

North Coast Consortium Zebra and Quagga Mussel

Coordinated Prevention Plan

**(Agency Logos To Be Added
When Approved)**

- I. Introduction
- II. Background
- III. Method and Risk Of Spread
- IV. Impacts
 - A. Environmental Impacts
 - B. Water Delivery / Power Generation / Agricultural Impacts
 - C. Boating Recreation Impacts
 - D. Economic Impacts
- V. Action Statement
- VI. Regulations and Regulatory Controls
 - A. Federal Regulations
 - B. California State Regulations
 - C. Local Regulations
- VII. Vulnerability and Risk Assessment
- VIII. Prevention - Controlling Vectors
 - A. Recreational Boating - Vessel Inspection Guidelines
 - B. Live Bait - Shoreline Fishing
 - C. Fish & Game - Live Fish Plants
 - D. Importation of Water
- IX. Public Education And Outreach
- X. Reservoir Monitoring
 - A. Quagga and Zebra Mussel Identification
 - B. Reservoir Priority
 - C. Sampling / Testing Methods
 - D. Monitoring Protocols
 - E. Cleaning & Storing Sampling Equipment
 - F. Data Recording and Reporting
 - G. Monitoring Reports / Record Keeping
 - H. Local and Regional Notification
 - I. Agency Information
- XI. Appendices

I. INTRODUCTION

The North Coast Regional Consortium Zebra and Quagga Mussel Coordinated Prevention Plan ('the Plan') is designed to provide guidance to water district and recreation manager's participating in the North Coast Consortium ('the Consortium') to promote the mutual goal of preventing the introduction and spread of dreissenid mussels in the region and throughout the State.

The plan provides best practice guidelines based on information available at the time of writing to help improve efforts to prevent the introduction of dreissenid mussels into uninfested waterways within the Consortium's jurisdictional boundaries. Members of the Consortium agree to implement the vessel inspection and reservoir monitoring guidelines as outlined in this document to promote a coordinated prevention effort in the region.

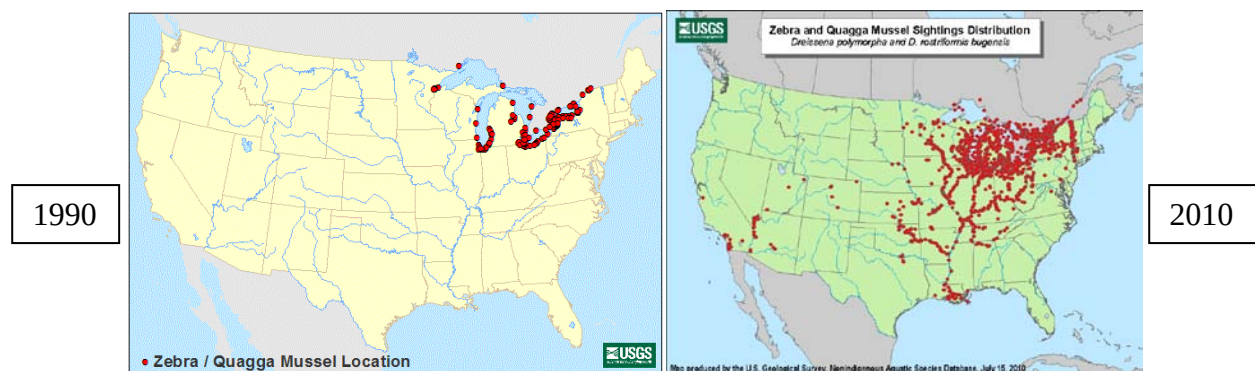
II. BACKGROUND

Zebra and quagga mussels are non-native dreissenid mussels from Europe. They reproduce prolifically, especially in warm western waters. Despite efforts to control their western expansion, they have begun to rapidly invade California fresh water systems. Zebra mussels were first discovered in Lake St. Claire in the Great Lake Regions in 1988. By 1992, they were found in all five of the Great Lakes.



quagga

zebra



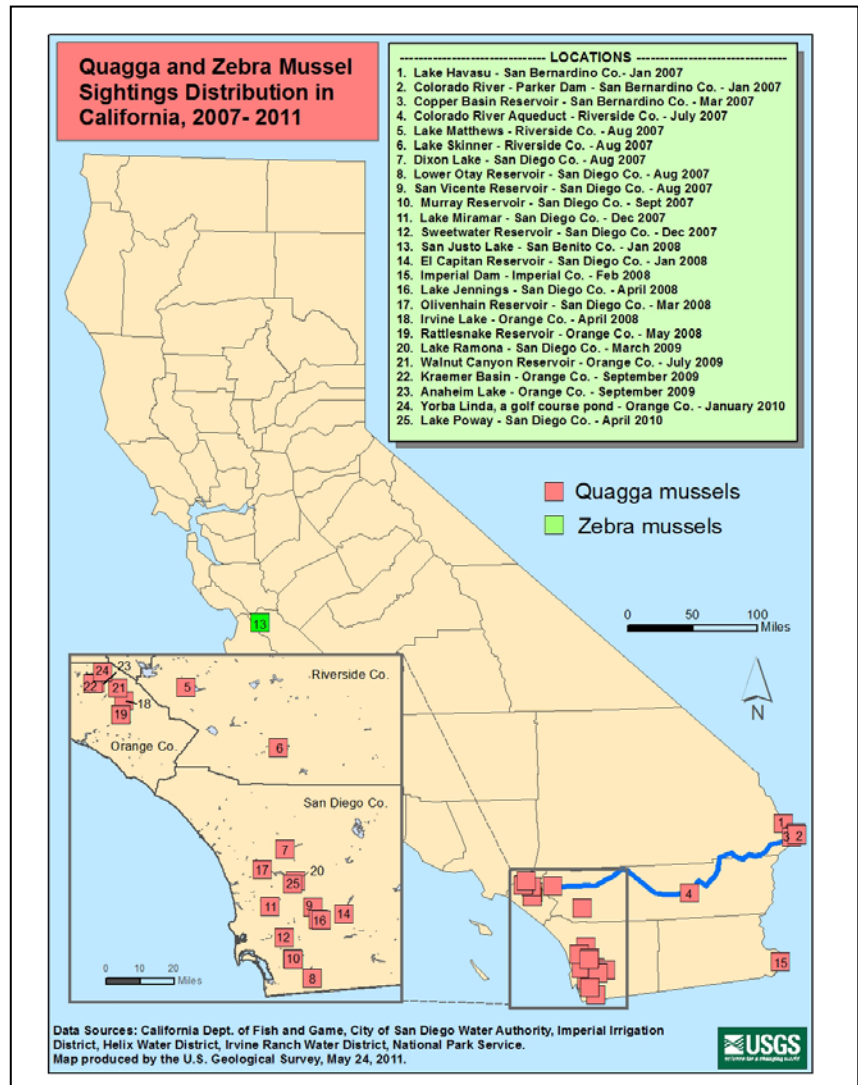
In January 2007, two and a half decades later, quagga mussels were found in Lake Mead, west of the continental divide, despite the passage of the Non-indigenous Aquatic Nuisance Prevention and Control Act (NANPCA) in 1990; the subsequent amending National Invasive Species Act (NISA) in 1996; and, targeted and strategic efforts by U.S. Fish & Wildlife to prevent their westward movement (see, The 100th Meridian Initiative: A Strategic

Approach To Prevent The Westward Spread Of Zebra Mussels And Other Aquatic Nuisance Species). Since January 2007, quagga mussels have been found in reservoirs in Nevada, Arizona and throughout Southern California. Most Southern California waterways receiving raw water from the Colorado River are suspected of being infested.

In January 2008, the closely related zebra mussel was found in San Justo Reservoir, which is located in San Benito County near the Santa Clara County line. The proximity of this infestation, and the risk it poses the Consortium's waterways cannot be overstated. An unwanted introduction of this nuisance pest will severely impact fresh water systems that provide critical drinking water supplies, irrigation to local agriculture, power generation, and recreational benefits to Consortium customers and constituents

In an effort to provide statewide guidance the California Science Advisory Panel, comprising of members from California

Department of Fish and Game, the Department of Water Resources, the Department of Food and Agriculture, Department of Boating and Waterways, and the U.S. Fish and Wildlife Service made recommendations in a May 2007 Report: *California's Response to the Zebra / Quagga Mussel Invasion in the West*. In addition, Governor Schwarzenegger signed AB 1683 in October 2007, and AB 2065 in October 2008. Both bills contain legislation intended to control the spread of quagga and zebra mussel within the State.



III. METHOD AND RISK OF SPREAD

Invasive mussels spread easily to isolated waterways by attaching themselves to boats, personal watercraft and related equipment. Once established in a waterway, they can also be introduced to new areas by flowing downstream, or by importation of infested water.

Mature mussels, as seen on the boat motor to the right, can live out of water for weeks depending on humidity and temperature. Microscopic larvae, which are the greater risk as they are not as obvious as the depicted example, can sustain themselves in small quantities of water found in a vessel. Because of their viability away from water, the transfer of zebra and quagga mussels by trailered recreational boats is a real threat. Boats from infested



waters can carry zebra mussels on their trailers, boat hulls, engines, props, drive trains, and anchor chains. Microscopic larvae can be carried in boat bilge water; live wells, bait buckets and engine cooling systems.

California has an interconnected water delivery system throughout the State, often flowing in from adjacent states. If one water agency's waterways become infested, all connected waterways are at risk of infestation.

Once introduced into a waterway, the mussels reproduce prolifically. One mature female mussel can produce over one million eggs per breeding cycle; and in warmer western waters they can breed more frequently. If just a few zebra or quagga mussels get into a fresh water system, they could multiply into hundreds of thousands, within months, and eventually decimate native aquatic populations, change water clarity, increase toxic algae blooms and undesirable vegetation, cripple water system infrastructure, including critical agricultural water delivery systems, disrupt recreational boating, and can potentially cost state and local water and recreation agencies and the agricultural industry millions of dollars annually in monitoring, maintenance, containment, infrastructure restoration, and eradication efforts.

IV. IMPACTS

A. Environmental Impacts

Once established, zebra and quagga mussels compete with native species for food, and permanently alter water chemistry, clarity, fisheries and habitat.

The mussels eat many of the microorganisms in the water, effectively taking out a bottom link in the food chain. The imbalance can lead to fewer large fish such as bass or trout and displace fish populations. They also filter about one liter of water per day. In mass quantity, they increase water clarity, allowing deeper light penetration, which encourages growth of benthic algae and aquatic vegetation, permanently changing the natural habitat.

B. Water Delivery / Power Generation / Agricultural Impacts

Zebra and quagga mussels foul drinking water delivery systems and pipes, power plant intakes, and agricultural and industrial facilities that use raw surface water, dramatically increasing maintenance and water delivery system costs across industries.

Zebra and quagga mussels latch inside pipes, valves and on dam surfaces, constricting and blocking pipes, decreasing water flow and creating a maintenance, nightmare for water delivery systems, electricity-generating dams, water treatment plants, and agricultural producers.

Agricultural proponent's for invasive pest prevention efforts have asserted that every dollar spent on prevention saves twentyfour dollars in eradication efforts. However, considering the insidious nature of this pest, and the unlikeliness that it can be eradicated from a waterway once introduced, the ongoing costs to repair damage to water delivery infrastructure will be staggering.



C. Boating Recreation Impacts

Zebra and quagga mussels can cover boat hulls, cause drag, which increases fuel costs, ruin boat motors, and colonize on boating piers and launch ramps. Their presence or risk of spread can result in temporary and sometimes permanent closure of waterways to recreational boating.

The mussels easily attach and grow on engines, props, hulls, and other exterior parts of the vessel and trailer. They can live on a boat's cooling system and water intakes, causing decreased water flow, engine damage, and increased maintenance costs for vessel owners. They can cover piers, pilings, launch ramps and ultimately coat the water's edge with sharp, smelly shells.

As zebra and quagga mussels spread, local agencies are seeking direction from federal and state authority as to proper containment measures. California Assembly Bill 1683 authorizes the California Department of Fish (CDFG) to inspect watercraft and water bodies for the presence of mussels. If mussels are detected, CDFG can order the closure of water system facilities, and recreational boating, until system operators have implemented an approved control and eradication plan. If funding is not available to implement an approved plan, recreational boating could be permanently banned thus affecting local businesses and markets tied to the local boating industry.

As of June 2011, more than 15 recreational boating waterways in California have been closed or restricted in some way due to the presence or threat of potential infestation of the zebra and quagga mussel.

D. Economic Impacts

According to reports posted by the CDFG, the zebra mussel has caused more than \$5 billion dollars of damage in the Great Lake Region. According to a 1995 study, Economic Impact of Zebra Mussels, O'Neil, impacted facilities expended over \$69 million in zebra mussel related expenses between 1988 and 1996. A U.S. study conducted by the Center for Aquatic Conservation at the



University of Notre Dame and University of Wyoming suggests invasive species may be costing the Great Lakes region more than \$200 million a year in losses to commercial fishing, sport fishing, and the area's water supply, see <http://sgnis.org/publicat/proceed/aide/pime2003.htm> (July 17, 2008). The USDA has surveyed economic impacts on their federal website, <http://www.invasivespeciesinfo.gov/aquatics/economic.shtml>. Various reports show startling and widespread economic impacts after these invasive species are introduced. And, in a letter to the Interior Secretary Dirk

Kempthorne, Honorable Senator Dianne Feinstein stated that "over the last twenty years quagga mussels and their cousin, the zebra mussel, have caused billions of dollars in damage in the Great Lakes and other water bodies south and east of the Mississippi River".

Within the State, the Metropolitan Water District, which provides water to the Southern California region, allocated nearly \$6 million dollars of emergency response funding after the quagga mussel was found in Nevada's Lake Mead in January 2007. The East Bay Regional Municipal Water District in Northern California budgeted \$1.8 million dollars of emergency funding after the zebra mussel was found in nearby San Justo Reservoir in San Benito County in January 2008. And, the County of Santa Clara Parks and Recreation implemented a vessel inspection program to protect local waterways that has potential ongoing operational costs of \$1 million dollar per year.

V. ACTION STATEMENT

Because the threat of introduction of this aquatic nuisance pest is a multijurisdictional problem, with staggering and undesirable economic, environmental, agricultural and recreational impacts, those agencies in the Bay Area who have chosen to become members of the Consortium have agreed to cooperate to implement a regional coordinated approach to prevent the introduction of zebra and quagga mussels. The following plan contains comprehensive guidelines for assessing risk, identifying potential vectors, implementing recreational boating inspection programs, monitoring reservoirs, and educating the public and shall form a basis of agreed uniformity for the members of the Consortium.

VI. Regulations and Regulatory Controls A. Federal Regulations

A. Federal Regulation

Non-indigenous Aquatic Nuisance Prevention and Control Act (1990)

In general, the Non-indigenous Aquatic Nuisance Prevention and Control Act (NANPCA) is a Congressional act to prevent and control infestations of coastal inland waters of the United States by the zebra mussel and other nonindigenous aquatic species. The act addressed ballast water discharges by vessels in the United States, and set up various technical, advisory, and oversight agencies for setting guidelines and monitoring compliance.

National Invasive Species Act (1996)

The National Invasive Species Act reauthorized the Great Lakes ballast management program and expanded applicability to vessels with ballast tanks (as opposed to vessels which carry ballast water).

B. California State Regulations

Assembly Bill 1683 (Fish & Game Code §2301)

Signed into law in October 2007, and codified in the Fish & Game Code beginning with §2301, AB 1683 was designed to control the spread of zebra and quagga mussels within the State of California and authorized the Department of Fish & Game to inspect and quarantine infected boats, close recreational facilities, and restrict access to certain lakes. The bill gave local water operators an option to control their own waterways by implementing a dreissenid mussel monitoring and prevention program.

Section 2301 of the Fish & Game Code provides specific authority to cite a person who possesses, imports, ships or transports in the State, or causes to be planted within the waters of the State, zebra and quagga mussels; and, gives authority to conduct inspection of vehicles and vessels for the presence of zebra and quagga mussels, as well as authority to impound or quarantine any conveyance that carries zebra and quagga mussels.

Assembly Bill 2065 (Fish & Game Code §2302)

Signed into law in October 2008, AB 2065 augmented AB1683 by mandating the implementation of mussel monitoring and control plans at uninfested waterways where certain recreational boating or fishing activities are permitted. The bill specified that the owners or operators, managed privately or by a governmental agency, shall do the following:

- 1) Assess the vulnerability of the reservoir for the introduction of zebra and quagga mussels;
- 2) Develop and implement a program to prevent the introduction of zebra and quagga mussels which includes
 - a. Public education
 - b. Monitoring
 - c. Management of recreation, boating or fishing activities that are permitted on the waterway.
- 3) Establish administrative penalties for failure to comply with legislated mandates.

Assembly Bill 1338 (Harbors and Navigation Code §85.2 a - e)

Signed into law October 2008, the bill expanded the use of the money in the Harbors and Watercraft Revolving Fund to make it available upon appropriation, to the Department of Fish & Game and the Department of Food and Agriculture for activities addressing boating-related spread of invasive species.

California Fish and Game Code (§§2270-2272)

No live aquatic plant or animal may be imported into the state without prior written approval of the department pursuant to regulations adopted by the commission.

C. Local Regulations

In addition to State mandate and authority to implement and enforce vessel inspection programs, members of the Consortium may also need to review and codify specific local ordinances to support prevention efforts through local enforcement. Ordinances may include, but are not limited to, the ability to restrict access or close recreational areas, control hours or days of permissible recreational use, restrict the use of live bait, or prevent the use of a waterway by certain types of vessels. Each member of the Consortium shall review their agencies specific enforcement authority to insure appropriate ordinances are in place to support needed enforcement of agreed upon program guidelines.

VII. Vulnerability And Risk Assessment

Risk assessment includes determining which water bodies have established zebra or quagga mussels, and which water bodies in California, including those under operational jurisdiction of members of the Consortium, have a high probability of zebra mussel establishment based on a series of risk factors.

High risk areas for infestation have suitable zebra mussel habitat (based on substrate type, pH, and mineral availability), appropriate water temperatures for spawning, adequate food supplies, coupled with high levels of boating activity, lack of vessel control or inability to control recreational access, high risk importation of water, and absent or weak monitoring efforts.

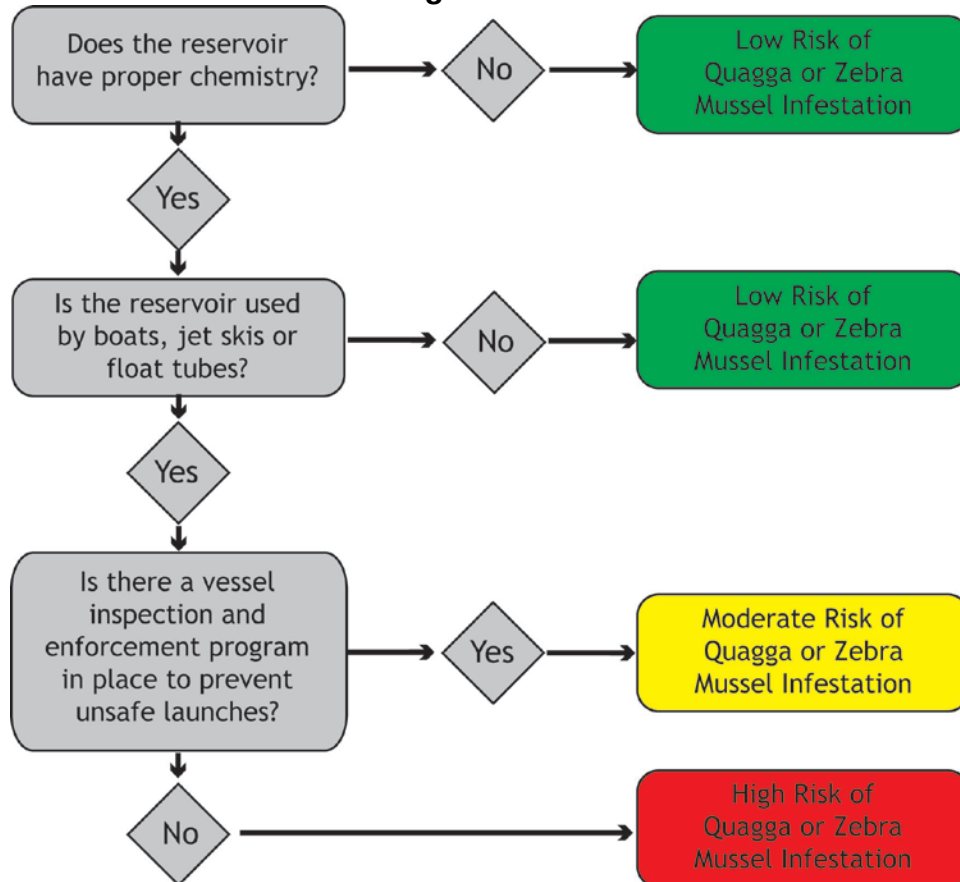
Considering the rapid spread on the East Coast, any boat registered, launched or moored out-of-State is a threat when attempting to launch on local waters. In addition, because of the rapid spread in Southern California,

any boat registered, launched or moored south of the Tehachapi Mountains or on San Justo Reservoir is also a risk.

In an August 2007 report, *Potential Distribution of Zebra and Quagga Mussels in California*, commissioned by the California Department of Fish and Game, author Andrew Cohen analyzed the risk of establishment of dreissenid mussels in certain state waters considering water body temperature, calcium concentrations, Ph, dissolved oxygen, and salinity. Based on his research, an assumption can be made that most watersheds and water bodies of the Central Coast that drain to the coast between San Francisco Bay and Ventura, and the San Francisco local watersheds are at high risk for colonization based on water chemistry.

In addition to scientific assessment, reservoirs can be assessed for risk based on the recreational access and whether that access is being adequately controlled.

A. Recreational Boating Risk Assessment Flow Chart



Based on risk assessment, the members of the Consortium can collectively make consistent and transparent determinations related to recreational boating access.

As of February 2008, based on current known infestations, the Consortium has agreed to the following quarantine guidelines:

Subject To Indefinite Launching Ban - Extremely High Risk Vessels

- Commercially Hauled Vessels
- Vessels Registered Out-Of-State
- Vessels Registered In Any County South Of The Tehachapi Mountains
 - o Imperial
 - o Kern
 - o Los Angeles
 - o Orange
 - o San Bernardino
 - o San Diego
 - o San Luis Obispo
 - o Santa Barbara
 - o Riverside
 - o Ventura

Subject To 30 Day Quarantine - Moderate To High Risk Vessels

Vessels registered within the current permissible Consortium area, but which have been launched in infested or high risk waters in the last 30 Days.

Infested or high risk waters include the following:

- Any waters out-of-state
- Any waters in a County south of the Tehachapi Mountains
- San Justo Reservoir

Subject To 5 Day Quarantine - Moderate Risk Vessels

Vessels registered within the current permissible Consortium area, which have not launched in an infested or high risk area, and appear at a Vessel Inspection Station wet or dirty, and un-banded, will be subject to quarantine for 5 days.

VIII. Prevention - Controlling Vectors

A. Recreational Boating - Vessel Inspection Procedures

Consistency in how vessels are inspected within the Consortium boundaries assists each agency as well as the public. The boating visitor will learn what is expected and the standard and method of inspection at one reservoir will be the same at another whether within one agency's jurisdiction, or at a sister agency's reservoir. In addition, by applying the same inspection standards, the Consortium can have confidence that allowing boats from other jurisdictions does not pose an undue risk.

To promote multi-jurisdictional consistency, boating community education, and risk reduction, the members of the Consortium agree to implement vessel inspection programs on their recreational waters and model their program after the following vessel inspection guidelines (see also Appendix B - Vessel Inspection Flowchart):

-Vessel Inspection Program Definitions

Vessel - A vessel includes trailered boats, jet skis, car top kayaks, inflatable boats, dingys and float tubes. All vessels and any associated trailer, water toys, and related equipment aboard the vessel that will or may enter the water are subject to inspection.

Live Time Database - The live time database is that internet based system that the Consortium members agree to use to facilitate real time information sharing and tracking of vessel inspection activities at all waterways within the Consortium's jurisdictional boundaries.

- **Determine where the boat is registered.**
 - Verify actual registration papers.
 - Owner / operator of a vessel with assigned CF# must present a current, valid registration card. Do not accept any other form of ID.
 - Owner / operator of a vessel with no CF# must present a current, valid vehicle registration or California Driver's License. Do not accept any other form of ID.
 - o If documentation shows the vessel, is registered out-of -state, or in a county South of the Tehachapi Mountains, immediately fail the vessel.
 - Give failure/ indefinite quarantine notice (see sample Appendix D).

- Immediately enter the failure into the shared access live time database.

o All others continue with inspection.

Note: A vessel with a CF# that is registered from a permissible area, yet towed by a vehicle registered from an impermissible area may still launch as long as the rear of the vehicle is clean and dry. In this situation, the vessel registration controls.

A vessel without a CF#, brought in by a vehicle registered from an impermissible area may not launch. In this situation, because the vessel is undocumented, the vehicle registration controls.

- **Determine where the vessel has been recently launched.**

- o Out-of-state, South of Tehachapi Mountains or an infested or high risk water way, issue a 30-day quarantine from date of inspection.
 - Give failure/ 30- day quarantine notice.
 - Give How To Clean And Dry Your Boat notice (Appendix E).
 - Immediately enter the failure into the live time database.

o All others continue with inspection.

- **Confirm the boat has not been previously quarantined.**

- o Check live time database to determine if vessel is clear for inspection.
- o Has a previously issued quarantine period expired?
 - If not, do not inspect until quarantine period has expired.
 - If so, confirm the boat has been properly cleaned and dry for the requisite period. If the vessel has been placed on an indefinite quarantine for suspected quagga or zebra mussel, secure a written or verbal release from Fish & Game or proof from the vessel owner that the vessel was been properly decontaminated before releasing from quarantine . Continue with inspection.

- **If not yet entered into the live time database, collect the signed Vessel Inspection Intake Form (see sample Appendix C).**

o Confirm form has been properly filled out and signed.

o Enter all information into the live time database.

- **Offer visitor DF&G "Don't Move A Mussel" handout or similar "FAQ Sheet" to promote visitor education (see Appendix F).**

- **Perform visual and manual inspection. Inspection shall include the following areas:**
 - o Boat Deck
 - o Boat Hull
 - o Bilge & Bait Wells
 - o Motor
 - o Trailer
 - o Fishing Equipment
 - o Water Toys And Equipment That Will Or May Enter The Water
 - o Rear of Vehicle

- **Record results of the inspection in the Live Time Database.**
 - o If the boat is not in the live time database enter all necessary data from the intake form into the database.
 - o If the boat is in the database, and passes inspection, note clear to
 - o If boat fails for failure to be clean and dry enter a failure / and give a 5-day quarantine notice.
 - o If boat fails for suspected presence of invasive mussels, give permanent failure / quarantine notice and notify appropriate park staff so DF&G can be contacted. Enter the failure into the live time database.
 - Note: If Fish & Game can not immediately send a warden or biologist to inspect the vessel on site, the vessel owner / operator will be directed to selfimpound the vessel at its registered address until F&G can make contact with them. Direct the vessel owner / operator not to launch on any waterway until cleared by F&G. Make sure the information is entered into the live time database as an indefinite quarantine to protect other Consortium members from an unwanted repeat attempt to launch at another reservoir.
 - The vessel will remain on indefinite quarantine in the live time database until released by an appropriate representative from Fish & Game, or administratively released after showing proof of decontamination and passing a full inspection. Whoever receives the information that the boat has been released by Fish & Game or cleared by subsequent inspection will be responsible to remove the indefinite ban in the live time database; and must keep sufficient records documenting the name of the Fish & Game representative who authorized the release, or the documents proving the vessel was decontaminated and passed a full inspection.

- **As boats pull from the water after being inspected earlier in the day, offer a band and explain the benefits of banding.**

- o Only consortium members with full physical inspections programs may place a band on a boat.
- o Members of the consortium will recognize an intact band from other Consortium members.
- o A vessel entering a vessel inspection station with an intact band will not need to submit to a full inspection. Instead the inspector shall inspect the band, insure that it is intact, untampered, and is a valid band from a member of the Consortium.
- o If a band is lost or broken during transport, the vessel is subject to tampering, the vessel owner / operator will be given 30-day quarantine, a notice on how to properly clean and dry the boat, and the information will be entered into the live time database.

1.Special Operational Issues

a. Consistency of Forms

Using a similar form insures that consistent, pertinent information is being collected and promotes efforts of the Consortium. Sample forms can be found in appendices.

b. Vessel Operator Refuses To Sign Initial Affidavit

The initial affidavit contains two important aspects, a consent clause to the search which provides legal authority to take further law enforcement action if contraband is found during the inspection. The operator is also certifying that the vessel has not been launched in an impermissible area under penalty of perjury. If the operator refuses to sign the affidavit, the inspection can not be properly completed. A failure notice can not be issued because an inspection has not occurred. The vessel may not launch and is simply turned away.

c. Vessel Owner/Operator Refuses Inspection

An operator may refuse to submit to an inspection, refuse to unlock an internal compartment, or refuse to allow the inspector to enter the boat without taking off their shoes. Each refusal precludes a full inspection. If a full inspection can not be completed, the inspector must fail the boat for a 5-day period.

d. What Constitutes Clean And Dry?

- All areas of the boat are free from standing water, and the vessel is dry.
- The exterior of the boat, trailer, and tow vehicle are free from mud, vegetation and debris.
- The drain plug has been pulled.
- The lower outboard motor has been flushed and drained.
- When the motor is lowered, water does not flow out.
- Live bait wells or bait buckets are completely dry.

e. Grounds For Vessel Failure or Refusal To Launch

- Mud or plant debris is found on any part of the vessel, trailer, or rear of an attached tow vehicle.
- Standing water is found in live wells, bait wells, bilge areas, or any other portion of the vessel.
- Water drains out of an engine when the outboard motor or out-drive is lowered into the vertical position.
- The vessel has been used in any body of water on the current banned county or banned waterway list.
- The vessel is registered out-of-state.
- The vessel has been commercially hauled.
- The vessel is found to have mussels attached.
- The vessel operator fails to comply with any aspect of the inspection.
- The band is from a non-Consortium member, or is a valid band that has evidence of tampering.

f. Banding Procedures

Vessel operators may elect to have their vessel banded upon departure from a Consortium waterway that operates a physical

inspection program. A band will allow vessel operators to re- enter any reservoir in the Consortium without having to be reinspected or pay an inspection fee.

Band Design

All bands used by members of the Consortium will be made of a similar tamper-proof, water-proof material identifying the agency that placed the band. Samples of current agency bands shall be made available to other jurisdiction inspectors to prevent fraudulent use of bands.

Band Placement

Towed Vessel	The band will be placed between the winch hook and eye attachments.
Kayaks / Car Tops	The inspector will attempt to place the band in a location that will break if the vessel is launched on a waterway. However, some vessel / transport configurations preclude the proper placement of a band. In this event the vessel will need to be re-inspected upon re-entry and will be required to pay any requisite inspection fee.
Missing / Broken	If a band is missing or broken, the vessel must be re-inspected regardless of the reason the operator provides. Associated re-inspection fees will apply.

Tampered or Fraudulent Bands

If a band has obviously been altered, taped, or fabricated in an effort to bypass inspection procedures, the vessel should be failed, and placed on quarantine for 30 days, and may be subject to citation based on the local jurisdiction's enforcement authority.

f. Wet Weather Inspections

During wet weather, it is not possible to safely conclude whether the source of the water on the boat is from rain, or from a previous launch.

- If the boat arrives banded, but wet, the boat will be permitted to launch.
- If the boat arrives covered and fully dry on the inside, and only exhibits wetness on the exterior parts of the boat from road splash or rain, the boat will be permitted to launch after passing all other portions of the inspection.
- If the boat arrives wet on the inside, the boat will be failed and quarantined for 5-days.

h. How A Vessel Gets Released From Quarantine

Once a vessel has been quarantined, the operator will be given a failure notice indicating the period of quarantine and the reason for quarantine; and information on how to properly clean and dry the vessel (Appendix E). At the expiration of the quarantine period, the vessel operator will be required to pass a new inspection.

Information given to operators of failed boats shall include the following:

- Review the *Vessel Failure Notice* . Tell the owner / operator how long the vessel has been quarantined.
- Advise the owner / operator not attempt to launch the quarantined vessel on any reservoir in any part of the State until the quarantine period has expired.
- Give the owner / operator a notice on how to properly clean and dry the vessel as recommended by the California Department of Fish & Game (see Appendix E):
 - o Thoroughly wash the hull of the vessel, trailer and rear end of the vehicle used to launch the vessel.
 - o Use hot water from a high-pressure hose when possible during all cleaning operations.
 - o Physically inspect all exposed surfaces. All rough surfaces must be cleaned until they are smooth to the touch.
 - o Remove all aquatic plants from the boat, motor and trailer and rear end of vehicle. Place aquatic plants in the trash.



- o Check and clean all underwater fittings, such as rollers, axle, bilge and trailer, and above water equipment, such as anchors, live wells, and docks.
 - o Drain water from all equipment including the motor, bilges, live wells, bait buckets, and coolers. Ensure all areas are completely dried.
 - o Ensure the watercraft's lower outboard unit is drained and dry.
 - o Pull the boat plug, and leave out until the next inspection.
 - o Dispose of all live bait in the garbage. Do not use live bait on the next visit.
 - o For personal watercraft, impeller areas can contain water. While on the trailer, run the engine for 5 to 10 seconds to blow out excess water.
 - o Once the vessel has been properly cleaned and dried, the owner must let it sit for the entire quarantine period.
- Advise the owner / operator that they will be required to pass a new inspection after the quarantine period expires.
 - o NOTE: Certain jurisdictions have special ordinances related to storm water run-off. Advise the owner / operator to select vessel washing methods that comply with their local storm water run-off ordinances. These ordinances are not consistent amongst Consortium members, so the owner / operator will need to consult local websites for further information to insure compliance with local ordinances.

i. Vessel Inspection Training Standards

Vessel Inspectors shall receive vessel inspection training, following the current guidelines set forth by the Department of Fish and Game. Consortium members will keep records of all training.

j. Limited Inspector Discretion

To limit confusion and promote consistency amongst program operators, inspectors shall follow these guidelines with limited discretion to deviate. Deviation confuses the public, causes complaints and undermines the credibility of the program.

k. Consistency In Signage

To promote an identifiable message, members of the Consortium will use similar signage in communicating their vessel inspection program to the public. Vessel Inspection Program sign samples are provided in Appendix H.

l. Suspected Mussels on Inspected Vessel

All suspected mussel contaminations must be immediately reported to the Department of Fish & Game. The issued failure notice should indicate that failure is-indefinite until the Department of Fish & Game has cleared the vessel for launch in State Waters. Members of the Consortium shall immediately enter the failure in the live time database, so other Consortium members can protect their water ways. If F & G can not immediately respond to verify the suspected infestation, and the vessel owner / operator is permitted to leave the site, advise the owner / operator that their vessel is self-quarantined at the address on the registration papers until Fish & Game has inspected and released the vessel.

A vessel under indefinite quarantine for suspected mussel contamination will not be permitted to launch on any consortium reservoir unless released by the Department of Fish & Game.

m. Wake Board Bladders and Boats with Ballast Tanks

Wake Board Bladders are not permitted as they can not be adequately inspected.

Ballast Tanks must be completely dry, or the vessel will be failed. If the ballast tank design precludes proper inspection, the vessel must be failed.

n. Bass Tournaments and Special Events

Each consortium member will evaluate requests to hold Bass Tournaments and / or special events for potential risk to the

reservoir; and make determinations to allow or disallow the event consistent with the policies and procedures outlined in this prevention plan.

B. Live Bait - Shoreline Fishing

Wet live bait is a potential source of introduction of zebra and quagga mussels. All wet live bait, like minnows, shall be banned from the vessel. Dry live bait, like worms and night crawlers, may still be used.

Consortium members agree to take steps to preclude use of shoreline bait along their shores by creating applicable ordinances, posting signage, and implementing education and enforcement efforts.

C. Fish Plants

Fish plants are a potential source of introduction of dreissenid mussels. Unless the provider of the fish plant can verify that they are a registered California Fish & Game aqua culturist, and are willing to sign a declaration that they are complying with the terms of their registration agreement with Fish & Game, the fish plant should be refused (see Appendix G - Draft Guidelines to Reduce the Risk of Quagga/Zebra Mussels in California Aquaculture).

Consortium members will inquire where the last plant occurred, if the any portion of the vehicle touched the previous waterway, and if so, what steps the operator of the vehicle took to clean and / or decontaminate the rear of the vehicle used to plant the fish. If necessary, the rear of the fish plant truck will be inspected to insure it is clean and dry.

D. Importation of Water

Importation of water is a potential source of introduction of zebra and quagga mussels. All risks should be considered by an importing water agency and any suspected or known exposures should be communicated to Consortium members to mitigate risk to other bodies of water in the Consortium.

E. Dredging and Infrastructure Repair Equipment

Occasionally, a water agency may contract with various companies for dredging, drilling or infrastructure repair. When the work requires equipment to enter the water, the contracting agency should fully screen the operator related to where the equipment was last used, and consider whether the equipment should be properly de-contaminated

and / or cleaned before entering the waterway, to prevent risk of exposure to other Consortium members.

IX. PUBLIC EDUCATION AND OUTREACH

Each member will develop a public education and outreach program that will include the following elements:

- Post signage at all reservoirs related to the existence of the Vessel Inspection Program.
- Distribution of brochures and / or leaflets to park visitors related to the risk that quagga and zebra mussels pose, and how visitors can help mitigate that risk.
- Post information on the agencies website with cross-links to the websites of consortium members, the California Department of Fish & Game, and any other site deemed relevant related to quagga and zebra mussel prevention.

X. RESERVOIR MONITORING

This section provides instruction and information for executing the zebra and quagga mussel monitoring program at consortium reservoirs. At minimum, either surface water samples will be collected and analyzed for veliger phase zebra and quagga mussels; or, biological substrate samplers will be deployed and monitored for early adult settlement stage mussels, at least one time each month. Optionally, surface surveys, dive surveys, and ROV inspections may be performed on an ad hoc basis. The shared objective of mussel monitoring is as follows:

- To provide early warning detection of zebra and quagga mussels in reservoirs that provide boating, fishing and aquatic recreation;
- To prevent adverse impact of mussel infestation and growth in recreation reservoirs;
- To prevent the spread of mussels into other water bodies;
- To control and treat mussel populations in surface waters.

The consortium members are encouraged to coordinate with Fish & Game for recommendations related to the best monitoring practices at various waterways in their jurisdiction. Each agency will strive to implement these recommendations where possible after considering budgeting, staffing and other resource constraints.

A. Quagga and Zebra Mussel Identification Veliger

Monitoring

Mussel veligers are identified by laboratory analysis. The parameters monitored and the detection limits are as follows:

Cross polarized light microscopy (CPLM)	presence/absence/density
Polymerase chain reaction (PCR)	presence/absence

Artificial Substrate Monitoring

Early stage adults are identified in the field by visual or tactile inspection, or by laboratory microscopic inspection. The parameters monitored and the detection limits are as follows:

Visual identification settlement	presence/absence
----------------------------------	------------------

Surface Survey

Mussel adults are identified in the field by visual inspection. The parameters monitored and the detection limits are as follows:

Visual identification adult settlement	presence/absence
--	------------------

B. Reservoir Priority

All reservoirs that permit recreational boating must be monitored for adult and veliger mussels at least one time each month. Water bodies that do not permit recreational boating, but are open to the public, and permit fishing, body contact, or receive raw water transfers from the source water distribution system, or areas downstream of the reservoirs should be monitored once a month for mussels at the agency's discretion, as they are also at risk for mussel contamination and facilitate the spread of mussels to nearby water bodies.

C. Sampling / Testing Methods

There are two basic types of mussel monitoring:

- 1) sampling the water column for veligers (larval forms); and
- 2) the detection of adults attached onto various surfaces.

Four monitoring methods are available to detect the occurrence of both the veliger and adult life stages of mussels: veliger plankton

sampling and analysis; early settlement; surface survey; and dive survey. General monitoring protocols developed by the California Department of Fish and Games (DFG) are included in the Appendices I, J, and K for reference.

Veliger Sampling (VS) - Veliger sampling with a plankton tow net provides the greatest chance of early detection. Samples are analyzed using either the polymerase chain reaction (PCR) or cross polarized light microscopy (CPLM) methods. (See Appendix A)

Artificial Substrate Monitoring (AS) - Artificial substrate samplers provide the simplest detection monitoring approach. Sampling consists of suspending substrate material (i.e. sections of ABS or PVC pipe, Plexiglas or plastic plates, concrete bricks, etc.) in the water column at various depths. Settling stage invasive mussels can be detected when attached to the sampler. (See Appendix B)

Surface Survey (SS) - Surface surveys are conducted in shallow streams and-shorelines-depending on changing water surface elevations, where appropriate hard surfaces are safely accessible. Surfaces are inspected visually and by touch for adult mussels. (See Appendix C)

Dive Survey (DS) - Dive surveys are useful for surveying relatively small and high risk areas such as marinas and intakes. They are most useful in response to a newly discovered infestation or to find an adult population that has been indicated by veliger or artificial substrate samples. Divers search for mussels on the surfaces of boats, docks, retaining walls, and other submerged structures (especially concrete).

For veliger sampling, individual nets and dedicated sampling gear will be used for each reservoir and facility location to prevent crosscontamination, OR the nets and sampling gear will be decontaminated between monitoring sites per DFG decontamination protocols. Collected samples will be preserved in the field with 20-25% ethyl alcohol and analyzed by laboratory staff using CPLM. If CPLM reveals the presence of veligers, confirmation samples will be taken and sent to the Scripps Laboratory for PCR analysis. A list of analytical laboratories performing mussel CPLM and PCR analyses is listed in Subsection I. Agency Information.

Scheduling

At least one method of mussel monitoring as presented in this prevention plan will be conducted on a monthly basis at reservoirs that permit recreational boating. Confirmation analysis and surface/dive

surveys may be conducted on an ad hoc basis. The next sampling event at a specific location using the dedicated gear will not be conducted until laboratory analytical results determine that the previous sample was veliger (mussel) free.

D. Monitoring Protocols Veliger Surveys

Zebra and quagga mussels have a planktonic, larval life stage (microscopic, free-swimming in water column) and in this stage are referred to as veligers. Veligers range in size from 70-200 microns (pm). Veligers are sampled using vertical plankton tow field procedure, using a 63-pm plankton tow net (maximum mesh size).

To optimize the likelihood of capturing veligers if they are present, several tow transects should be made at various locations within a lake/waterbody. Sample at a variety of areas, including near boat ramps, open water, near water outflows and inflows, downwind areas, and eddies, or areas where plankton collects (i.e., behind islands, etc). Tows may be horizontal or vertical through the water column. To do this, lower the net to 1 meter above the bottom and pull up to the surface. Individual waterbodies (size, depth, productivity, suspended solids, etc.) and equipment (net diameter, mesh size) will vary, so adjust sampling accordingly. Discrete samples from individual tows from the same lake/waterbody can be composited into a single sample container for laboratory analysis.

To perform a tow along a dock or bridge, attach tow rope to the mouth of the net, and lower the net into the water to the desired depth. Slowly retrieve the net by pulling back the rope in a steady, handover-hand motion at about 0.5 m/s (e.g., if the tow distance is 20 m, retrieval should take 40 seconds). Pulling too fast will cause a pressure wave in front of the net that pushes water and plankton away from the mouth of the net, and does not effectively sample the desired volume of water. Record the distance of each tow on the field log data sheet. Rinse net contents into sample bottle between each tow using a squirt bottle of DI water and washing down the sides of the net into the collection cup. Transfer the rinsate in the collection cup to a sample bottle and add ethyl alcohol to sample to ensure preservation at 2025% ethyl alcohol. (i.e. 105 ml 95% Ethanol added to 395 ml rinsate) for CPLM analyses.

For PCR analyses, samples must be kept chilled, shipped overnight on ice, and be processed within days. Label the outside of the sample

container with the lake/waterbody, date, time, analysis (i.e. mussel veliger CPLM) and sampler.

Contact laboratory for CPLM or PCR analyses to process the samples. Preserve plankton per laboratory specifications. Depending on your lab and the method of sample analysis, preservation method may vary. Know your lab's protocol prior to collecting samples. When making several tows keep sample on ice between tows and add alcohol after tows are combined. Dilutions for final solutions and different alcohol percentages can be calculated at the following website:

<http://www.restrictionmapper.org/dilutioncalc9.htm> .

Maintain a field log of plankton tows, and complete a laboratory Chain of Custody for each analytical sample. For the field log, record the date, location, and time each tow sample was collected. For individual transects, record the net diameter, mesh size, and distance (i.e., depth) of each tow, and calculate the actual water volume sampled. An example of a field log data sheet for plankton tows is available in the Zebra and Quagga Mussel Veliger Sampling Protocol Vertical Tow in the appendix.

Artificial Substrate Monitoring

Artificial substrate samplers include plates, pipes, concrete blocks, or any material placed in the water for mussel settlement. In addition, buoys, docks, or other structures placed in the waterbody can be routinely monitored for mussel settlement. A description of the construction and assembly settlement plates sampler is presented in the Mussel Artificial Substrate Monitoring Protocol in Appendix J.

Ideal sites for placement of substrate samplers are areas with high boat traffic such as docks, ramps, and marinas with as much protection from vandalism as possible. Other sites include water quality monitoring stations or towers and government agency boathouses.

The deployment and inspection of the artificial substrate is described in Appendix J. One to two substrates are deployed per site. Depending on water clarity and depth, the artificial substrate is set at a depth of at least 6 feet, and at least two feet above the bottom for shallow areas. At deeper sites, a second substrate is installed at a depth to 15 meters (50 feet).

A visual and tactile examination of the artificial substrate should be conducted every month for attached zebra and quagga mussels. At

early settlement stage, mussels first feel like sand paper. In 1 to 2 months a mussel grows large enough (1/4 inch) to be seen upon close inspection and feels like a small pebble or sunflower seed. Visually inspect each plate (top, bottom, and sides), the spacers, the cable and the weight, and gently feel any attached organism. If no mussels are detected, lower the substrate back into the water.

Suspected substrates are collected and taken to the laboratory for microscopic analyses. To aid identification, first take a close-up digital photograph of each specimen. Next, collect the specimen(s) and place in a vial preserved with 20% to 25% ethanol. Label the vial with location, date, and name of collector. Place the artificial substrate in a large ziplock bag or small garbage bag and keep it in a cooler with ice while in the field, and store the substrate in the freezer until "overnight delivery" on ice to the laboratory. Replace the substrate in the field with a new one.

Never transfer substrates from one site to another, or from one water body to another to prevent any possibility of contamination between monitoring sites (should mussels be present and not yet detected).

Record the inspection of the substrate on field datasheet even if no mussels are found; absence data is as important to document as presence data. An example of the artificial substrate field datasheet is presented in the Zebra and Quagga Mussel Artificial Substrate Monitoring Protocol in Appendix J.

Surface Surveys

Each agency may also conduct a visual and tactile search for mussels over hard and soft substrates in a wade-able area, by gently running fingers over smooth surfaces, and checking for gritty, sandpaper feeling. Areas to include in the surface survey include:

- Dock floatation, buoys, and mooring lines.
- 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 both hard and soft substrates, and gently stir up silted areas to expose mussels. Inspect dark areas (dark substrates and low light/shaded areas); quagga and zebra mussels prefer dark substrates and low light/dark areas. Search areas at or near boat ramps, docks, marina, all concrete structures, and low flow areas. The minimum linear feet to be searched per substrate type are as follows:

- 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

The survey is complete before meeting the minimum linear feet if mussels are found in 3 or more areas within the survey location, or if all available substrate has been searched.

If mussels are present, record the water body, the lat/long or GPS coordinates of the mussels' location(s) and sketch/describe location(s) (e.g.-nearest landmark; etc.)-on- the-datasheet. An -example of surface survey datasheet is available at the DWR website provided in the Zebra and Quagga Mussel Surface Survey Protocol in Appendix K.

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 length of ruler used. Collect 5 density estimates per mussel location.

Collect 4 to 5 specimens, and place in ziploc bag with sample label indicating location, lat/long or GPS, date, and name of collector. Seal dry and put in freezer. If other species of clams or mussels are found, collect 1 or 2 specimens. Preserve the specimens in ethanol, rubbing alcohol, a freezer, or allow to air dry.

E. Cleaning and Storing Sampling Equipment

Dedicated sampling gear will be used to prevent cross-contamination and reduce the risk of spreading zebra and quagga mussels. One set including a plankton net, rope, bucket, wash bottle, etc., will be used per site. The sampling gear is not used again until an 'absent' result is received from the analytical laboratory indicating that mussels are not present.

After a positive sample for adult or veliger mussels is received from the analytical laboratory or observed in the field, any field equipment and sampling gear that came in contact with the water must be decontaminated. Equipment decontamination procedures using vinegar or bleach solutions or thermal washing are described in the veliger sampling protocols in Appendix I.

If trailering a boat from a different water body, decontaminate the boat, trailer, vehicle, and equipment before transporting. Vessel decontamination-procedures-using-thermal-washing-is presented-in-the veliger sampling protocols in Appendix I.

F. Data Recording and Reporting

If mussels are found, immediately contact the appropriate DFG regional mussel contact, see Appendix A - Consortium and Agency Contact List.

Every time a survey is made the data must be recorded on a datasheet before leaving the field. Send datasheets, or modified summary data to the appropriate DFG regional contact as requested; All data should be entered into the agencies' data reporting system, and the datasheets should be retained on-site.

Examples of field datasheets are available at the DWR Environmental Services web site:

<http://www.des.water.ca.gov/docs/datasheet%20%20surface%20survey.pdf>

G. Monitoring Reports / Record Keeping Veliger Sample Results

Sample results will be sent by the laboratory with a standard turn-around-time of 2 weeks for non-detects (Absence). The lab will verbally notify the agency immediately for positive results (Presence). If veliger sample is positive, immediately schedule a follow-up

sampling event in order to collect confirmation samples with rush turn around, and verbal notifications.

If Artificial Substrate sample is positive, immediately send plate to the laboratory for microscopic identification of adults, and to DWR and/or DFG for expert confirmation. Immediately schedule a follow-up sampling event in order to collect confirmation samples with rush turn around, and verbal notifications.

Veliger Confirmation Samples

Follow the sampling steps for veliger monitoring as presented above. However do not preserve confirmation samples in ethyl alcohol. Immediately place the sample on ice and freeze to preserve sample. Send the confirmation samples to Scripps Laboratory for PCR analysis (Presence/Absence) with rush turn around and verbal notifications.

Artificial Substrate Confirmation Samples

Follow the sampling steps for artificial substrate monitoring as presented above. However Do not preserve confirmation samples in ethyl alcohol. Immediately place the sample plate on ice and freeze. Send the confirmation sample plate to Scripps Laboratory for PCR analysis (Presence/Absence) with rush turn around and verbal notifications.

H. Local and Regional Notification

Each agency should have a communication response plan as an integral part of their mussel monitoring plan that includes personnel roles and responsibilities, and including agency notification guidelines for reporting suspected or confirmed presence of mussels to external agencies, media and the public. Each agency is responsible for implementing their communication plan and notifying regulatory authorities.

For this plan, each consortium partner agency will identify a contact responsible for communicating monitoring results between the other partner agencies. see Appendix A - Regional Consortium Member Contact List.

For the regional consortium reporting, two levels of reporting exist for 'suspected presence of mussels' and 'confirmed presence of mussels'. It is assumed that mussels are not present in the waterbodies monitored by the consortium agencies until a suspected or confirmed presence is detected. If veliger or adult mussels are suspected from

monitoring results, the reporting agency will immediately notify the consortium partner contact of the suspected presence of mussels. If veliger or adult mussels are determined to be present in the confirmation sample, the reporting agency will immediately notify the consortium partner contact of the confirmed presence of mussels. The notification will consist of the reporting agency, the level of reporting (i.e. suspected or confirmed presence of mussels), waterbody name, date, type of monitoring, and analytical method. Each consortium partner agency will determine the level of response for accepting or banning boaters from the reporting agency's waterbody or jurisdiction (i.e. quarantine guidelines, honoring inspection bands, etc).

This information must be reported to those agencies that control the recreational boating on the reservoir if different from the water agency.

XI. APPENDICES

- Appendix A - Consortium and Various Agency-Contact-List
- Appendix B - Vessel Inspection Flow Chart
- Appendix C - Sample Vessel Inspection Intake Form
- Appendix D - Sample Vessel Inspection Failure Form
- Appendix E - How To Properly Clean and Dry A Boat Flyer
- Appendix F - Don't Move A Mussel Flyer
- Appendix G - Draft Guideline To Reduce The Risk of Quagga/Zebra Mussels in California Aquaculture
- Appendix H - Sign Samples
- Appendix I - Zebra and Quagga Mussel Veliger Sampling Protocol Vertical Tow California Department of Fish and Game
- Appendix J - Zebra and Quagga Mussel Artificial Substrate Monitoring Protocol California Department of Fish and Game
- Appendix K - Zebra and Quagga Mussel Surface Survey Monitoring Protocol California Department of Fish and Game

Prepared By:
Kelly Klett, Management Analyst
Santa Clara County Parks and Recreation Department