FREQUENTLY ASKED QUESTIONS
QUAGGA/ZEBRA MUSSELS

What are Quagga and Zebra mussels?
Dreissena bugensis (Quagga) and Dreissena polymorpha (Zebra) are destructive invasive aquatic species that grow to about an inch in diameter. Sometimes they are larger, sometimes they are microscopic. The small, freshwater bivalve mollusks are triangular with a ridge between the side and bottom. It has black, cream or white bands, and often features dark rings on its shell almost like stripes.

Why should we be concerned about Quagga/Zebra mussels in California?
They reproduce quickly and in large numbers. Once established, eradication is extremely difficult though new technologies are becoming available. Their establishment in California waters could result in an environmental and economic disaster.

What is the environmental impact of the Quagga/Zebra?
Quagga/Zebra mussels will upset the food chain by consuming phytoplankton that other species need to survive. They are filter feeders that consume large portions of the microscopic plants and animals that form the base of the food web. Their consumption of significant amounts of phytoplankton from the water decreases zooplankton and can cause a shift in native species and a disruption of the ecological balance of entire bodies of water. In addition, they can displace native species, further upsetting the natural food web.

What is the economic impact of the Quagga/Zebra?
Quagga/Zebra mussels can colonize on hulls, engines and steering components of boats, other recreational equipment and if left unchecked, can damage boat motors and restrict cooling. They also attach to aquatic plants and submerged sediment and surfaces such as piers, pilings, water intakes and fish screens. In doing this they can clog water intake structures hampering the flow of water. They frequently settle in massive colonies that can block water intake and threaten municipal water supply, agricultural irrigation and power plant operations. U.S. Congressional researchers estimated that an infestation of the Zebra mussel in the Great Lakes area cost the power industry $3.1 billion in the 1993-1999 period, with an economic impact to industries, businesses and communities of more than $5 billion. California could spend hundreds of millions of dollars protecting the state's water system from a Quagga/Zebra infestation.

How did the Quagga/Zebra mussels get to California?
Quagga/Zebra mussels primarily move from one place to another through human-related activities. They attach to hard surfaces and can survive out of water for up to a week. The microscopic larvae also can be transported in bilges, ballast water, live wells or other equipment that holds water. Authorities discovered Quagga mussels living in the Colorado River at Lake Mead, Lake Mohave and Lake Havasu in January 2007. It is likely they were originally brought to Lake Mead on the hull of a recreational boat. Additional bodies of water were infected in California as the veligers drifted downriver from Lake Mead.

Where did the Quagga/Zebra mussels come from?
Zebra and Quagga mussels are native to the Ukraine and Russia. Zebra mussels were first discovered in the Great Lakes in 1988, and a year later, Quagga mussels were discovered in the same area. It is believed they arrived in America via ballast water discharge.

Where have the mussels been detected in California?
Quagga mussels have been detected in the Colorado River system. Any facility, reservoir, lake or stream receiving raw Colorado River water has been exposed to the Quagga mussel. Quagga mussels are currently found in waters from the Nevada border to San Diego County. Zebra mussels were found in San Justo Reservoir, San Benito County, in January 2008. They are currently the only known population of Zebra mussels in the state.

How many waterbodies have been known to be infested with Quagga/Zebra?
For the most up-to-date listing of confirmed mussel finds, go to http://nas.er.usgs.gov/taxgroup/mollusks/zebramussel/maps/CaliforniaDreissenaMap.jpg

Are Quagga mussels similar to Zebra mussels?
The Quagga mussel is a close relative of the Zebra mussel and is very similar in appearance and in environmental and economic impact. Quagga mussels differ from Zebra mussels in that they are hardier and can live at greater depths and in colder temperatures. Quagga mussels have actually displaced Zebra mussel populations in some infested areas.

Do Quagga/Zebra mussels have predators?

Quagga/Zebra mussels have few natural predators in North America. It has been documented that several species of fish and diving ducks have been known to eat them, but these species are not an effective control. In some cases, the mussels concentrate botulism toxin causing bird die offs.

How can we get rid of them?

It may be possible to eradicate Quagga/Zebra mussels if they are in small masses and low density. However, preventing their spread is the best course of action. Since their larvae are free drifting, preventing their spread downstream from known infestations may not be possible. Eradication can also be expensive depending upon the infected water body.

What is being done in response to the spread of Quagga and Zebra mussels?

State and federal agencies are mounting a unified response using the Incident Command System. The principal agencies include the California Departments of Fish and Game (DFG), Water Resources, Food and Agriculture, Boating and Waterways, and Parks and Recreation, along with U.S. Fish and Wildlife, National Park Service and Bureau of Reclamation, Metropolitan Water District and City of San Diego Water Department, and multiple local authorities. Actions include:

- Increased inspections at California Department of Food and Agriculture border stations
- Training and deployment of survey teams to inspect water bodies statewide
- Development and implementation of monitoring plans for high risk waters in the state
- Training of DFG wardens and biologists and other agencies' staff to conduct inspections
- Purchase and deployment of portable wash stations
- Developing plans for eradicating Zebra mussels from San Justo Reservoir
- Public information and education efforts including direct mailings to boat owners, posting of notifications at water bodies, distribution of informational cards at multiple locations and media efforts

What does the law say about these mussels?

Fish and Game Code §2301 and §2302 provides DFG with the following authority to protect the state from invasive mussels.

FGC §2301 applies to waterbodies infested with dreissenid mussels, and relates to Containment Plans

Conveyances (vehicles, boats and other watercraft, containers, and trailers) – DFG staff and designees (including Border Protection Station staff and State Park Rangers) may do all of the following:

- Stop and inspect any conveyance (boat, vehicle, trailer, container, etc.) that may carry or contain adult or larval dreissenid mussels.
- Order that areas in a conveyance that contain water be drained, dried or decontaminated using DFG approved procedures.
- Impound or quarantine conveyances for the period of time necessary to ensure that all of the mussels on or in the conveyance have died.

Surface Waters and Facilities - DFG staff may do all of the following:

- Conduct inspections of surface waters and associated facilities located within area that may contain mussels.
- In some circumstances, close or restrict access to waters or facilities that are either infested or may be infested with mussels.
    - Closure or restriction must be limited to the manner and duration necessary to detect and prevent the spread of mussels within California.
    - Closures require the agreement of the Secretary for Resources and that DFG work with the owner or operator on the scope of the restrictions, especially when they impact the local economy.
    - DFG may work with the effected authority and associated agencies on closure procedures that would minimize the impact upon the local economic and recreational opportunities.

Additional Limits to DFG's Closure Authority

- DFG may not close water delivery and storage facilities operated for purposes of providing water supply if the operator has prepared and implemented a plan to control or eradicate mussels as described in FGC §2301.
- DFG may require the operator of such a facility to update its plan, and if the plan is not updated or revised, then the department may close or restrict access to the facility.

FGC §2302 defines the responsibilities of reservoir owners or managers in uninfested waters and relates to Prevention Programs. Any district, agency or authority that owns or manages a reservoir where public recreational, boating or fishing activities are permitted.

- **Owners and managers will do the following:**
  - Assess the vulnerability of the reservoir to infestation by dreissenid mussels.
  - Develop and implement a program to prevent the introduction of dreissenid mussels that includes public education, monitoring, and management of the recreational activities, along with other actions deemed appropriate by the owner or manager.
- **Grants districts, agencies and authorities the ability to:**
  - Refuse fish planting by DFG unless DFG can demonstrate that the fish come from an uninfested location.
- **What about waters not open to the public?**
  - The agency, district or authority that owns or manages the reservoir must, based upon available resources, include visual monitoring for the presence of mussels as part of its normal field activities.

What are the penalties under the law?

Once DFG has adopted regulations for imposing and appealing penalties, it has the authority to impose an administrative penalty of up to $1,000 on any person who violates FGC §2301 and §2302, any verbal or written order or regulation adopted pursuant to this section, or who resists, delays, obstructs or interferes with the implementation of this section.

Does the law require anything of other agencies?

The law requires that public or private agencies that operate water supply systems cooperate with DFG to implement measures either to avoid infestation or to control or eradicate any infestation that may occur. If mussels are detected, the operator will work with DFG to prepare and implement a plan to control or eradicate the mussels as listed in the code section.

What is DFG doing to stop the spread of Quagga/Zebra in Southern California?

DFG, in cooperation with many other state, federal and local agencies, has been working together to contain and control the Quagga mussels since their discovery in Lake Mead in January 2007. DFG has taken the following specific actions as part of its response:

- Hired staff in regional offices to serve as leads for local Quagga/Zebra mussel issues. At its headquarters, DFG hired staff to guide monitoring and planning document development statewide. All of these staff provide guidance, support, information and advice to local authorities, water mangers and the public.
- Has a boat inspection and decontamination training program that it has offered statewide. In 2007, DFG through the Pacific States Fisheries Management Council trained its wardens and biologists about inspection and offered the training to other state and local agencies. As of May 2008, more than 400 people have been trained statewide to conduct inspections.
- In cooperation with Department of Water Resources, developed a series of sampling protocols for veligers, surface, substrate and calcium monitoring. These protocols ensure consistency in sampling and data gathering which is needed for tracking and responding to these invasive mussels.
- In cooperation with Sea Grant Extension, is developing a volunteer training program for teaching interested individuals and groups monitoring techniques as an additional resource for local authorities.
- Has developed a communications plan and networked with many local, state and federal agencies to create a coalition that shares information, resources and consistent messages when working with the media and public.

Is there still recreational boating allowed in the infested waterbodies?

This varies depending upon the water body. San Justo Reservoir was closed to boating following the discovery of the Zebra mussels. Some infected waters do not have boating, others have limited boating while others have the restriction that vessels need to clean, drain and dry when they leave to keep from transporting the mussels.

Why haven't all the infested waters closed to boat traffic?

Each water body holds a unique position in the city or county it is in. A unilateral closure of waters can have devastating economic impacts upon a community. DFG works with each water authority in charge of an infested water to determine the best control and containment methods. Options include possibly closing additional lakes or reservoirs, allowing only rental boats or mandating cleaning of all boats exiting the water or reducing access. Staffing and resources can affect these decisions and the ability to implement some of these options.

What about having a database of vessels leaving infested waters?

DFG is giving this suggestion consideration for feasibility and effectiveness. As part of this analysis, several other components would need to be investigated to ensure a program would work, such as:

- The Department of Motor Vehicles developing new CF Number decal with a bar code that can be scanned for statewide database collection.
- Requiring infested waters to record CF numbers and vehicle identification numbers of all vessels, and place them in a statewide Web site database for identification by recreation lakes and reservoirs that are not infested. This has additional requirements of staff, electronic scanners and access to the database at all waters.
- Requiring a decal or non-removable sticker for boats launched into infested waters, but that sticker might prohibit that vessel from being put into any other water regardless of whether or not it has been thoroughly cleaned or decontaminated.
- Providing a certification process for boats launched into infested lakes or reservoirs would require funding and significant staffing. Of special concern would be how to ensure the quality control of the certification process.
- Offering a certificate of decontamination to allow CF numbers to be removed from the list on the Web site and the decal or sticker to be removed from the boat. Again, quality control would be an issue and this process would also require knowing if a boat was launched into contaminated waters again.

What about boats in saltwater? Does saltwater affect the mussels?

If a boat has been in saltwater, there is little risk of it transporting live freshwater mussels (though it can transport other invasive species). A conservative estimate of the lethal salt concentration for mussels is 10 to 15 parts per thousand (ppt), so realistically, anything above 10 ppt should kill Quagga/Zebra mussels. The average ocean salinity is 35 ppt. What is currently unknown is the time duration necessary for the salt to kill the mussels.

Will DFG provide Quagga-sniffing dogs to assist lake operators with identifying infected boats?

The DFG K-9 Program is still developing. Though available as a resource for Quagga/Zebra detection, these dogs and their handlers have all of the same patrol duties and obligations as other wardens. DFG is still defining the role these dogs will have. Several dogs have been used to verify a vessel's decontamination prior to its release from quarantine while others have assisted with DFG invasive mussel checkpoints. The dogs have proven to be effective, and DFG has encouraged other agencies interested in K-9 support to investigate establishing their own program.

For more information
Quagga hotline – 866-440-9530
http://www.dfg.ca.gov/invasives/quaggamussel/