Eye ON Invasives

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A California Department of Fish and Game Newsletter

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In this issue:

Welcome to Our First Newsletter

Welcome to to the Department of Fish and Game's (DFG) first newsletter about invasive species issues in California. While the newsletter is new, our concern about invasive species is not. As early as 1935, the Fish and Game Code contained provisions for restricting live animal importation "when such species are proved undesirable and a menace to the native wildlife or to the agricultural interests of this State."

At that time, DFG focused on restricting birds and mammals, and crayfish were the only aquatic species restricted. By 1972, the restricted species list contained many additional aquatic species, including species of snakehead, fish that were added to the federal injurious wildlife list in 2010. DFG biologists recognized early on the need to keep these invaders out of our waters.

In 1994, all members of the genus Dreissena, which includes zebra and quagga mussels, were identified as detrimental species to California and added to the list. When they arrived in Nevada, overland from the Great Lakes in 2007, California already had boat inspection programs in place at the Department of Food and Agriculture Border Protection Stations.

We recognize that regulations cannot be relied on as the sole preventative of introductions and continue to look for new and better ways to prevent new introductions and contain or control those already in California. We have established many public and private partnerships that we will introduce you to in this and future editions of the newsletter.

In this, our first quarterly issue of Eye On Invasives, we focus on invasive mussels, and share with you some of the many efforts underway by DFG and our partners. Future issues will present a diverse array of invasive species, both aquatic and terrestrial, those currently in the state, and those identified as potential invaders.

We recognize that keeping our stakeholders informed is a key part of our prevention program. Please share this newsletter with others. Because invasive species can have significant impacts to the environment and to our economy, we must work together to reduce their impacts in California.

What's on the DFG Restricted Species List today?

Birds, mammals, frogs, toads, salamanders, lampreys, fishes, reptiles, crayfishes, slugs and snails, and clams.

The California Department of Food and Agriculture is responsible for dealing with noxious weeds and other agricultural pest species.

DFG's Quagga/Zebra Mussel Project

The mission of DFG's Invasive Species Program is to reduce the negative effects of non-native invasive species on the wildlands and waterways of California. Our projects address introduced animals and plants, both terrestrial and aquatic. More fundamentally, we try to address the ways by which invasive species are introduced—typically inadvertently by human activities.

One such project is the effort to contain invasive freshwater mussels. We have been working to contain and control quagga mussels since their discovery in Lake Mead in January 2007. When their presence was confirmed and the magnitude of the potential problem realized, we hired staff to work at a local level and to coordinate all statewide activities. Our staff provide expertise, guidance, support, information and advice to local authorities, water managers and the public.

Some specific actions we have initiated include:

- Increased inspections at California Department of Food and Agriculture Border Protection Stations
- Trained and deployed survey teams to inspect water bodies statewide
- Developed and implemented monitoring plans for high risk waters in the state
- Purchased and deployed portable wash stations in each DFG Region
- Distributed information and education material including direct mailings to boat owners, posted notifications at water bodies, distributed informational cards at multiple locations and worked with the media to reach the public.

We have also implemented a watercraft inspection and decontamination training program that is offered statewide. In 2007, DFG, through the Pacific States Fisheries Management Commission, trained game wardens and biologists how to conduct inspections and offered the training to other state and local agencies. So far, more than 1,000 people have been trained statewide to conduct inspections.

As active as DFG has been with containing the spread of invasive mussels, the issue is so complex that we can't do it all alone. This means coordination with other state, federal and local agencies is very important, and we have formed a coalition that shares information, resources and consistent messages when working with the media and public.

Our principal partners include the California Departments of Water Resources, Food and Agriculture, Boating and Waterways, and Parks and Recreation. Other partners include the U.S. Fish and Wildlife Service, National Park Service, U.S. Bureau of Reclamation, Metropolitan Water District and multiple local authorities. Partners are not limited to government entities. DFG seeks to engage and support non-governmental organizations and universities working on quagga and zebra mussel research.

At the policy level, we are actively involved with the Invasive Species Council of California (*ISCC*) and the California Invasive Species Advisory Committee (*CISAC*). The ISCC and its advisory council help coordinate and ensure complementary, cost-efficient, environmentally sound and effective state activities for invasive species. We also formalized the California Agencies Aquatic Invasive Species Team (CAAIST) which is made up of representatives from each state agency involved with aquatic invasive species. This team is responsible for the implementation of the California Aquatic Invasive Species Management Plan.

The DFG Quagga and Zebra Mussel Project is dedicated to working with partners in the private sector and at all levels of government. Working closely with these stakeholders is vital for preventing the spread of mussels and the economic and environmental damage they cause. However, it's not just those with direct commercial or regulatory interests that we need to engage. A well informed and motivated public is absolutely essential to our success, so we invite everyone to go to our website *www.dfg.ca.gov/invasives/quaggamussel/* to learn how to get involved.

Mussel Magnitude

Quagga and zebra mussels have been in the United States since the late 1980s, and were first discovered in the Great Lakes. These mussels are native to Russia and Ukraine, and most likely were introduced to the Great Lakes by way of ballast water from ships. In January 2007, quagga mussels were found for the first time in California in Lake Havasu, which borders Arizona. Since then quagga mussels have spread to lakes and reservoirs in Southern California through water conveyances. Lake Havasu is the source water for the Colorado River Aqueduct, which provides water to many water districts in Southern California. Quagga mussels have spread from Lake Havasu to 24 other lakes and reservoirs in San Bernardino, Riverside, San Diego, Imperial and Orange Counties.

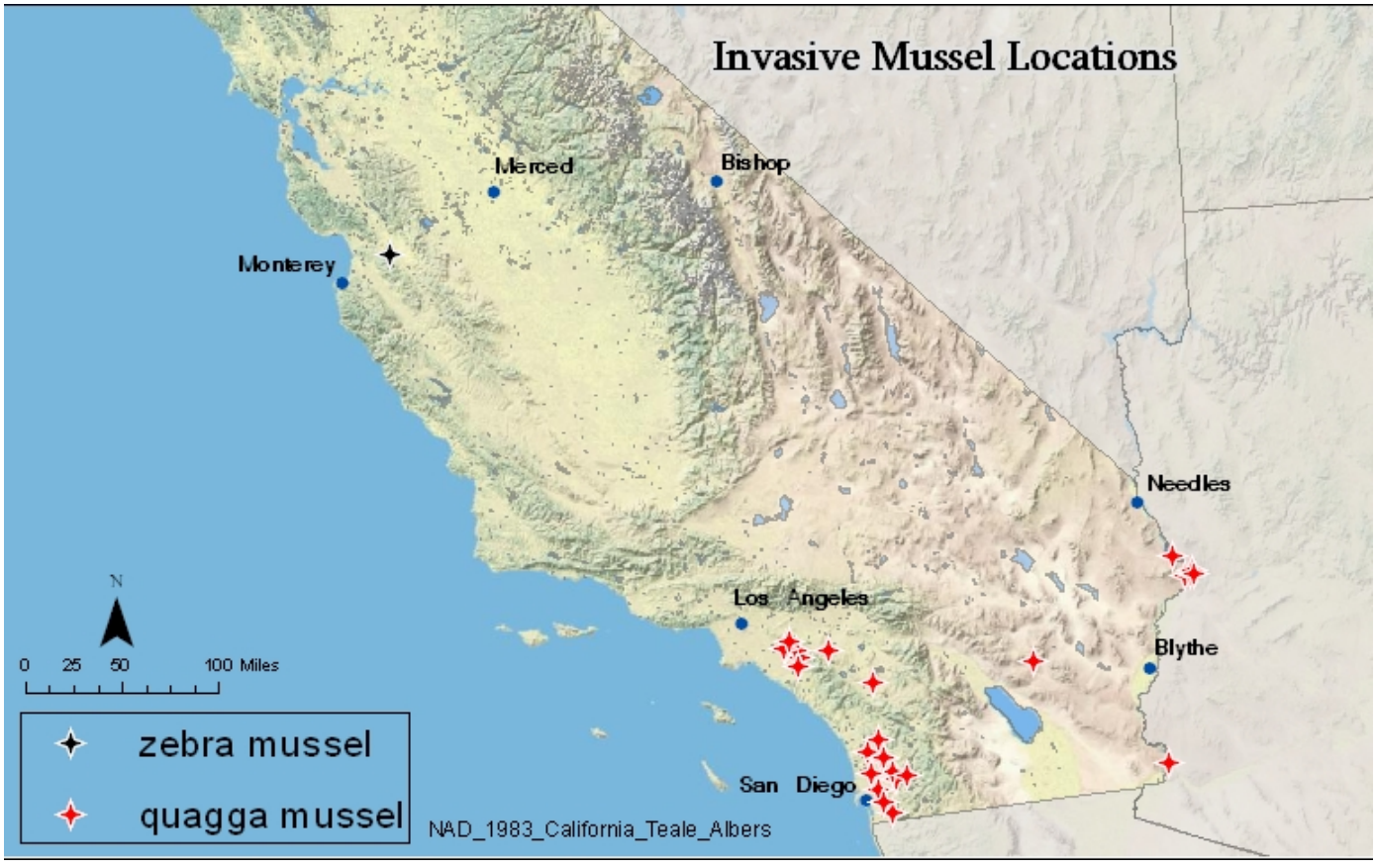
Many of these water bodies act as both water supply facilities and recreational destinations, offering opportunities such as boating, fishing and camping. These many different uses make preventing the spread of quagga mussels very challenging.

A year after quagga mussels were discovered in Lake Havasu, zebra mussels were found in San Justo Reservoir in San Benito County. To date, zebra mussels have not been detected anywhere else in California. In order to prevent the spread of mussels to other waterways, the Bureau of Reclamation and San Benito County Water District closed San Justo Reservoir to public recreational uses.

DFG is currently developing a detailed report on the distribution of quagga and zebra mussels in California. A copy of this report will be available in the coming months and will be posted on our website.

Did You Know?

The Colorado River Aqueduct provides drinking water to 26 cities and water districts. The Aqueduct serves more than 19 million people.



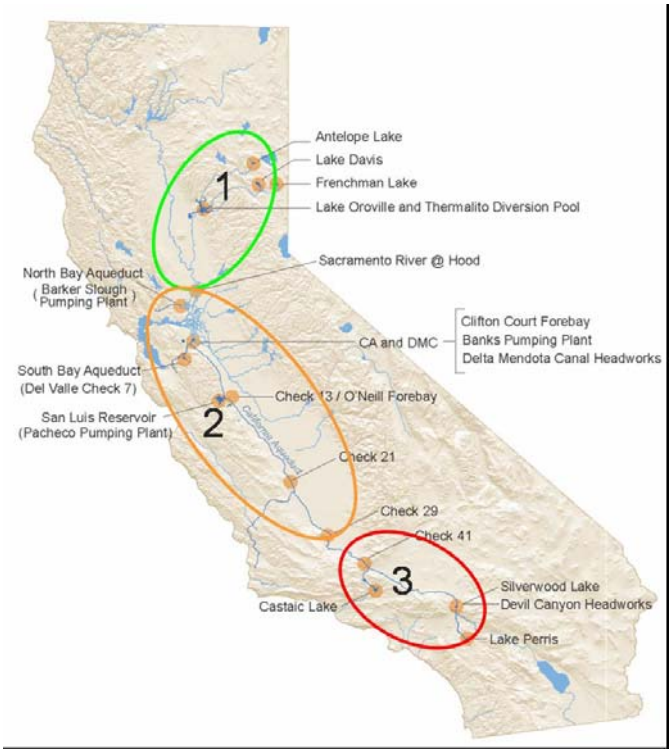
Partner Spotlight

Department of Water Resources Assesses the Vulnerability of the State Water Project

The Department of Water Resources (DWR), in partnership with RNT Consulting (RNT), is currently conducting studies to determine the risk quagga and zebra mussels (mussels) pose to California's State Water Project (SWP). DWR and RNT have analyzed 10 years of water quality data to determine whether the lakes, reservoirs, rivers and aqueducts that comprise the SWP are low, medium, or high risk for mussel colonization.

The first study involved analyzing pH and calcium data from water throughout the SWP. RNT compared water quality conditions at each location to what is considered to be limiting pH and calcium conditions for mussels. According to RNT, the minimum pH for long term survival of mussels is 7.3, or 7.8 when calcium is above 12 mg/L.

The results from this study show that the SWP can be divided into three zones based on susceptibility of mussel establishment. Zone 1, the northern part of the SWP, which includes Antelope Lake, Lake Davis, Frenchman Lake, Lake Oroville, the Thermalito Diversion Pool and the Sacramento River at Hood, has been determined to be unsuitable to support mussels. In this zone, pH levels and calcium concentrations were well below sustainable levels for mussels.



Zone 2, which includes the North Bay Aqueduct, the northern end of the California Aqueduct and Delta Mendota Canal, San Luis Reservoir and O'Neill Forebay is potentially able to support mussels but there is uncertainty if this zone could support long-term mussel populations. In this zone, pH levels and calcium concentrations were usually within tolerable ranges for mussel survival; however on several occasions in the last decade the zone had periods of time when the conditions were limiting. Based on the available data, DWR is uncertain whether these sites would be able to support long term mussel populations. Addit ional studies of mussel survival under these marginal conditions will occur in Summer 2011.

Finally, the southern part of the SWP, defined as Zone 3, is able to support mussels because it has relatively high calcium concentrations and pH above limiting levels. Zone 3 includes the lower portions of the California Aqueduct, Castaic Lake Outlet, Castaic Lake at Jensen Influent, Silverwood Lake Outlet at Devil Canyon, Devil Canyon Headworks and Lake Perris Outlet.

Prior studies by RNT and DWR are contributing to a better understanding of environmental conditions needed for mussel survival. In separate studies, RNT and DWR found that when pH or calcium levels are lower than the optimum levels, the shells of mussels tend to break down, and if prolonged, can result in mortality. However, if pH or calcium levels return to a more favorable state, the mussels can repair themselves. In general, the adult mussels are able to withstand longer periods of unfavorable conditions while their larvae are more susceptible to mortality under unfavorable conditions. Future research will examine the effect of low pH and high pH on larval mussels, as well as adults, as a potential control method for mussels in power plants and water delivery infrastructure.

The information developed from DWR's assessment will be used to identify where further study is necessary. DWR intends to continue to monitor for mussels throughout the SWP as it has in the past, and may collect more water quality data from Zone 2 to better understand its susceptibility. In addition, the results from this assessment will be used to determine priorities for boat inspections in the portions of the SWP that are open to recreation.

Department of Fish and Game K-9s Track Down Quagga and Zebra Mussels

You've probably heard of drug sniffing dogs – but have you ever heard of mussel sniffing dogs? As early as 3000 BC, humans have used dogs and their keen sense of smell to help them hunt for food. Since then, dogs have been used by the military and law enforcement to locate lost people and suspects on the run, concealed drugs and weapons, and prohibited fruit and vegetables; and more recently to find invasive mussels.

Dogs first accompanied DFG wardens in the late 1990's and into the early 2000's. In 2006, the Chief of the Law Enforcement Division launched a DFG-sponsored program to train up to 24 dogs. "These dogs are paired with handlers throughout the state to add depth to the abilities of our game wardens to stop criminal activities. All of the dogs are trained to detect quagga and zebra mussels. The dogs' detection abilities will speed up searches while also providing protection for their handlers. In addition, these dogs provide an outstanding public relations and educational tool for the Department" said Chief Nancy Foley.

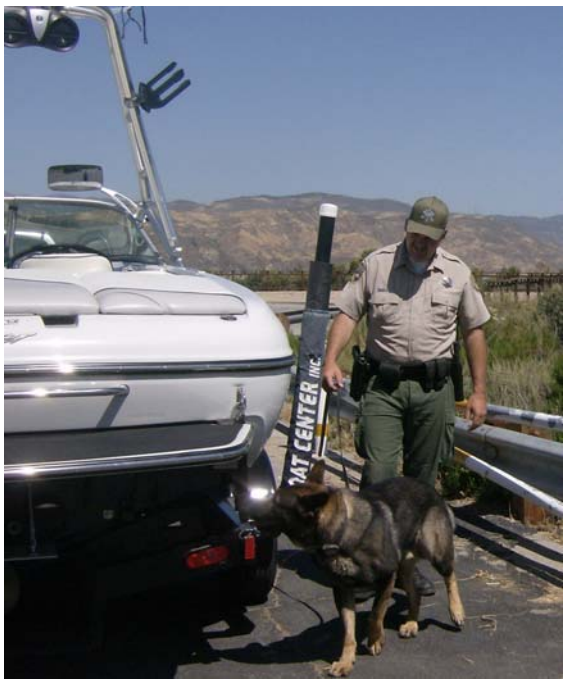
With a sense of smell that may be up to a million times stronger than humans, dogs are able to discern multiple target scents from other background smells. The training is conducted by DFG, and the training academies for detection are at least six weeks long.

In addition to detecting quagga and zebra mussels, DFG dogs are trained to detect firearms and a variety of game species. Searching for mussels on watercraft is just one of the many important jobs these dogs have. In order to "stay on their paws" and be ready when called upon, they receive at least 16 hours per month of maintenance training and must pass detection recertification at least once a year.

Not only are these dogs trained to smell mussels, but their warden partners are also trained to inspect watercraft. When called upon, the dog and warden work as a team to thoroughly and systematically search the watercraft for mussels. If the dog smells mussel odor, he "tells" his handler by performing his trained alert, which may be sitting and looking where the odor is the strongest, or by scratching at the spot. Each dog has one alert for all the scents they are trained to detect, so it is up to the warden to further investigate what has prompted the dog's alert.

The teams are available to check watercraft that have been identified by DFG scientists as being possibly infested with mussels. The dogs help the scientists decide whether or not a suspect watercraft needs to be fully decontaminated.

This program is largely funded through private donations and fundraisers, and is administered by Californians Turn In Poachers, Inc. (CalTIP), a not for profit organization. Organizations, agencies, and individuals are invited to sponsor a dog or donate funds to support a dog and warden team. For more information please contact Lieutenant Lynette Shimek, K-9 Unit Coordinator, at (707) 275-8862.



Why Clean, Drain, and Dry?

Why should you worry about these little quagga and zebra mussels, you ask? Did you know that quagga and zebra mussels can survive out of water for up to 30 days depending on weather conditions? And that a boat that has mussels attached to it can then transfer those mussels to a non-infested lake or river? Quagga and zebra mussels are bad news for boaters and water recreation enthusiasts. If these small mussels invade a water body, they can not only attach themselves to boats, but also to docks and mooring lines – even the rocks along the shoreline. The consequences range from having to scrape off the shells, to boat damage, to complete closures of lakes and reservoirs.

Quagga and zebra mussels can damage boats in numerous ways. They can block the intakes to a boat's cooling system and cause the engine to overheat. By attaching to the bottom of a boat, these mussels can increase drag, which reduces the boat's speed and fuel efficiency. They can jam the steering system on a boat, making it difficult and potentially dangerous to maneuver. If allowed to accumulate on the hull, mussels must be scraped off to remove them, which may lead to the need to repaint the hull. All of these impacts would increase the amount of time and money boat owners would put into maintaining their watercraft.

Quagga and zebra mussels also impact sport fishing. The mussels can alter the environment, thus reducing the size and number of fish. Fish that were once present for recreational fishing activities may no longer survive in the lake or reservoir. In extreme cases, a lake or reservoir may be closed to recreational activities all together because of the mussel infestation.

One way to avoid these types of impacts is to clean, drain and dry your boat after every use. Many local authorities have instituted mandatory inspection programs at their lakes and reservoirs. Most of these programs promote the "Clean, Drain, Dry" guiding principle, and they may also screen watercraft for those that pose a higher risk of introducing quagga and zebra mussels. Contaminated or suspect boats are being turned away.

To minimize your wait time at the launch ramp, call the water body before you visit it to find out what to expect. As an added precaution, if you live in Southern California and boat in quagga mussel infested waters, it is recommended that you limit your boating to only quagga mussel-infested water bodies, rather than moving from infested to uninfested water bodies.

A handy resource developed by DFG and the Department of Boating and Waterways is called "The Boat Cleaning Guide Book." This online booklet provides information to help boaters and other water recreation enthusiasts keep watercraft and equipment free of invasive mussels. A copy of this guide book is available at www.dfg.ca.gov/invasives/quaggamussel. By following the "Clean, Drain, Dry" principle every time you boat, you will be helping to protect California's waters, wildlife and recreational opportunities for today and tomorrow.

A sneak peek into the next issue of *Eye On Invasives*:

Pathways of Invasion : How Do They Get Here?

- Horticultural Hitchhikers
- Partner Spotlight – Busted By CDFA
- Bait Bucket Invasions
- And much more!