response actions actively participate and contribute to control actions and monitoring).

**Agenda**  
**Tuesday, June 20, 2023**  
**9:00am–2:45pm**

Time	Topic
<b>SESSION ONE</b>	
9:00am–9:45am	<b>Welcome – Preparing for an Introduction of Invasive Mussels – Lake County’s Prevention Program</b> <ul style="list-style-type: none"> <li>● Participant Introductions and Expectations</li> <li>● Share the core elements of the Lake County invasive mussel prevention program</li> </ul>
9:45am–10:15am	<u><b>Introduction to Exercise</b></u> <ul style="list-style-type: none"> <li>● Process for development of plan</li> <li>● Review of <i>Lake County Integrated Preparedness and Resilience Plan for Dreissenid Mussel Management Plan</i></li> </ul>
10:15am–10:45am	<u><b>Houston, We Have A Problem . . . – The First Steps Taken When Invasive Mussels are Detected</b></u> <ul style="list-style-type: none"> <li>● Steps needed to confirm detection</li> <li>● Notification of detection</li> <li>● Identification of lead/shared lead entity(ies) and roles</li> <li>● Local declarations of emergency, and potential results</li> </ul>
10:45am-11:00am	<u><b>BREAK</b></u>
11:00am–11:50am	<u><b>The First Step (continued)</b></u> <ul style="list-style-type: none"> <li>● Tools and mechanisms for Lake County water body managers to delineate extent of infestation</li> <li>● Identification of approaches, methods, and timing of communication to government officials, businesses, residents, and visitors</li> <li>● Obligations to report – Information sharing</li> </ul>
11:50am-NOON	<u><b>Key Points from This Session to Incorporate into Plan</b></u> An opportunity for session participants to make suggestions on key topics to incorporate into plan based on today’s discussion
NOON-1:00pm	<u><b>LUNCH</b></u>
<b>SESSION TWO</b>	
1:00pm–2:00pm	<u><b>Potential scenarios</b></u> Explore potential scenarios for invasive mussel introduction <ul style="list-style-type: none"> <li>● Scenario A. Detection of adult invasive mussel at Lakeport launch site.</li> <li>● Scenario B. Detection of adult invasive mussel on mid-lake settling plate.</li> <li>● Scenario C. Detection of invasive mussel veliger in mid-lake plankton sample.</li> </ul>

2:00pm–2:30pm	<p><b><u>Response Phase</u></b></p> <ul style="list-style-type: none"> <li>• What triggers activation of the Incident Command System? And then what does that look like for Clear Lake? Share tools available to Lake County</li> <li>• Maximizing skill sets and capabilities in the event of a response</li> </ul>
2:30pm-2:40pm	<p><b><u>Key Points from This Session to Incorporate into Plan</u></b></p> <p>An opportunity for session participants to make suggestions on key topics to incorporate into plan based on today’s discussion</p>
2:45pm	<b><u>ADJOURN</u></b>

**Agenda**

**Wednesday, June 21, 2023**

**9:00am-2:15pm**

Time	Topic
<b>SESSION THREE</b>	
9:00am–10:00am	<p><b><u>Potential Treatment Options for Invasive Mussels</u></b></p> <p>Physical, chemical, and biological treatments for invasive mussels, and the associated permits required to implement the treatments, will be presented and discussed.</p>
10:00am–11:00am	<p><b><u>Transitioning To Containment</u></b></p> <p>Participants will discuss the necessary steps Clear Lake water body management staff and local neighboring water body authorities will take to transition to containment upon establishment of invasive mussels in Clear Lake</p>
11:00am–11:40am	<p><b><u>Containment Impacts to Lake County Prevention</u></b></p> <p>Participants will discuss how long-term containment of Clear Lake influences prevention strategies across Lake County</p>
11:40am–NOON	<p><b><u>Key Points from This Session to Incorporate into Plan</u></b></p> <p>An opportunity for session participants to make suggestions on key topics to incorporate into plan based on today’s discussion</p>
NOON-1pm	<b><u>LUNCH</u></b>
<b>SESSION FOUR</b>	
1:00pm–2:00pm	<p><b><u>Invasive Mussels in Public and Private Water Systems - Statutory Requirements</u></b></p> <ul style="list-style-type: none"> <li>• Treatments and costs associated with strategies to deal with invasive mussels by public water purveyors as well and private residents with septic systems.</li> <li>• Requirements for control plan upon establishment of dreissenids in Clear Lake (California Fish and Game Code Section 2301) <ul style="list-style-type: none"> <li>○ (d) (1) A public or private agency that operates a water supply system shall cooperate with the department to implement measures to avoid infestation by dreissenid mussels and to control or eradicate any infestation that may occur in a water supply system. If dreissenid mussels are detected, the operator of the water supply system, in cooperation with the department, shall prepare and implement a plan to control or eradicate dreissenid mussels within the system. The approved plan shall contain the following minimum elements: <ul style="list-style-type: none"> <li>(A) Methods for delineation of infestation, including both adult mussels and veligers.</li> <li>(B) Methods for control or eradication of adult mussels and decontamination of water containing larval mussels.</li> <li>(C) A systematic monitoring program to determine any changes in conditions.</li> <li>(D) The requirement that the operator of the water supply system permit inspections by the department as well as cooperate with the department to update or revise control or eradication measures in the approved plan to address scientific advances in the methods of controlling or eradicating mussels.</li> </ul> </li> </ul> </li> </ul>
2:00pm–2:10pm	<p><b><u>Key Points from This Session to Incorporate into Plan</u></b></p> <p>An opportunity for session participants to make suggestions on key topics to incorporate into plan based on today’s discussion</p>
2:10pm–2:15pm	<b><u>Summary and Next Steps</u></b>
2:15pm	<b><u>ADJOURN</u></b>





## Exercise Goals

- Become familiar with invasive quagga and zebra mussel issues and their threats to the Clear Lake economy, natural resources, and recreation
- Gain understanding of potential management decision making and roles and responsibilities in the event of an introduction of invasive mussel
- Build knowledge base for preparedness actions
- Understand the financial constraints, challenges, and needs associated with an introduction of invasive mussels



# KEY PROJECT DELIVERABLES AND TIMELINE



## Introductions and Expectations



# Exercise Agenda

**Tuesday June 20<sup>th</sup> 9 am – 2:45 pm**

- Background – Preventing an Introduction
- Response Plan Review
- Steps Taken Upon Detection
- Legal Authorities, Jurisdictional Roles
- Explore Scenarios and Response Options
- Incident Command
- Communication

**Wednesday June 21<sup>st</sup> 9 am – 2:15 pm**

- Exploring Treatment and Control Options
- Transition to Containment
- Impacts from Containment Management
- Public and Private Water Purveyor Responsibilities



## Preparing for an Introduction of Invasive Mussels – Lake County's Prevention Program

Angela de Palma -Dow and Corey Husted, Lake County





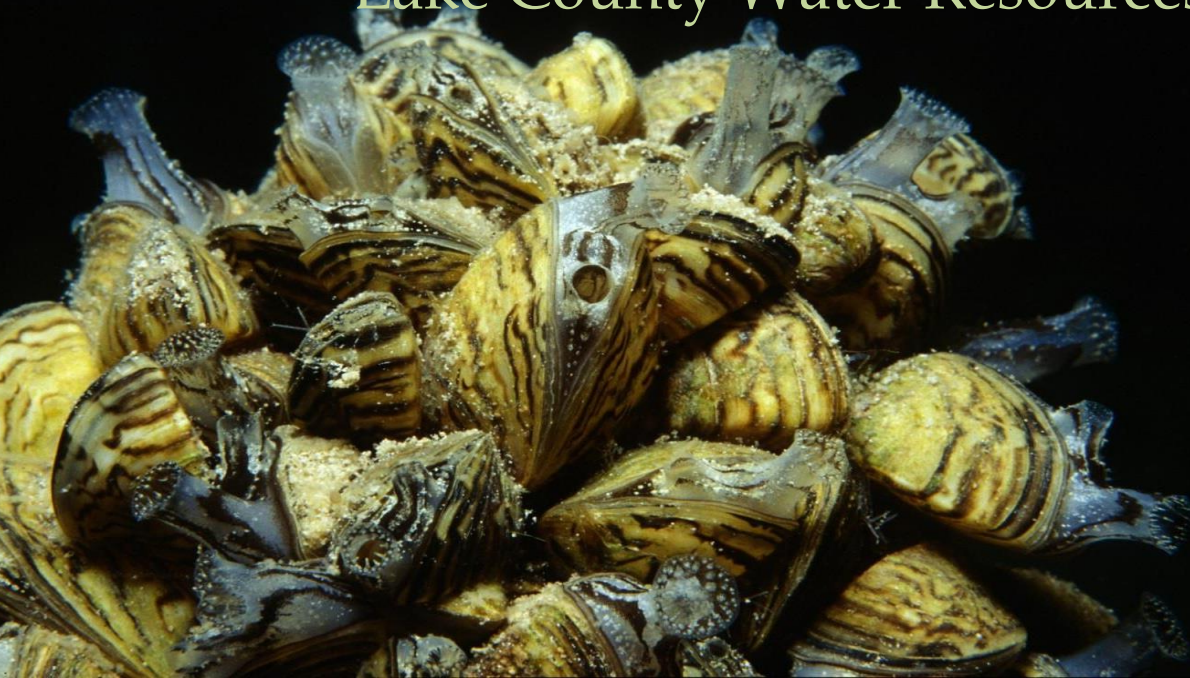
# Lake County Invasive Mussel Prevention Program



Angela De Palma-Dow  
*Invasive Species Program Coordinator*

Corey Husted  
*Water Resources Technician*

Lake County Water Resources Department



@lakecountywater

[www.nomussels.com](http://www.nomussels.com)



# A BIG thank you to our ramp monitors!

*This program only works because they do!*

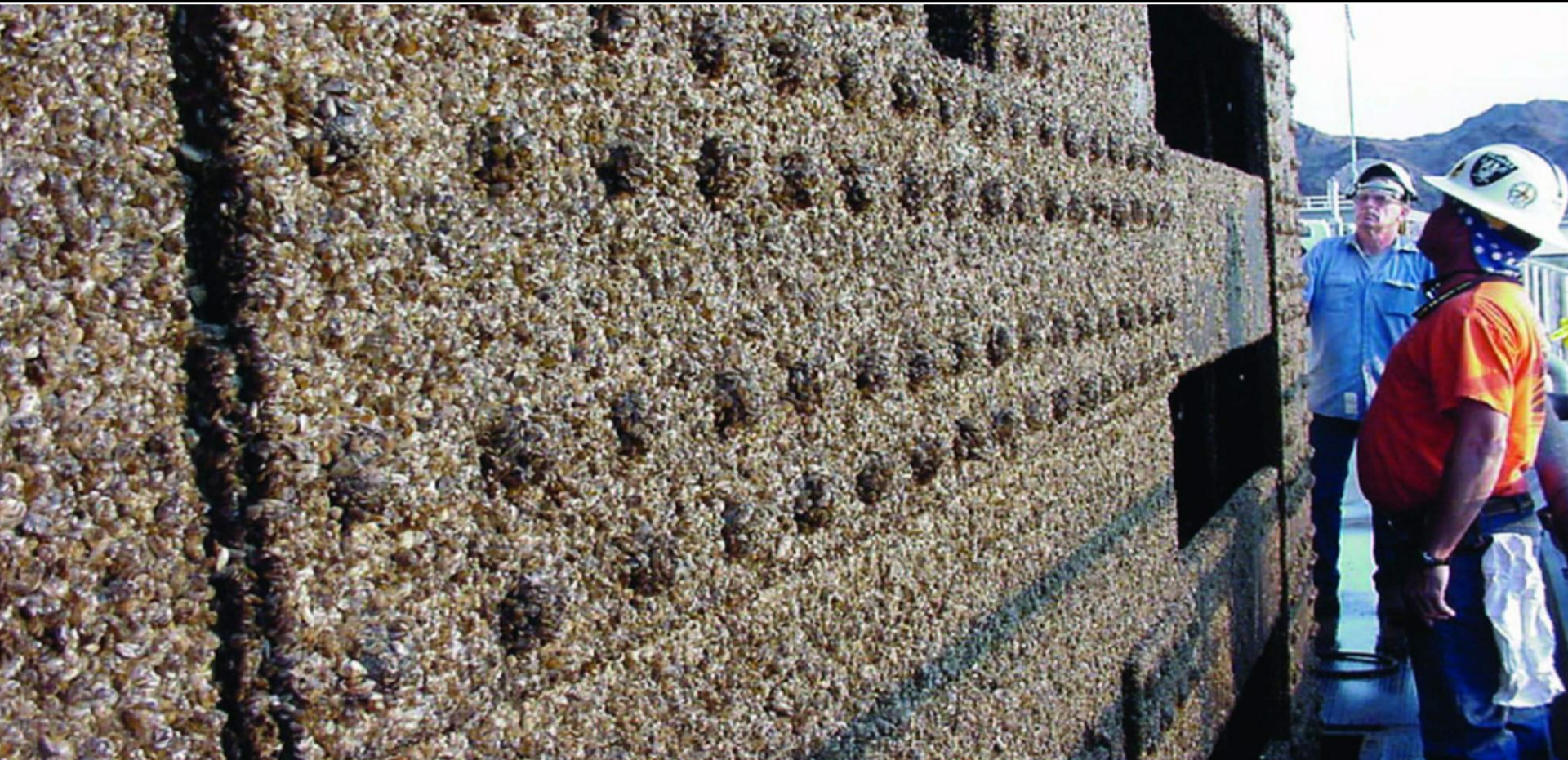


Thank you Ramp Monitors: Bob, Scott, Al, Tony, Larry, Ken, Don, Brenda, Wayne, Jack, Frank, Christian, Linda, Gary, and Robert



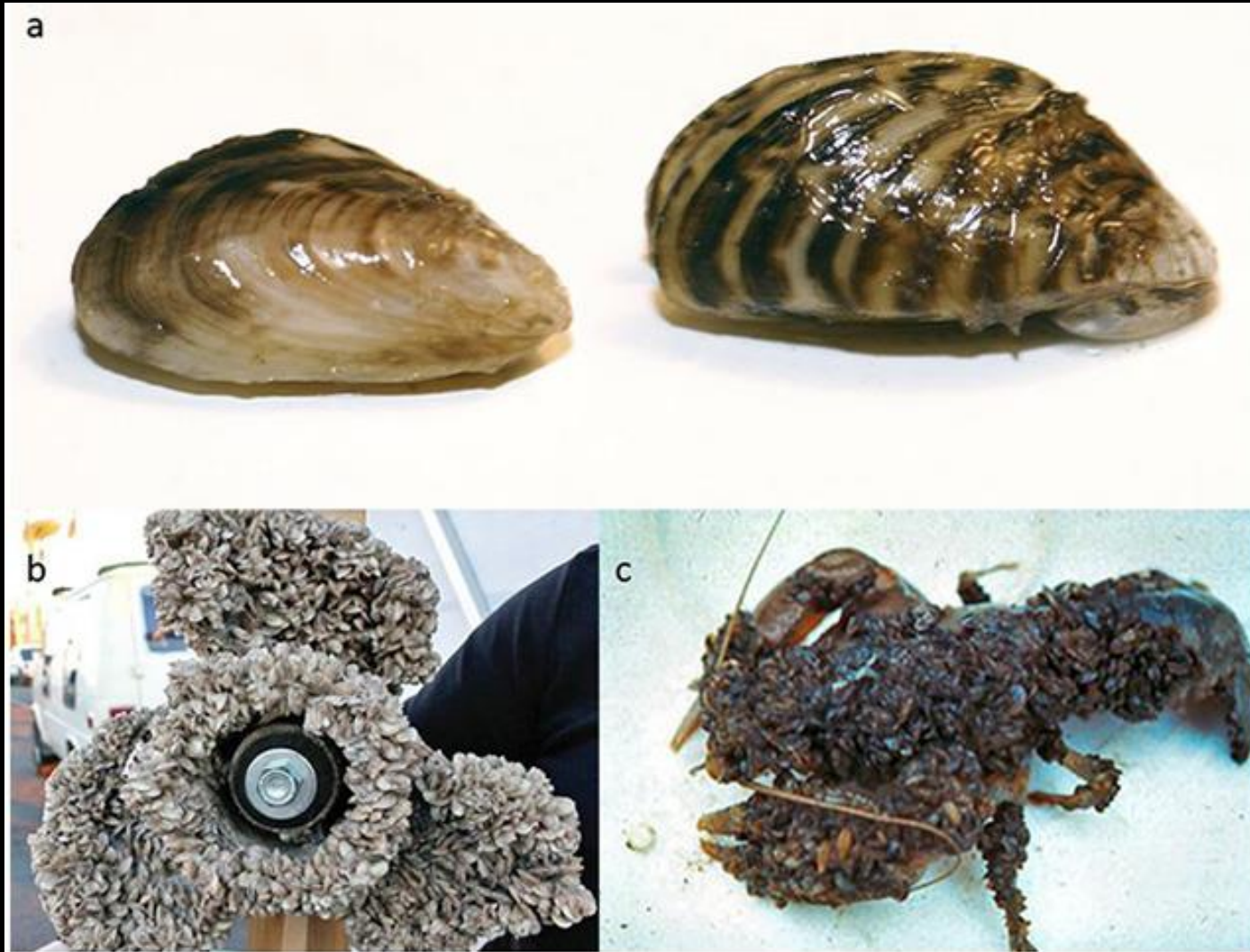
## Definition of an invasive species

...a species that is not native and whose introduction causes, or is likely to cause, economic or environmental harm or harm to human health.



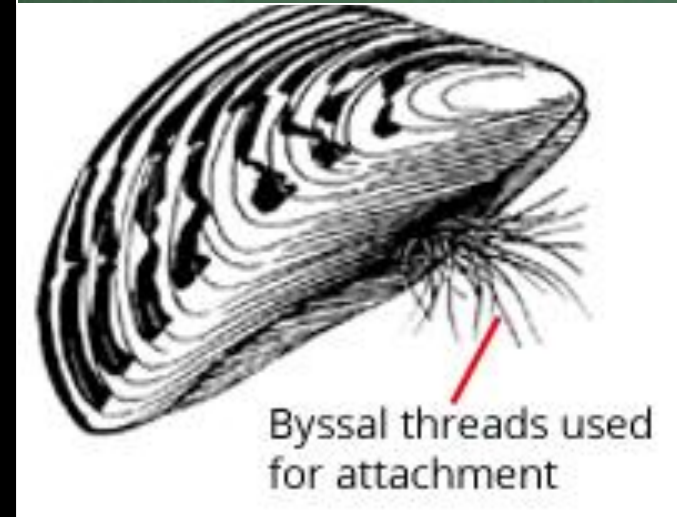


# Quagga & Zebra Mussels



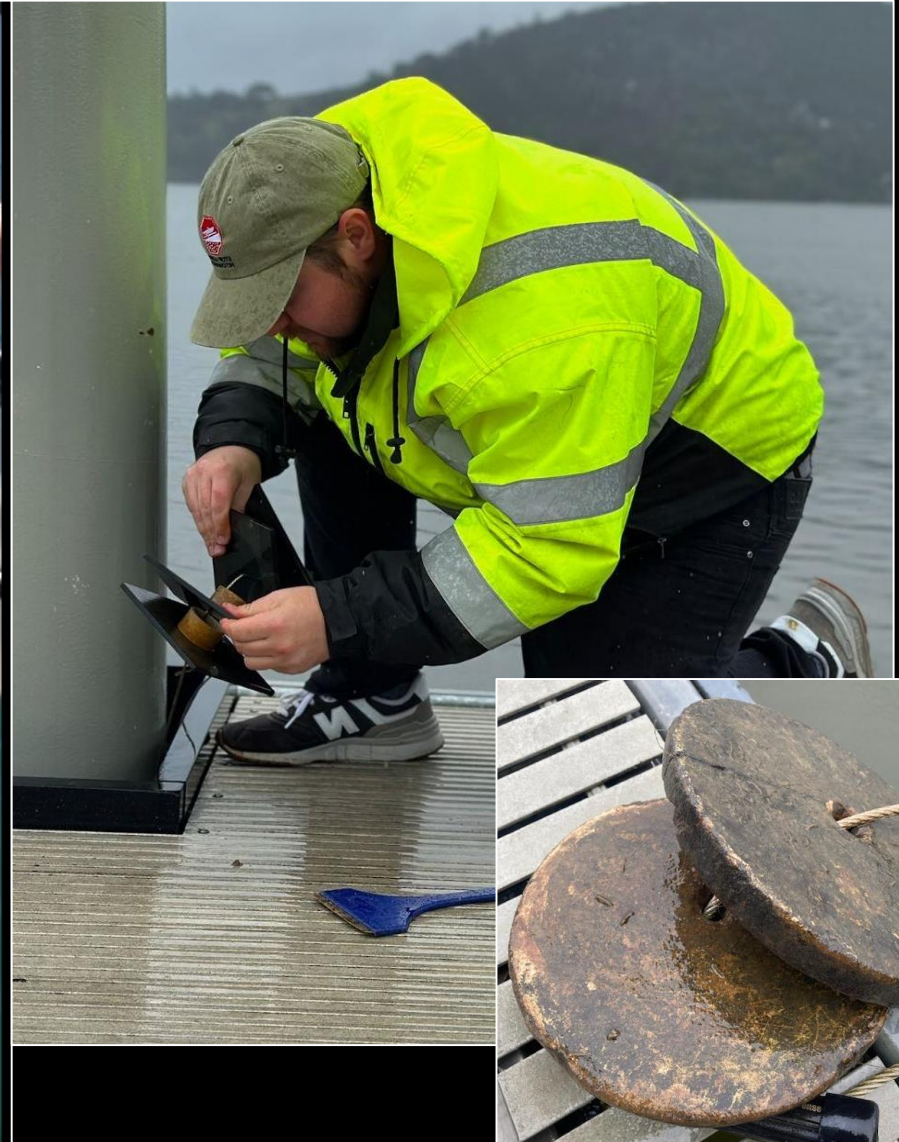
# Biology Basics

- Lifespan 3-5 years
- Low juvenile survival, but high reproductivity
  - Max 6 spawning cycles/yr
  - 30,000 + gametes / cycle
- Juveniles planktonic / free floating
  - Very Small
- Adults attach–byssal threads
- Not a palatable food for N.A. Fish





# Mussel Monitoring For adults and juveniles







**Where do they come from?**



# Where do they come from?





# Where do they come from?

- Shipping → Through Channels, locks, and bays → Ballast Water → Recreational Boating



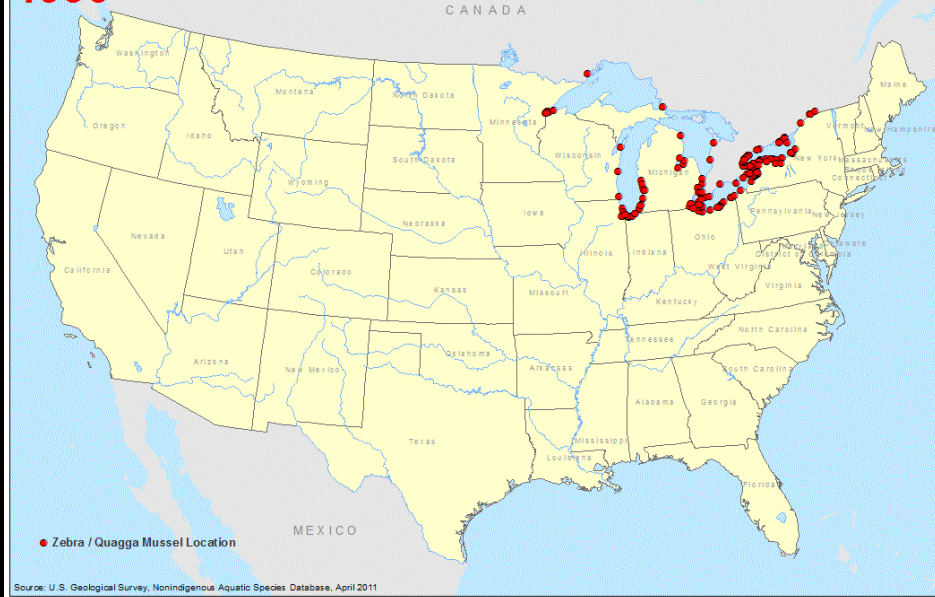


# Great Lakes invaders: Dreissenid mussels

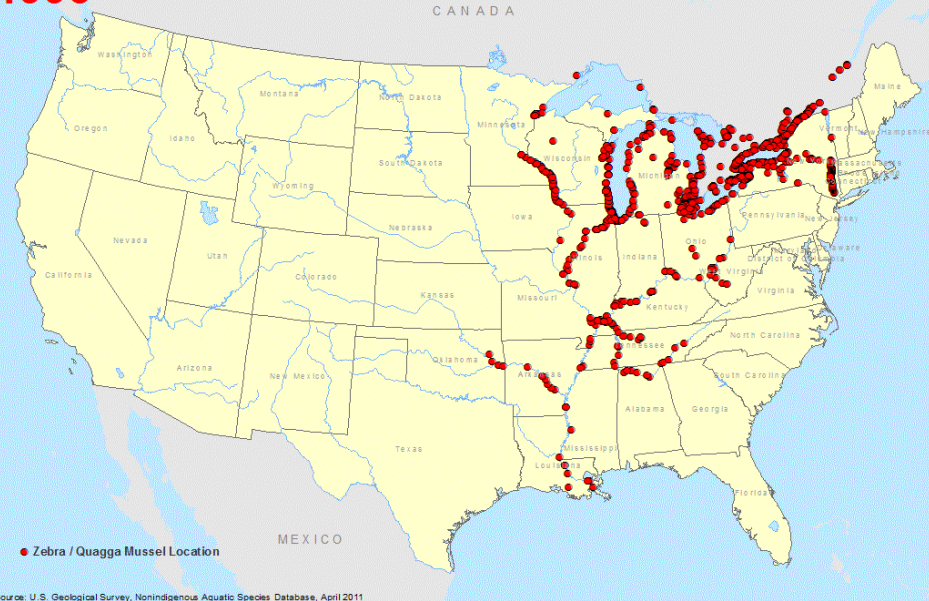
1986



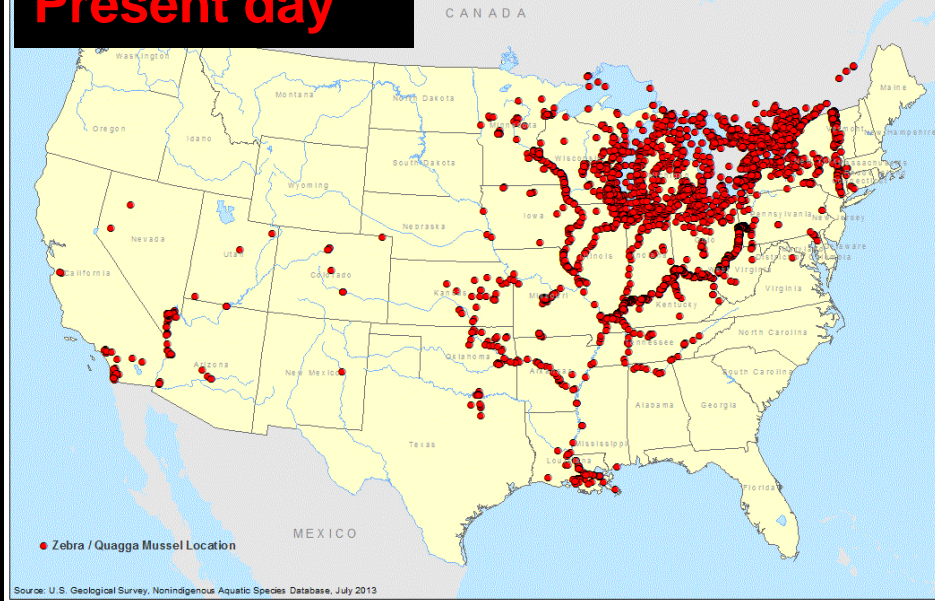
1990



1993



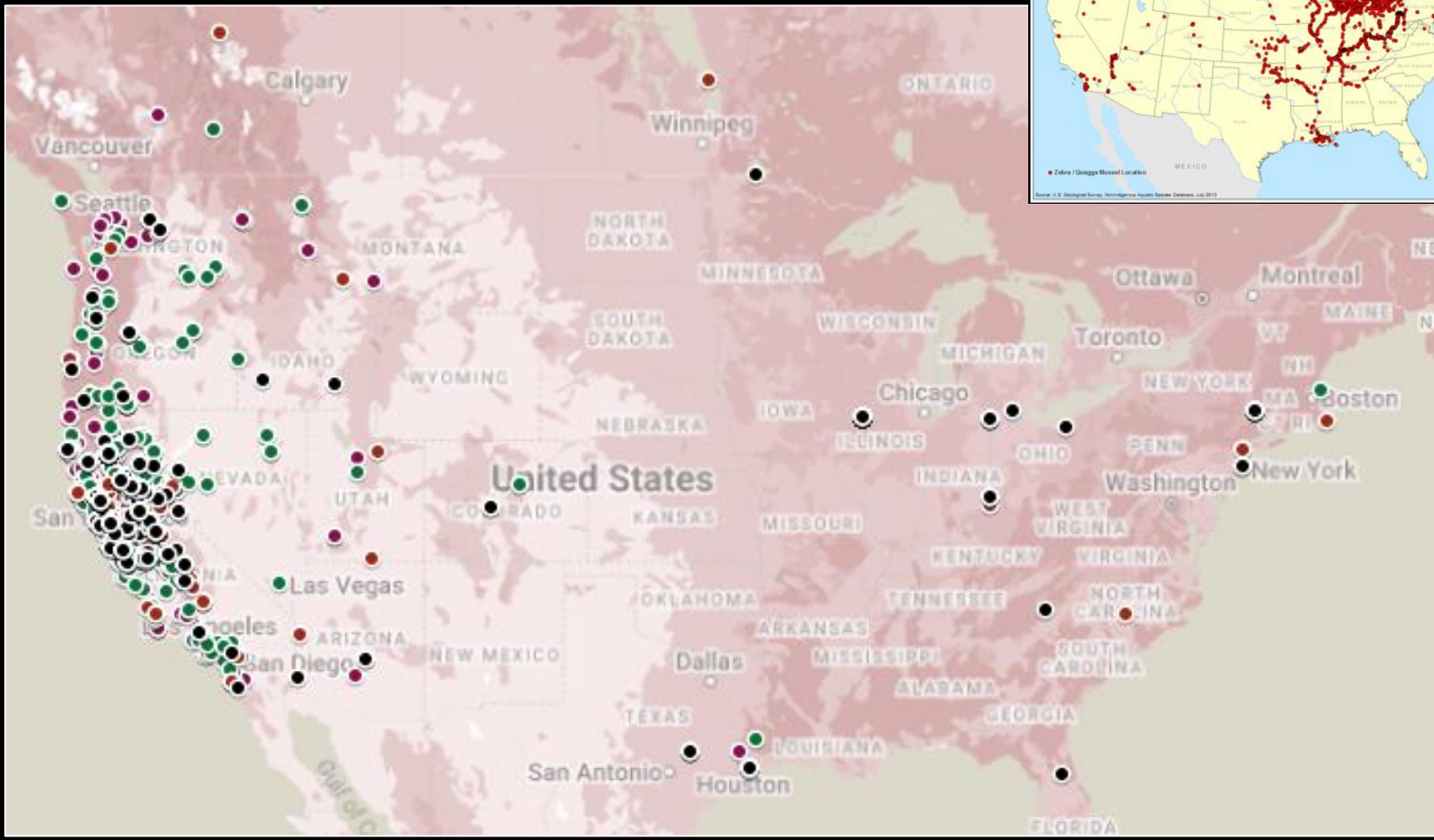
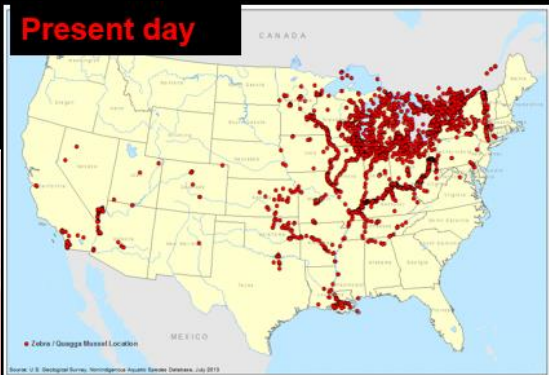
Present day



# 2018-2022

## Boat Visitors to Clear Lake

*Where were they last?*







# Our Prevention Program

# Our Prevention Program Screening & Inspection

- Local Ordinance 2936
- Mandatory screening & sticker program
- All vessels must be clean, drain, dry before launching



LAKE COUNTY  
Watershed Protection District

## Lake County Quagga and Zebra Mussel Prevention Plan



March 2019



**STOP AQUATIC  
HITCHHIKERS!**  
Be A Good Steward. Clean. Drain. Dry.  
[StopAquaticHitchhikers.org](http://StopAquaticHitchhikers.org)





[Cleaning Procedures \(PDF\)](#)[Inspection Process](#)[Mussel Screening Application](#)[Prevention Plans & Reports](#)[Resident Screening](#)[Screening Locations](#)[Visitor Screening](#)[Volunteer](#)

**NEW! Rapid Response Plan Website! Check it out!**

[Home](#) » [Departments](#) » [Water Resources](#) » [Programs & Projects](#) » Invasive Mussel Prevention

## Invasive Mussel Prevention



The Lake County Quagga/Zebra (QZ) Sticker is required, in addition to a State DMV sticker, for all vessels launched in Lake County water bodies. Remember to check in with a participating screener when you return from any out-of-county trips with your boat - it's the law! Program screeners have current information on counties and water bodies in the western United States infested with invasive mussels. Re-screening and inspections, when needed, are free. Resident and Visitor stickers are \$20.

# Multi Step *Prevention* Program



**Screening**

No / Low risk



High Risk

**Inspection**

No / Low risk

Still High Risk

**ATTENTION BOATERS**

The CA DMV sticker does NOT replace the Lake County mussel sticker

STATE      LAKE COUNTY VISITOR      LAKE COUNTY RESIDENT

The Lake County mussel sticker is required on all vessels launched in Lake County

**Decon**

No / Low risk

2019 Inspections	2019 Decons
170	34

## Screening Locations

Several locations offer expanded business hours for boaters who want to launch early in the morning or in the evening hours of operation. In addition, many resort owners and event organizers offer this service to their guests and even check-in. Be sure to check with your resort or organizer to see if they offer this service.

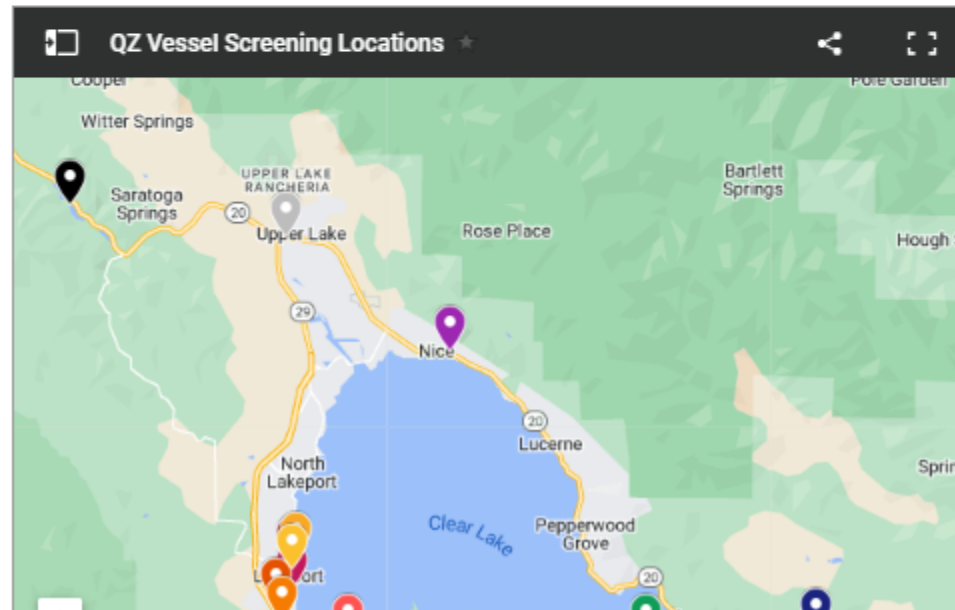
- Download [Screening locations 2023 \(PDF\)](#) for times and phone numbers
- View a [Map of the screening locations](#)

[QZ Vessel Screening Locations - Google My Maps](#)

**Note:** List changes frequently, so check back often.

### Screening

Mobile screeners can meet you at your location. Screening locations are also posted at public launch ramps.



NAME OF LOCATION
Indian Beach Resort
Limit Out Tackle
Clearlake Bait & Tackle
Clear Lake Campground
McAtee's Marine Repair
Hillside Powersports
Clearlake Outdoors
Lake County Chamber of Commerce
Konocti Vista Casino Resort
SkyLark Shores
Lakeport Bait & Tackle
Braitto's Marina
Clearlake State Park
Kelseyville Lumber & Supply
Borenbega
Clear Lake Vista Resort
Lake Builders Supply
Chris Hudgins, SeaDoo Dealer
Narrows Resort
Konocti Bait Shop
Lake Pillsbury Resort
Soda Creek Store
Suzanne L-B
Bob Sullivan Screening/Inspection
Conrad Clobrandt
Mark Holloway
Robert Valdez

PHONE
707-998-3760
707-998-1006
707-994-4399
707-994-2236
707-263-0440
707-263-9000
707-262-5852
707-263-5092
707-262-1900
707-263-6151
707-900-5101
707-279-4868
707-279-4293
707-279-4297
707-530-4541
707-289-4017
707-274-6607
480-516-9239
707-275-2718
707-349-8963
707-743-9935
707-743-2148
707-489-6792
707-337-0480
707-245-9181
707-295-9112
408-691-7726



# Inspections



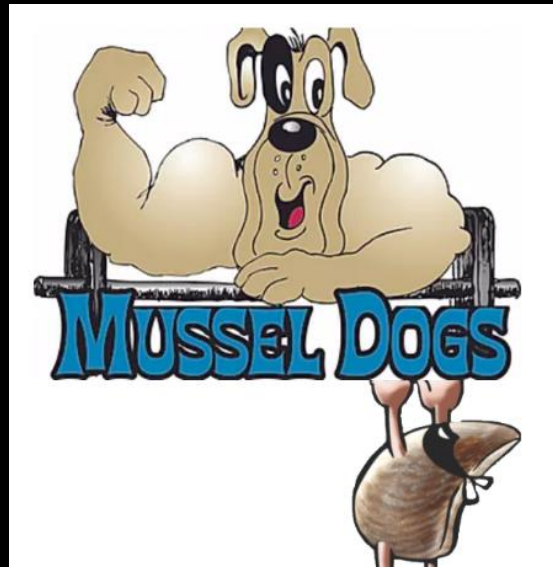








# Boat inspections are faster & fluffier!



Lake County Water Resources Department  
Published by Angela Dow (?) · 18 May at 15:15 · 🌐

Good boy! Thank you Mussel Dogs for helping us protect Clear Lake!





# Decons





# The stickers work



# 400 + Public / Private Boat Ramps

-Open 24 hours day / 365 Days year

\*No Launch Fees





# Clear Lake has preferred habitat for QZ

Year	Temp (°C)	Conductivity (mS/cm)	pH*	D.O. (mg/l)	Total Hardness <sup>1</sup> (mg/L CaCo3)	Total Calcium <sup>1</sup> (mg/L)
2016 May	22.3	0.4	8.7	6.6	173.0	30.0
2016, Nov	16.7	243.0	9.5	3	131.0	23.0
2017, April	14.4	300.0	8.3	1.2	113.0	21.0
2017, July	26.0	263.0	10	7.0	123.0	22.0
2017, Oct	17.4	257.1	9.1	2.9	127.0	23.0
2018, April	16.0	243.3	8.6	1.6	N/A	N/A
2019, June <sup>1</sup>	25.3	269.0	8.4	7.8	116	22
2019, August <sup>1</sup>	25.9	287.2	8.0	8.0	125	23.5
<b>Preferred Range for Q/Z mussels</b>	<b>6-32<sup>2</sup></b>	<b>&gt;22μS/cm<sup>3</sup></b>	<b>6.5-9.5<sup>2</sup></b>	<b>&gt;2-6<sup>2</sup></b>	<b>100-420<sup>2</sup></b>	<b>&gt;12<sup>2</sup></b>



# Impacts to Ecology & Economy



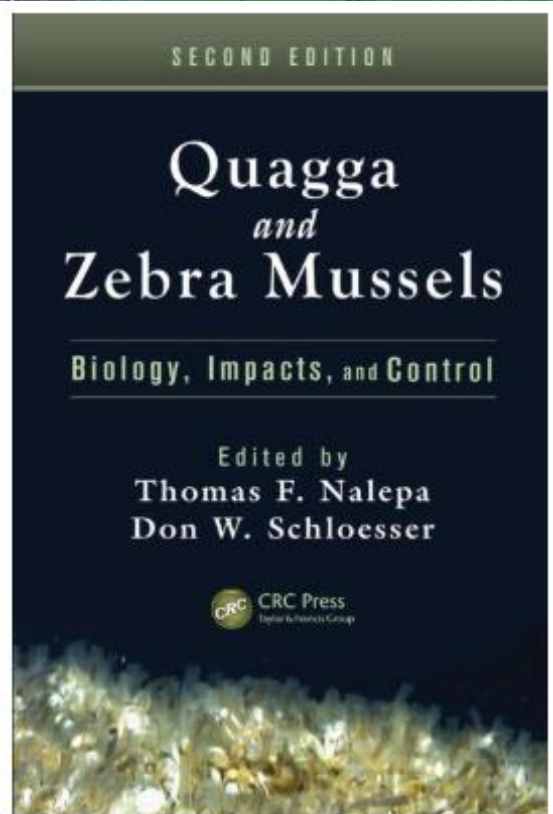
**Food (plankton)  
goes in**

**Dissolved  
nutrients come  
out**

The fishery as a whole is being affected, because the amount of energy available for fish has been reduced. The food source is going to be gone or completely transformed.



# More Mussels = More Cyanobacteria (blue-green algae)



**“We observed that mussels can selectively reject *Microcystis* and simultaneously feed at high rates on high quality algae when available.”**

## CHAPTER 32

### Role of Selective Grazing by Dreissenid Mussels in Promoting Toxic *Microcystis* Blooms and Other Changes in Phytoplankton Composition in the Great Lakes

Henry A. Vanderploeg, Alan E. Wilson, Thomas H. Johengen, Julianne Dyble Bressie, Orlando Sarnelle, James R. Liebig, Sander D. Robinson, and Geoffrey P. Horst



Our economy, the fishing, is dependent on healthy food web, which we have now. For these large fish to have enough to eat to attract fishermen. This is where ECOLOGICAL impacts meets the ECONOMIC impacts for this program.





Lake County relies on > \$1.3 million annual fishing dollars (resident and non-resident)



*(Giusti et al. 2016; Certified Tourism Ambassadors Lake County Program )*

# An QZ introduction

- Significant local economic losses ....
  - Sticker sale losses (5 year period)
    - \$1 M in Public Revenue
    - \$500,000 Private Revenue
      - \$150,000 per year is from visitor sales
  - Grant funding (5 year period)
    - \$1.3 M in County Staff Support
    - \$50,000 in materials / training support
  - Drinking water rates would increase to consumers
    - \$100K - \$500K per year estimated



# Drinking Water Intakes

- Hoover, Davis, and Parker Dams cost over \$6,026,100 in 2016 alone
- Smell, bacteria, decay
- Constant cleaning, treatment, mitigation
- Filters, pipes, treatment
- \$\$\$ Passed down to the consumer
- 17 drinking water systems on Clear Lake
- Can we afford this?

## INVASIVE SPECIES Impacts on FEDERAL INFRASTRUCTURE



Michael Vissichelli · November 2018







**Next Steps to Improve the Program!**

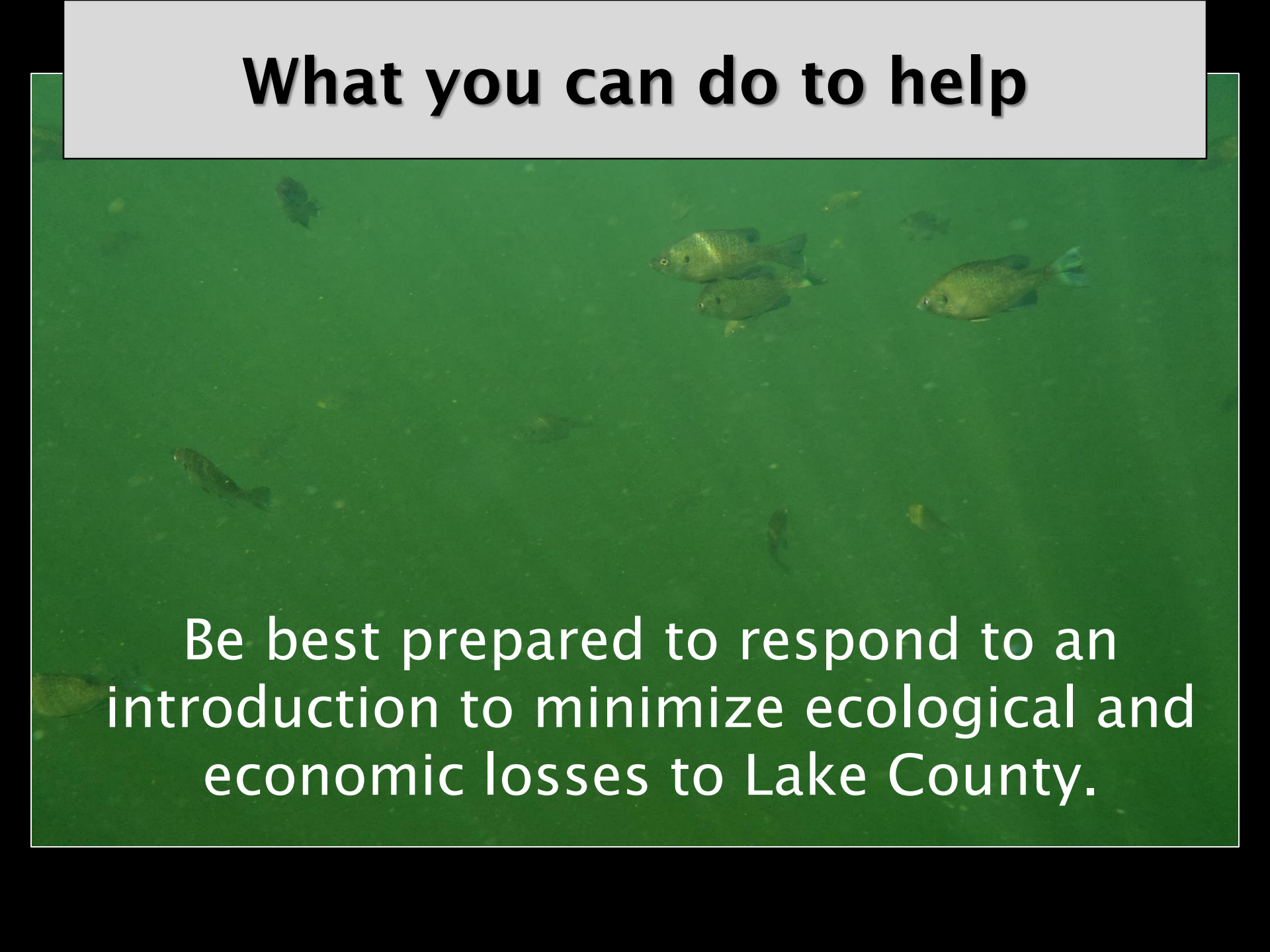
# Next Steps

## Goals

- Go Fully Digital!
  - Now it's "honor system"
  - Connect to Colorado Parks Western States Watercraft Inspection Database (WID)
- Improve Road & Ramp Signage
  - Hwy 5 Billboard being designed
  - Explore other funding
  - Boost Capacity of program
    - More Monitors



# What you can do to help

An underwater photograph showing several fish swimming in clear, greenish water. The fish are of various species, including what appear to be bluegills and other sunfish-like fish. The lighting is bright, creating a clear view of the fish and their movements.

Be best prepared to respond to an introduction to minimize ecological and economic losses to Lake County.



# Thank you! Questions?

*Angela De Palma-Dow*  
*(707)263-2344*

*Angela.Depalma-Dow@lakecountyca.gov*

## [www.nomussels.com](http://www.nomussels.com)

We are  
hiring ramp  
monitors!  
Extra help  
25 hrs / wk



Lake County Water  
Resources  
Department  
[@lakecountywater](https://www.instagram.com/lakecountywater)





# Review of Lake County Integrated Preparedness and Resilience Plan for Dreissenid Mussel Management Plan

Lisa DeBruyckere, Creative Resource Strategies, LLC  
Leah Elwell, Conservation Collaborations, LLC



## Clear Lake Plan Outline

- Background
- Legal Authorities, Current Statutes, Jurisdictional Roles
- Rapid Response Strategy
- Mechanisms of response
- Incident Command
- Communication
- Response Actions
  - Prevention
  - Control
  - Containment
  - Monitoring

- Transition to Containment
- Outreach materials
- Amendments to ordinances
- Transitioning existing prevention staff to containment
- Impacts to water purveyors
- Potential mitigation solutions
- Permanent Decontamination Station Feasibility Analysis
- Long-term Management Recommendations
- Funding





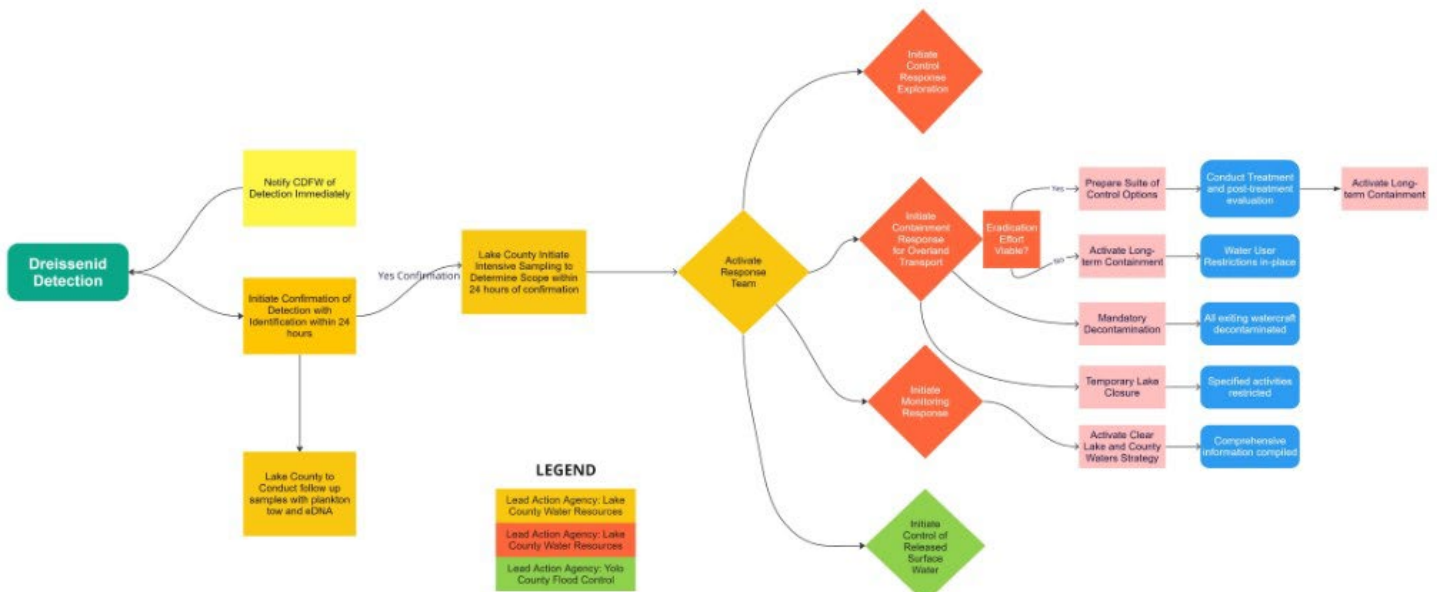
<https://www.clearlakemusselprevention.org/>



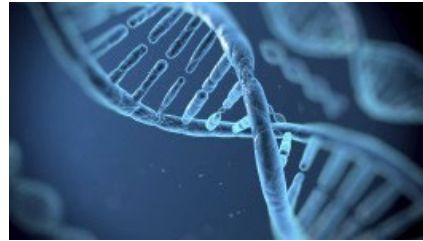
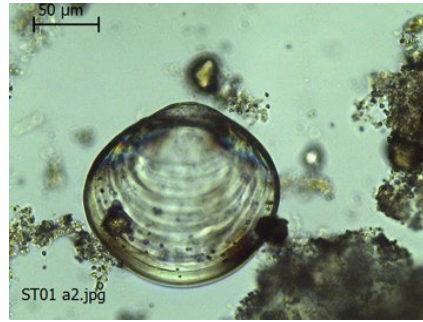


# Immediate Steps

- **Confirm** detection
- **Notification** of detection
- **Identification of lead /shared lead entity(ies) and roles**
- Local **declarations of emergency**
- **Delineate** extent of infestation
- **Communication** internal and external
- Obligations to **report**

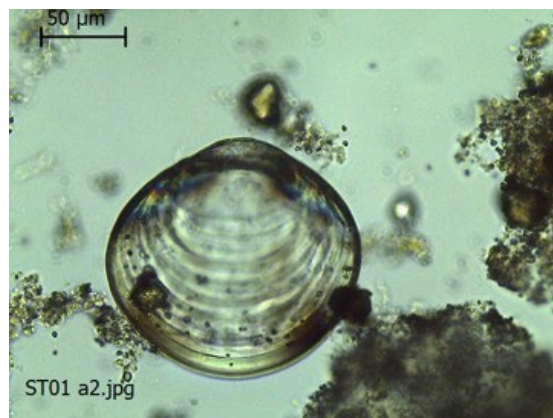


# Confirmation



## Confirmation Confirm the detection

- Minimum criteria for detection of invasive mussels, an adult or juvenile
  - specimen must be verified by two independent experts and confirmed by DNA,
  - veliger must be identified and verified using cross-polarized light microscopy by two independent experts and confirmed by DNA analysis (PCR and gene sequencing).
- After the initial detection, follow-up sampling will occur





# Notification

## Notify key individuals/organizations

- Contact California Department of Fish and Wildlife (CDFW) within 24 hours
- Regardless of the nature of the initial detection, per Fish and Game Code Section 2301 “any entity that discovers dreissenid mussels within the state **shall immediately report** the discovery to the CDFW”.
- The discovery should be reported to the CDFW Region 2 Quagga/Zebra Mussel Scientist (or CDFW wildlife officers if Region 2 Mussel Scientist is not available) and via the CDFW online Quagga Mussel Observation Report Form



Photo: Microsoft Stock



Identification of Lead Agency

# Key authorities - Background

- **Lake County Watershed Protection District**— primary entity responsible for invasive mussel prevention in Lake County.
  - Authorized by U.S. Congress and California State Legislature
  - Administered by Director of Water Resources, who reports to the County Board of Supervisors
  - **Plans, manages, maintains, implements and evaluates all AIS programs**, working with partners
- County of Lake accepted responsibility for the protection of Clear Lake's basin from the State Lands Commission in 1973; this transfer of responsibility resulted in lakebed management and shoreline protection ordinances
- In 2009, Lake County's DWR separated from the Dept. of Public Works, and responsibility for the WPD was transferred to DWR.
- **California delegates responsibility for preventing and managing invasive mussel infestations to local water body managers** (Fish and Game Code Title 14), making local codes and ordinances important in establishing authorities.
- Fish and Game Code Section 2301 – in the event of an invasive mussel introduction to Clear Lake, **the lead entity in the implementation of a RR containment and transition plan and the development of a Control Plan is a public or private agency that operates a water supply system.**

## Fish and Game Code, Section 2301

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

## Fish and Game Code, Section 2302

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

## California Code of Regulations, Title 14 Section 672.1

- **Control Plan** - **Within 60 days of CDFW requesting, or within 60 days of dreissenids being detected, public or private agencies that operate water supply systems must immediately develop a dreissenid mussel control plan and implement measures to prevent further spread.** The plans must include a description of the status of the dreissenid population at the time of plan development, control activities, and monitoring to determine dreissenid population changes. The plan may also include maintenance activities to maintain functionality of the water supply facility.
- **Prevention Program** – **Entities that own or manage a reservoir where recreational, boating, or fishing activities are permitting must implement a dreissenid mussel prevention program that includes a vulnerability assessment for dreissenids, a monitoring program, and management of recreational activities that prevent the introduction of mussels, and to keep them from being moved from the waterbody.**Annual reports re: the prevention program are due annually by March 31.



## Filling the Gaps— Code and Ordinance Recommendations

- Add a definition for “pollutant” and explicitly include a reference to aquatic invasive species (AIS).
- Add a definition of “significant impact” that includes the decision threshold. “Significant impact” is the term used in the “catch-all” permit procedure in Sec. 23-4.
- Consider mentioning AIS in Section 6.4(B) Construction (page 11) – e.g., materials used in construction should be free from AIS, materials should be decontaminated before moving to another site, etc.
- Several sections in ordinances that have the potential to include language associated with containment:
  - Sec. 6.8(D) for relocation of floating structures (page 14). Incorporate language that requires inspection and decontamination before relocation.
  - Sec. 23-8 for Marinas and Harbors (page 15) – The county could encourage/require marinas to offer decontamination facilities or require inspections before boats leave marinas, etc.
  - Section 23.13.4 Removal of improvements (page 20)– The county could require inspection/decontamination upon removal of an improvement if the structure is being moved to another location; or, the county could require proper disposal.
  - Section 12.4 – Littering and pollution (page 18) – Add a provision regarding AIS to reinforce that AIS are pollutants and introduction is prohibited.
  - Section 12.6 for discharge – Explicitly reference AIS and potentially require use of best management practices.

## Filling the Gaps— Code and Ordinance Recommendations

- As a condition of the shoreline encroachment permit, the county could require an annual inspection/monitoring and reporting of results, and then identify some actions that needed to be taken if mussels are detected.
- The county could likely impose an annual inspection of structures as part of routine county inspections; these inspections could incorporate both safety issues as well as AIS.
- The county could state in its ordinances that it is unlawful to launch a boat from any place other than a ramp, private dock, pier, designated beach. This would allow the county to cite or fine people who are launching their boats from any shoreline location and help to ensure that watercraft are inspected prior to launch. There are examples of counties that define “boat launch facilities” as being “a boat ramp, dock, pier or other facility designated by the department for launching boats into the water” (e.g., Island County, Washington, Chapter 9.40). This Washington county states that “It is unlawful for any person to launch or recover a boat in and Island County park except in areas specifically designated and/or marked for that purpose; provided, that this provision does not apply in case of an emergency (9.40.165).” Tempe, Arizona mandates that “all public watercraft must be launched at a designated boat launch facility.”

# Declaration of Emergency

## Why:

- Create Awareness
- Generate possible funding support
- Mobilize activities

## Tools

- Create ready materials (e.g., press releases)

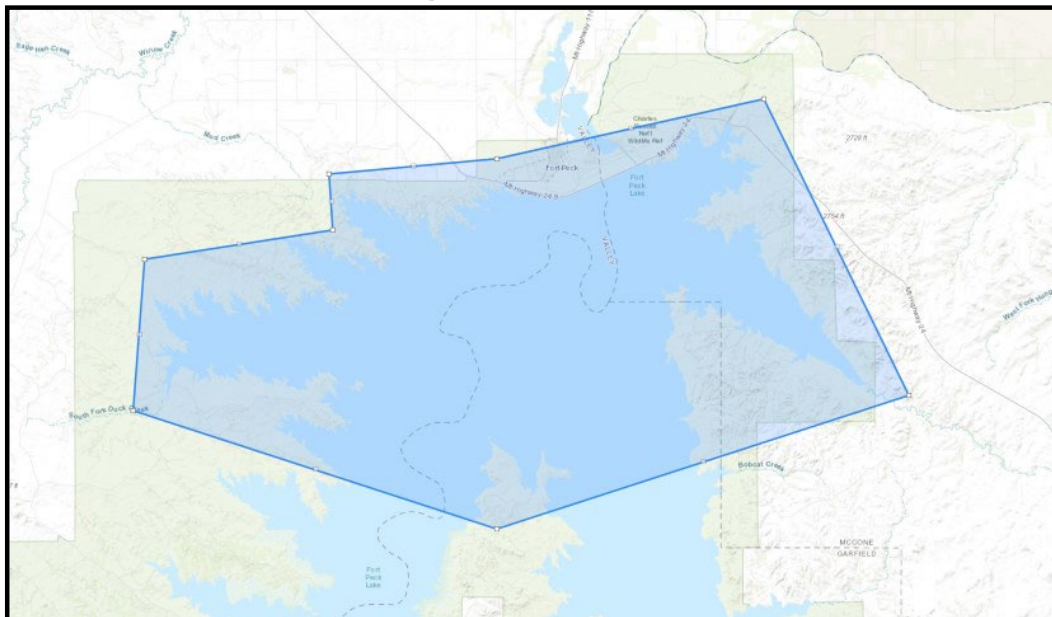
## How

- Per Ordinance 31, Lake County may declare local state of emergency.



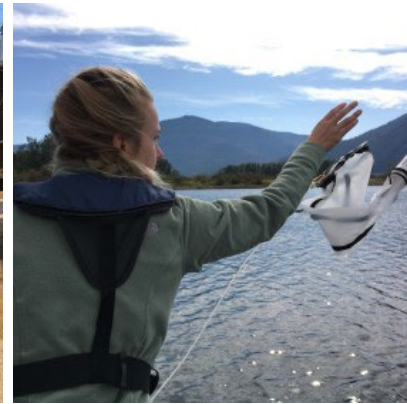
## Delineation

Determine the scope and scale of the infestation



## Delineation

- Suite of tools that may be considered
  - Sniffing dogs
  - Shoreline walking
  - Dive team
  - Exhaustive plankton tow
  - eDNA
- Nearby waterbodies
- Sites downstream of water body



## WATER BODY CLASSIFICATIONS

- **Not Sampled**—Waters that have not been monitored.
- **Undetected/Negative**—Sampling/testing is ongoing and nothing has been detected or nothing has been detected within the time frames for delisting.
- **Inconclusive** (temporary status)—Water body has not met the minimum criteria for detection.
- **Suspect**—Water body that has met the minimum criteria for detection.

### TRIGGER FOR MANAGEMENT ACTION

- **Positive**—A minimum of one subsequent sampling event that meets the minimum criteria for detection. Positive must include the initial detection plus at least one subsequent detection for a total of 2 verified detections.
- **Infested**—A water body that has an established (recruiting or reproducing) population of ANS.



# Internal & External Communications

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

## Report Obligations

**USGS**  
Science for a changing world

**NAS - Nonindigenous Aquatic Species**

Home | Alert System | Database & Queries | Taxa Information | Report a Sighting | Screening Tool (SE2MeIO)

**Mollusks**

 Mollusks (Phylum Mollusca) are found in marine, brackish, and fresh waters. They include a diverse group of animals such as clams, mussels, oysters, scallops, abalone, conchs, shipworms, snails, nudibranchs, chitons, squids, and octopuses. Common methods of introduction include ballast water introductions, aquarium releases, and accidental release from aquaculture facilities. Displacement by competition is the most frequently observed impact on native species. The most notable nonindigenous mussel introduction is the zebra mussel (*Dreissena polymorpha*), a native of eastern Europe.

We welcome any [contributions](#) or [comments](#) you may have.

**Data Queries and Species Lists**

 **Data Queries**  
Species List of Nonindigenous Mollusks  
(links to species profiles and collection information)  
[New Zealand Mollusk Distribution](#)

**Zebra and Quagga Mussel Information**

 [Zebra and Quagga Mussel Home Page](#)



## Scenario A.

Observation of adult invasive mussel at Lakeport launch site by a county employee trained to conduct boat inspections.

# Scenario Exploration

## Scenario B.

Observation of an adult invasive mussel on mid-lake settling plate by CDFW employee.



## Scenario C.

Observation by a local resident of an adult mussel on a boat at a Lakeport gas station.





## Scenario D.

Observation by a fishing tournament participant of a boat with adult mussels attached in the water (during the tournament).



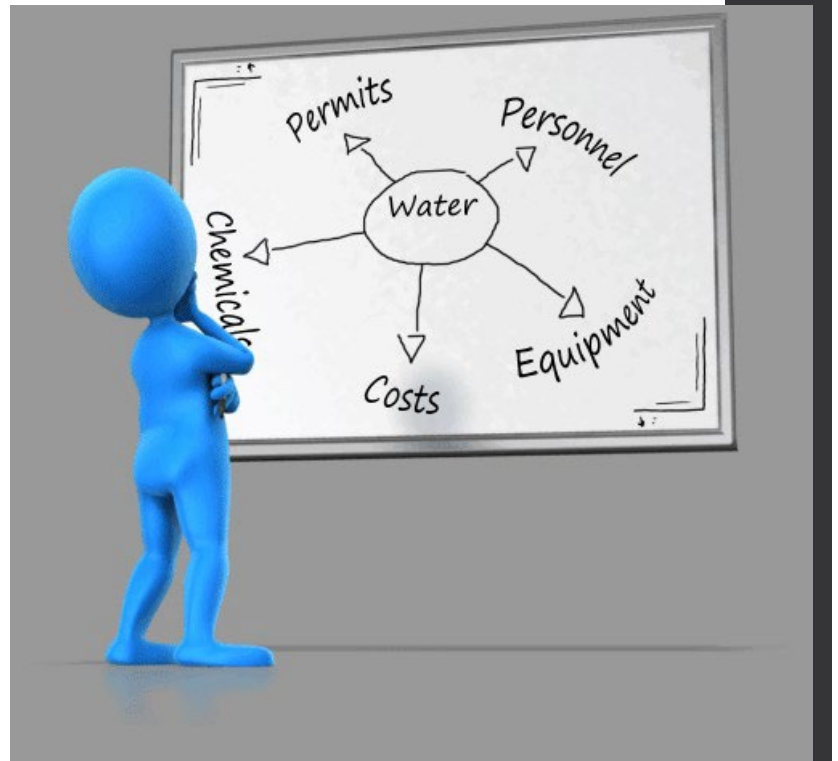
## Scenario E.

Observation of invasive mussels in water system of local resident.



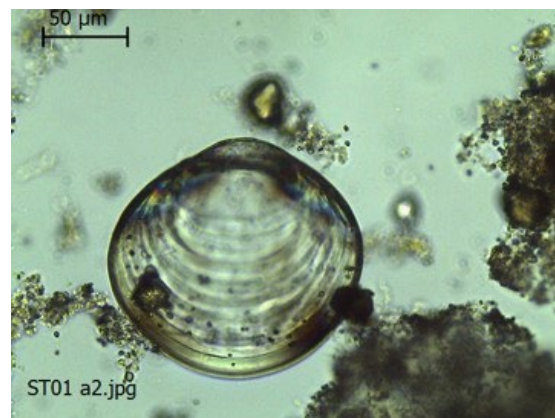
# Response Considerations

- Anticipated costs of eradication effort and subsequent monitoring, coupled with available funding
- Available resources (personnel, equipment, etc.) for all aspects of response (e.g., signage, barrier curtains, chemicals, grants to partners, increased monitoring, additional oversight of watercraft monitoring)
- Amount of water in the system to be treated. Consider the following: Potential for drawdown or flows reduced before treatment. Flow sources, including springs, and the potential to regulate that flow



# Response Considerations

- Regional and local distribution of invasive mussels (single vs. multiple, continuous vs. patchy, isolated vs. widespread, upstream vs. downstream, edge vs. interior, etc.)
- Invasive mussel age class structure or life stages present of infestation, if known
- Pathways/source (if known) – identified, controlled, eliminated, etc.
- Species track record of eradication/control attempts
- Ability to obtain required permits and permissions (e.g., Emergency ESA Consultation) in expedited timeframe



# Response Considerations

- Survey and assessment confidence
- Affected native fish and wildlife habitats
- Time of year in relation to reproduction, migration, etc.
- Land use patterns
- Presence of state or federally listed rare, threatened, or endangered species or critical habitats (e.g., Clear Lake Hitch)
- Regulatory hurdles associated with control actions (e.g., use of chemicals)



Photo credit: USFWS.

## Activation of Response Teams / Incident Command System (ICS)





# Triggers for Activation of Incident Command System



- Skill Sets

- GIS
- Other needs

- Resources

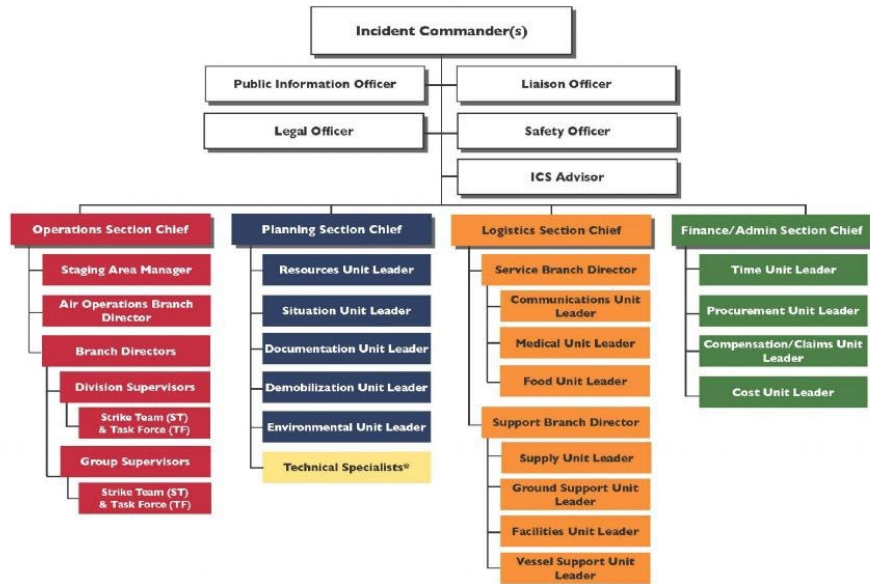
- FTE assignments
- Available equipment

Maximizing  
Skill Sets,  
Resources  
and Priorities

# ICS and Clear Lake



## Incident Command System Organization Chart



www.emsics.com

Copyright © 2000 by EMSI, Inc.



### NEXT STEPS

- Prep for Control / Eradicate
- Control/Eradicate
- Contain

Photo credit: PSMFC Smugmug Photo Archives.



## POTENTIAL TREATMENT OPTIONS

### Mussel Control Considerations

- Biological options
- Chemical options
- Mechanical options





Home Columbia River Basin Dreissenids Incident Response ESA Consultation Reference Docs

## COLUMBIA RIVER BASIN DREISSENIID INCIDENT RESPONSE TOOLKIT

A resource to facilitate a response to an introduction of dreissenids in the Columbia River Basin





### Introduction

Since their introduction to the Great Lakes region of North America in the 1980s, invasive dreissenid mussels (zebra mussels (*Dreissena polymorpha*) and quagga mussels (*Dreissena rostriformis bugensis*)) have expanded their distribution across North America. From 2012–2018, the states of Washington, Oregon, Idaho, and Montana intercepted a total of 394 dreissenid-fouled watercraft that originated from throughout North America. In 2016, invasive mussel larvae were discovered in Tiber and Canyon Ferry Reservoirs in Montana—this was the first documented detection of dreissenids near the perimeter of the Columbia River Basin (CRB). The westward expansion of dreissenids, primarily via watercraft vectors, precipitates the need for contingency plans and other planning efforts to prepare entities for an introduction of dreissenids by facilitating a rapid response.



### Toolkit Purpose

This toolkit provides resource managers with the tools and information to effectively implement a response to a dreissenid introduction. The toolkit includes information on Columbia River Basin geography, entities; dreissenid biology and distribution; environmental, economic, and cultural effects of dreissenids; use of the Incident Management System; response resources; and environmental compliance, including Endangered Species Act (ESA) consultation steps.



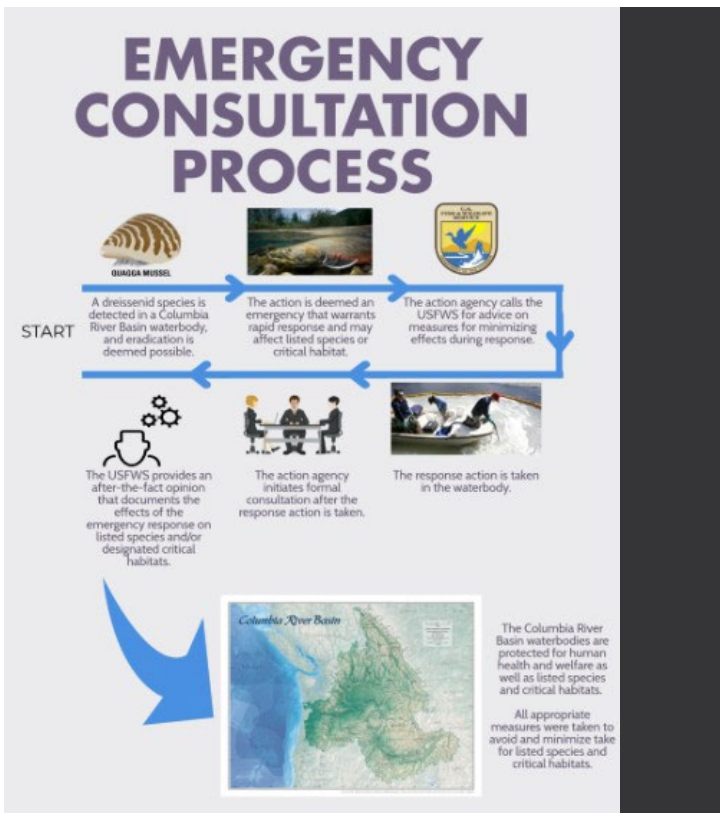
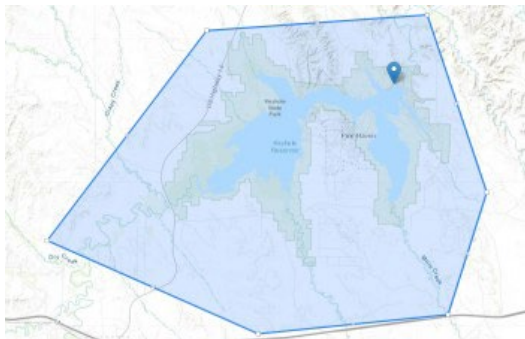
### Consequences of No Action

This toolkit has been prepared to facilitate a rapid response to an introduction of dreissenids. The anticipated consequences of taking no action would include long-lasting, significant, and detrimental economic, environmental, and social/cultural effects that would alter ecosystem function and processes throughout the CRB and affect quality of life for people who live in the basin. There are many factors influencing whether or not attempts to eradicate dreissenids in any CRB waterbody will be successful. And the potential effects of response actions to listed species and critical habitats are never fully known prior to control actions. Thus, at the time of an actual response, it is prudent to weigh the short-term and long-term economic and environmental costs of eradication attempts with the likely long-term costs of established populations of dreissenids.

To use this site, click on the menu tabs at the top of the site to navigate to the different themes. The Columbia River Basin, Dreissenids, and Reference Materials tabs provide background information; Incident Response and ESA Consultation tabs provide information integral to taking action.

# USFWS CONSULTATION

- Define potential control and action area (incl. upstream and downstream of water body) – polygon
- Include likely staging areas



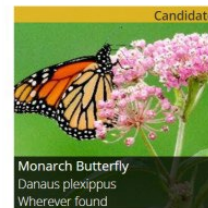
# USFWS CONSULTATION

- Listed species and critical habitats
  - No critical habitats within action area
  - Endangered species
- Describe potential response actions based on delineation of infestation and listed species and critical habitats within proposed action area ( [www.crbdirt.com](http://www.crbdirt.com))
  - Chemical/mechanical response options
  - Archeologist on site throughout project
  - Barriers and staging areas
  - Limit public access
  - Establish treatment and staging areas, incl. closures
  - Rhodamine dye and flow monitoring at treatment sites
  - Bioassays throughout treatment
  - Guidelines for timing of in-water work windows
  - BMPs

## Mammals



## Insects



## Flowering Plants



# Control

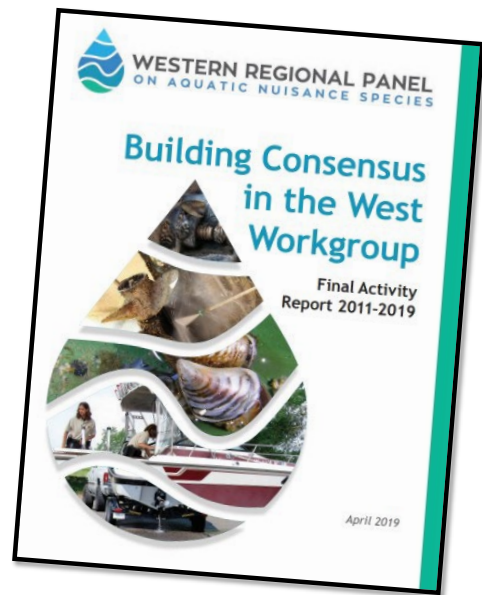
- Sourcing materials
  - Containment booms/silt curtains
  - Potash, Earth Tech QZ
- Application of Materials
- Bioassay for treatment efficacy
- Temporary closure
- Communications/Signage



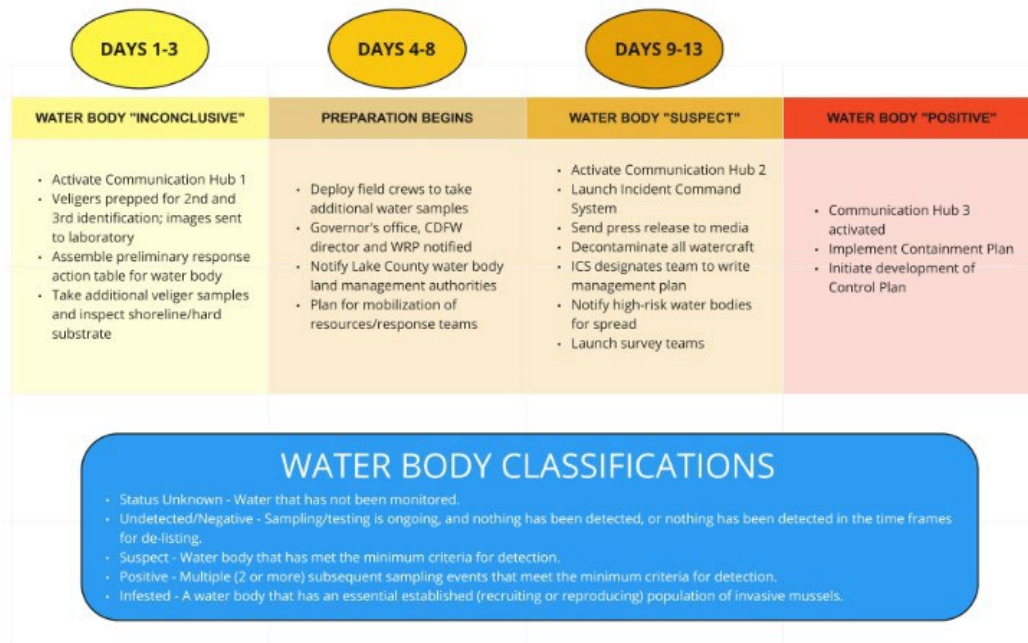


# DELISTING A WATER BODY

- **Inconclusive** —1 year of negative testing including at least one sample taken in the same month of subsequent year as the positive sample (accounting for seasonal environment variability) to get to undetected/negative.
- **Suspect**— 3 years of negative testing to get to undetected/negative.
- **Positive** — 5 years of negative testing to get to undetected/negative.
- **Infested**— following a successful eradication or extirpation event including a minimum of 5 years post-event testing and monitoring with negative results.



# TRANSITION TO CONTAINMENT





# Internal & External Communications

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

## Containment Considerations

- **Temporary closure** of the lake to all motorized, non -motorized activity
- Installation of **temporary signage and barriers**
- **Mandatory decontamination** of all exiting watercraft (ensure decon units are available at key points exiting water body)
- **Moratorium on all current and future fishing tournaments** until appropriate containment protocols can be established
- **Assess likely movement of boats** and other watercraft that recently used mussel-detected water body to identify inspection needs in other waters
- **Develop and implement HACCP** plans to ensure response personnel do not further spread of dreissenids (5 steps to HACCP planning)
- **Quarantine any operations** likely to spread dreissenids outside of Keyhole
- **Work in partnership with water purveyors** to stop or slow water release to potentially uninfested sites – Belle Fourche River Compact entities



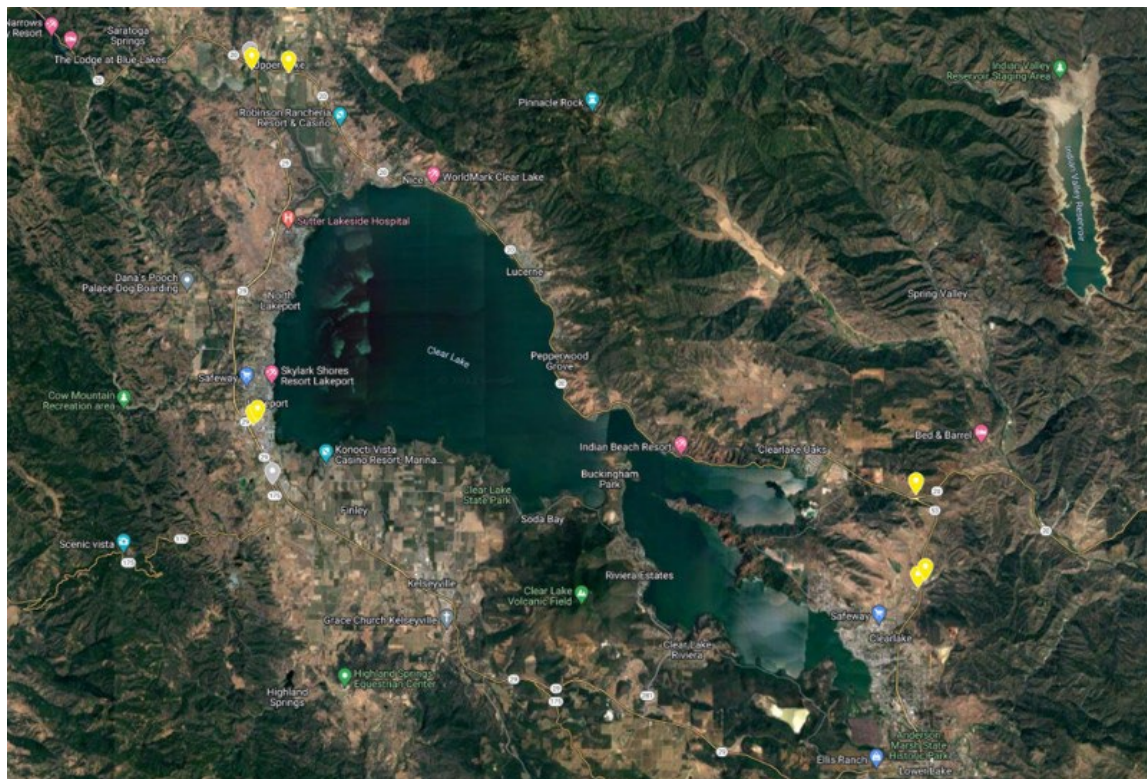
AIS watercraft inspection station in Wyoming. Photo credit: WGF.



Signage at closed boat ramp. Photo credit: Montana Fish, Wildlife, and Parks.

# Possible Options for Containment

- Decontaminate all watercraft
- Quarantine operations
- Containment protocols to address sanctioned water -related events
- Assess likely movement of boats and other watercraft to inform inspection and decontamination needs in other county water bodies



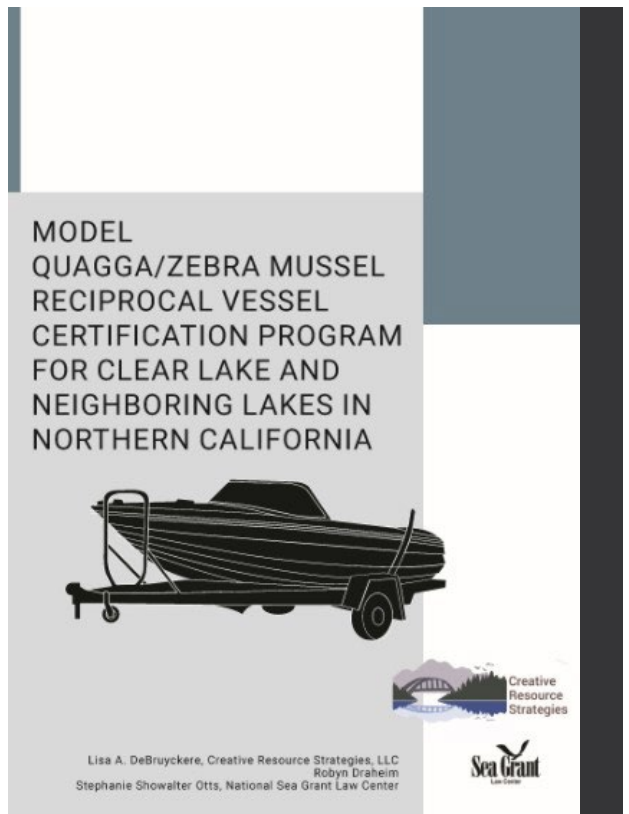






## Local Waterbody Collaborations

- Monitoring
- Prevention
- Coordination and Collaboration



## RESOURCES



- [Westernais.org](http://Westernais.org)
  - Original CRB Rapid Response Plan document
  - Past exercises
  - After action reports
- [CRBDirt.com](http://CRBDirt.com)
  - New improved interface for dreissenid rapid response
- FEMA Trainings
  - IC-100
  - IC-700
  - <https://training.fema.gov/emi.aspx>
- APHIS Trainings
  - <https://aphis.usda.gov/aphis/ourfocus/animalhealth/training-and-development>
- Emergency Management Services International  
<http://www.emsics.com/>
- Waterbody Classifications:  
<https://westernregionalpanel.org/wp-content/uploads/2019/11/WRP-BC-Activity-Report-FINAL>



## Preventing the Spread of Quagga and Zebra Mussels

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June 21, 2023

CALIFORNIA DEPARTMENT OF  
**Fish and Wildlife**



# Quagga and Zebra Mussels



# Quagga and Zebra Mussels







## **Fish and Game Code Section 2118**

- Restrictions on importation, transportation, possession, or release alive into this state, except under a revocable, nontransferable permit

## **Title 14 Section 671**

- Importation, Transportation and Possession of Live Restricted Animals

# California Department of Fish and Wildlife Laws and Regulations: Dreissenid Mussel



## **Fish and Game Code Section 2301**

- Restrictions on importation, possession and transport of dreissenid mussels
- Inspection of conveyances
  - Enforcement Authority to CDFA and Parks
- Control Plans

## **Fish and Game Code Section 2302**

- Prevention Programs

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# California Department of Fish and Wildlife Laws and Regulations: Dreissenid Mussel



## **Title 14 Section 672**

- Possession, Importation, and Transportation of Dreissenid Mussels
- Definition, Dead Mussel Permits

## **Title 14 Section 672.1**

- Dreissenid Mussel Control and Prevention
- Inspection of Conveyances

## **Title 14 Section 672.2**

- Dreissenid Mussel Penalty and Appeal Procedures

## California Department of Fish and Wildlife Laws and Regulations: Dreissenid Mussel



### **Title 14 Section 672.1(a): Control Plan**

- Shall consist of a written document describing:
  - the status of the dreissenid mussel population at the time the plan is developed,
  - control activities, and
  - monitoring to determine changes in the population.
- Annual Report
  - Submit an annual report by March 31 that covers the period from January 1 – December 31
  - Plan implementation shall be demonstrated through submission of annual reports

## California Department of Fish and Wildlife Laws and Regulations: Dreissenid Mussel



### **Title 14 Section 672.1(b): Prevention Program**

- Requires reservoir owners and managers to summarize their Prevention Program in a written Prevention Plan
- Plan must include:
  - Vulnerability assessment
  - Monitoring
  - Management of recreational activities, which includes education & outreach
- Annual Report
  - Submit an annual report by March 31 that covers the period from January 1– December 31
  - Summarizing any changes in reservoir’s vulnerability, monitoring results, and management activities

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# California Department of Fish and Wildlife Laws and Regulations: Dreissenid Mussel



## Title 14 Section 672.1(c): Inspection of Conveyances

- Quarantine process for conveyances and Quarantine Notice
- Illegal to tamper with tags, stickers, bands, or other methods used to quarantine a conveyance
- Administrative Penalty of \$100 - \$1,000 for violations



# California Department of Fish and Wildlife Laws and Regulations: Dreissenid Mussel



## Title 14 Section 672.2: Administrative Penalty Process

- Written Notice of Penalty Assessment
  - Reason for penalty
  - Amount of penalty
  - Time and method for payment
  - Options for appeal

# Title 14 Section 672 Dreissenid Mussel Regulations



State of California – Department of Fish and Wildlife  
**DREISSENIID MUSSEL PERMIT APPLICATION**  
 DFWM 1014 (New 04/03/15) Page 1 of 3

New  Renewal  Amendment

**SECTION 1 – PERMITTEE INFORMATION**

First Name: \_\_\_\_\_ MI: \_\_\_\_\_ Last Name: \_\_\_\_\_ Previous Permit # (if applicable): \_\_\_\_\_

Affiliation: \_\_\_\_\_ Title: \_\_\_\_\_

Affiliation's Mailing Address: \_\_\_\_\_ Day Telephone: \_\_\_\_\_ Fax Number: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_ Email Address: \_\_\_\_\_

Will others be in possession of dreissenid mussels under this permit?  
 Yes  No. If yes, list individuals below. Attach additional pages if necessary:

Last Name, First Name	Day Telephone	Email Address

**SECTION 2 – DREISSENIID MUSSELS REQUESTED**

Species	Lifestage	Number of individuals or description of material (Enter "N/A" for none.)
<i>Dreissena rostriformis bugensis</i> (quagga mussel)	Adult	
<i>Dreissena rostriformis bugensis</i> (quagga mussel)	Veliger	
<i>Dreissena polymorpha</i> (zebra mussel)	Adult	
<i>Dreissena polymorpha</i> (zebra mussel)	Veliger	
Other Dreissenid Species:		

**SECTION 3 – PURPOSE**  
 (Describe how each species, lifestage, and quantity requested in Section 2 will be used. Attach additional pages if necessary.)

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# Quagga and Zebra Mussels Range in California



## Quagga Mussel

- Jan 07 Colorado River
- Mar 07 San Bernardino Co.
- Jul 07 Riverside Co.
- Aug 07 San Diego Co.
- Feb 08 Imperial Co.
- Apr 08 Orange Co.
- Dec 13 Ventura Co.
- Dec 16 Los Angeles Co.

## Zebra Mussel

- Jan 08 San Benito Co.



# CDFW's Quagga/Zebra Mussel Project Goals



Prevent further introductions into the State

Contain mussels within currently infested waters

Eradicate mussels from infested waters, if feasible



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# CDFW's Quagga/Zebra Mussel Project Goals



- **Specific objectives to obtain these goals:**

- Coordination and Collaboration with water managers and agencies
- Prevention
- Detection
- Control and Eradication
- Information Dissemination/ Public Outreach and Education



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# CDFW's Invasive Species Program



## Headquarters

- Set statewide policy and develop regulations
- Coordinate at Federal and State levels
- Collaborates with Regions to develop resources for statewide use to encourage program consistency

## Regions

- On the ground coordination and implementation
- Regional Scientists dedicated to quagga and zebra mussel issues

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# Coordination and Collaboration



## National and Regional Level

- Western Regional Panel on Aquatic Nuisance Species
- Building Consensus

## State Level

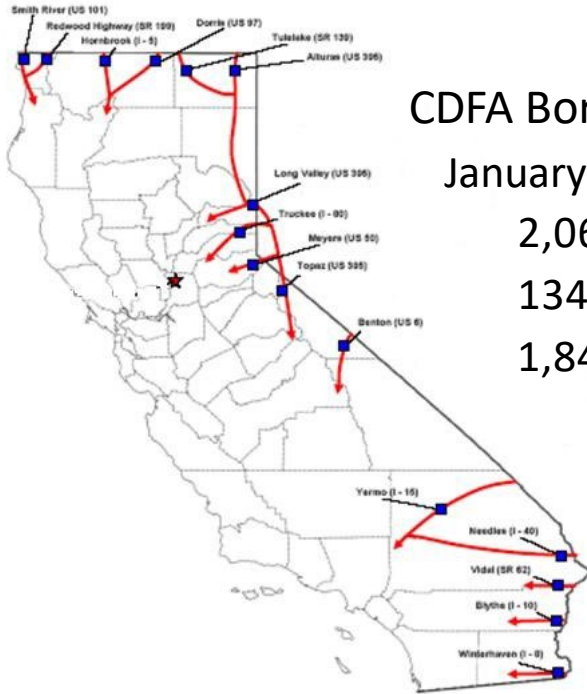
- Invasive Species Council of California
- Quagga/Zebra Mussel Interagency Team

## Local Level

- CDFW Regional Scientists coordinate with and assist water managers within their CDFW regions

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# Prevention CDFA's Role



## CDFA Border Protection Stations

January 2007 – December 2022

2,066,031 vessels inspected

134,701 vessels cleaned

1,843 vessels with mussels

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# Prevention Local Agency's Role



## Prevention Program

- Inspections:
  - Self, screening, trained staff
- Decontamination, dry time, exclusion, certification
- Live bait restrictions or inspections

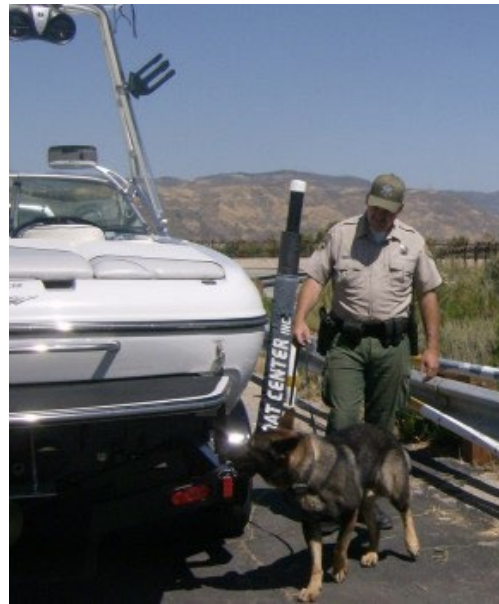


# Prevention

## CDFW's Role



- Assist local agencies and water managers in the development of Prevention Programs and Plans
- Inspections & Quarantine
  - CDFW Regional Scientists
    - Inspect and release quarantined vessels
  - LED / K-9 Teams



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# Detection



Waterbody Risk of Establishment is based on calcium (Ca+) levels.

Early Detection Monitoring

- Water quality and water sampling
- Visual Surface surveys
- Artificial substrates
- Plankton (Veliger) tows
- Bioboxes

Veliger Sample Analysis and Identification

- CDFW Bodega Marine & OSPRSanta Cruz Laboratories



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# Control & Eradication



- CDFW assists local agencies in the development of Control Plans for infested waterbodies to comply with the code and regulations:
  - Consist of a written document describing:
    - the status of the dreissenid mussel population at the time the plan is developed
    - control activities
    - monitoring to determine changes in the populations

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# Information Dissemination



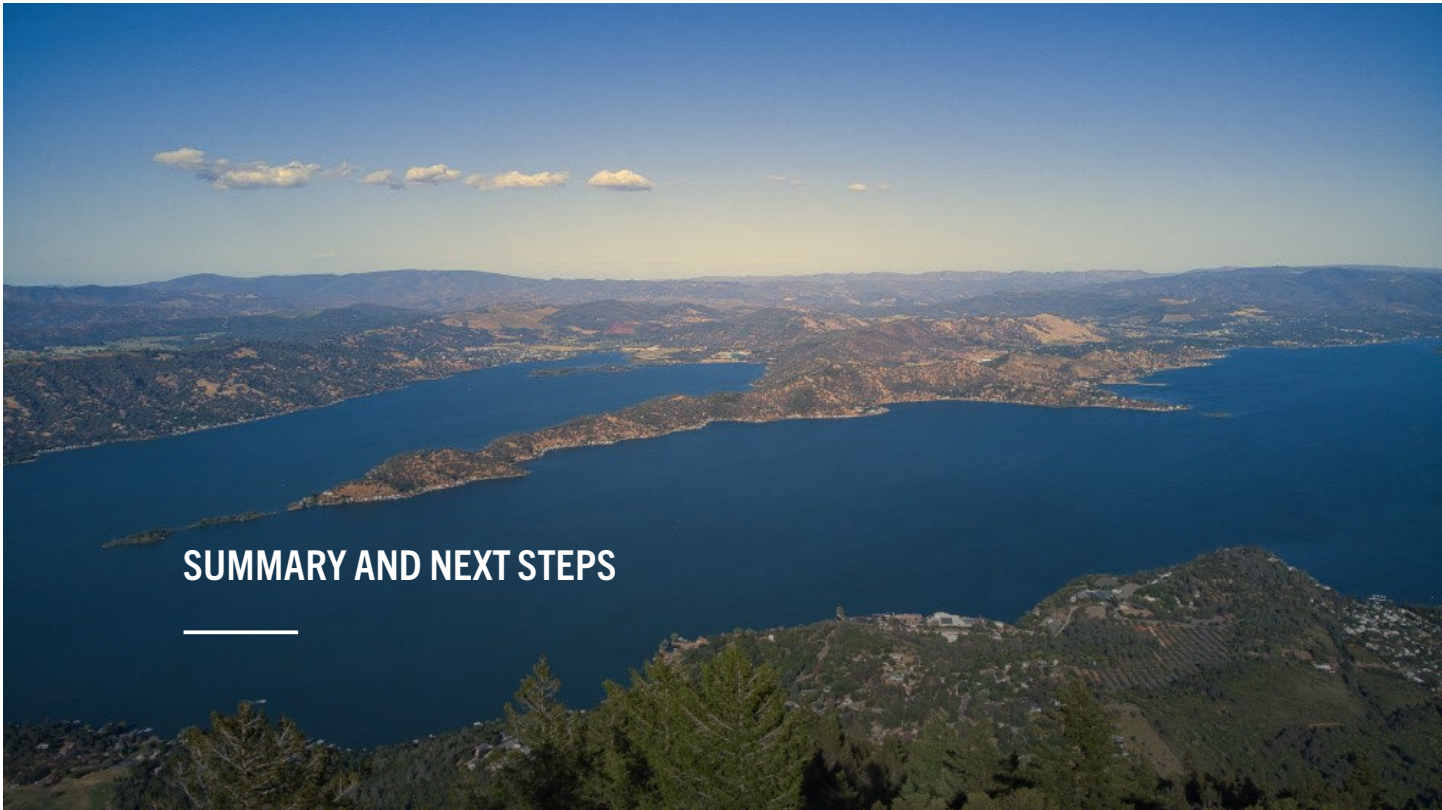
## Outreach & Education

- Quagga/Zebra Mussel Hotline: (866) 440 -9530
- Website: [www.dfg.ca.gov/quaggamussel/](http://www.dfg.ca.gov/quaggamussel/)
- Press Releases/PSAs/Radio Shows
- Quarterly Newsletter
- YouTube Video
- Events



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**SUMMARY AND NEXT STEPS**

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## Appendix D. Mentimeter survey results from the June 20-21, 2023 Clear Lake Virtual Exercise

During the June 20-21, 2023 Clear Lake virtual exercise to test the capabilities of the draft rapid response and transition to containment plan, attendees were asked questions throughout the exercise. Relevant feedback is provided in this appendix.

### What words come to mind when you think of invasive mussels in Clear Lake?



#### Have you had an interaction with a ramp monitor while on Clear Lake?

- Yes - 7
- No - 3

#### Are there any other code/ordinance recommendations you have for Lake County to consider to fill any existing gaps?

- Shoreline property owners are responsible for boats launching from their property comply with QZ ordinance – and penalties for both the boat owner and property owner if they do not.
- Property owners with access should be required to post signs stating QZ program requirements. Signs can be provided by the county, but posting is the responsibility of property owners.
- All water vessels (including kayaks and canoes) have to be clean, drained, and dry, and get screened and stickered.
- Partner shops conducting inspections and selling stickers can be cited if they are not following procedures.
- Clearly state in the ordinance who the authority is in the county for enforcing when boats get decontaminated when they leave an infested waterbody. Is it the sheriff, city policy, county?
- Is there a way to permit property owners' private docks and ramps to engage them in the education and prevention effort?

#### What other information could we add to the rapid response plan to improve it?

- Probably already in there, but a step-by-step process for the response and implementing management or mitigation measures.
- Overview of responsibilities.
- Different responses to different findings, i.e., eDNA versus veligers and adults.

- A section on mussel identification compared with other shelled creatures commonly found in Lake County.
- Specific roles for officials – WRD Directors, Board of Supervisors, City Managers, Mayors, City Councils, State Assembly person, US Congress person, State Government.

**What other information could we add to the rapid response plan to improve it?**

- A section that describes prevention measures by other jurisdictions.
- Mussel identification and where to report sightings – or potential sightings.
- Get in contact with CDFW re: sample; send out PSA online.
- Coordination among counties.
- Articulation of how the Office of Emergency Services would be involved if an infestation would occur.
- Communication with lake renters and new home owners.
- Create a task force for north bay if an infestation were to occur.
- An investment funding pathway to prepare a savings plan to afford a response.
- What amount of sticker sale is too much where people won't pay and try to skip the sticker altogether?
- Flow chart/checklist of who gets notified.
- Require property owners with AirBnb rentals to include verbiage about AIS inspections in their house rules.
- A more general AIS sticker that will make people more engaged and supportive of the program.
- Normal “on-hour” pathway and “off-hour” pathway for notification and communication.
- An updated list of all regional water body contacts.
- An inventory of equipment and resources locally.
- An updated list of private intakes.
- How infestation will impact every resident, even if they don't recreate on the lake. For instance, their tax dollars, impacts to businesses, etc.
- Comparisons to cost between prevention program and containment – to leverage more local and state investment into prevention, if possible.
- Effects on native species/plants if infested.
- Will this plan apply to prevention or response to other AIS?
- Revise the current prevention plan to make it more robust and increase prevention monitoring.
- A full section on economic impacts.
- What would containment process look like at a lake as large as Clear Lake, and what would be allowed/required during the interim process between prevention and containment?
- Contact protocols and phone numbers for CDFW during anytime outside office hours.

**Would you like Lake County water managers to consider a potential control action if the lake had a confirmed detection of invasive mussels?**

- Yes – 9
- Maybe – 3

**What steps could Lake County take now, or prior to an introduction, to pave the way for a potential control action?**

- Line up stakeholders to assess pros/cons of various biological and chemical treatments associated with ecosystem and human health risk assessments.
- Summarize all control actions at North American lakes that are similar in size, use, and water type to Clear Lake.

- Communicate repeatedly and publicly how devastating an infestation would be, and how challenging/damaging remediating will be.
- Put money aside now and add a little bit every year to prepare for a response.
- Reach out with local law enforcement and agencies.
- Have an education campaign ready.
- Impose restrictions, special addendums, and standardize protocols for sport fishing contests at Clear Lake.
- Increase prevention monitoring by including additional locations to be used as baseline data.
- Expand baseline sampling locations.
- Get all partners and regulatory agencies lined up and on board for a response.
- Identify all private launch facilities.
- Set up a banding program.
- Outreach to tribal nations.
- Research current rules/laws for use of controls.
- Ask California Water Board what is needed to approve chemical discharges for QZ response.
- Research regulations.
- Identify locations for water decontaminations to be done.
- Restrict access to the lake, increase ramp monitors, banding program, more prevention monitoring, O&E, etc.

**What may be the greatest challenge Lake County faces when it initiates a containment program for Clear Lake?**

- So many access and exit points.
- Fishing tournaments, sponsors.
- After hours boat movement.
- Cost – we cannot afford to decontaminate all boats so vessel owners may have to pay and that will make compliance very hard with so many exits.
- Temporary closure would be expensive, if possible.
- Non-cooperation from Caltrans for roadway checks.

**What most concerns you about implementing a containment-only approach to managing Clear Lake in perpetuity?**

- Nobody will come here.
- Compliance.
- Cost.
- Losing all state grant funding.
- Impacts to tribal cultural resources.
- Risk of downstream infestation.
- The employment woes and funding that comes with a containment-only approach.
- It will be a rough couple of years getting the public used to a new-use type of lake.
- Because it's a natural lake, there's now way to contain the lake.

**Do you believe an invasive mussel infestation would cause financial hardship for water purveyors and self-supplied water users?**

- Yes – 11
- No - 0



## Appendix E. Post-exercise survey results

All participants were invited to complete a 12-question electronic survey to understand the level of satisfaction with the exercise, opportunities to participate and how best to improve the plan. Of the 26 participants, a total of 5, or 20%, completed the post-exercise survey.

In summary, participants expressed the following:

- The exercise met their expectations. Planned engagement questions allowed their ideas to be heard and recorded.
- Additional tools such as videos could enhance knowledge prior to the exercise.
- Additional presentations from infested waterbody managers could have enhanced discussion.
- Knowledge gained during the exercise will help inform the development of other regional response plans.
- Additional participation from the city employees, other departments within the County and tribes would have been helpful to enhance discussion.
- More emphasis on funding at the exercise with other state agencies would help clarify how response might be paid for
- Biggest take-aways
  - Flow of information will be crucial in a response.
  - More communication with various entities is needed now to be able to work cooperatively in the future.
  - There are significant risks posed to Clear Lake and other waterbodies from watercraft that are not inspected.
  - Yolo County will be an essential partner with Lake County in the development of a control plan.
- Overall, participants gave “high marks” to Lake County for their work to prevent the introduction of mussels and explore containment and treatment options.