QUAGGA MUSSELS SUMMARY

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WHAT ARE QUAGGA MUSSELS?

Quagga Mussels (QM) are non-native freshwater mussels from Eastern Europe that clog waterways, undermine healthy lake ecosystems, ruin boat engine cooling systems, and financially burden water resource agencies.

QMs are prolific breeders that can overrun a lake causing hundreds of thousands of dollars worth of damage annually. One female QM can spawn 1,000,000 offspring annually. QMs rapid reproduction can negatively disrupt an aquatic ecosystem in a very short amount of time. Once QMs are introduced into a waterway, there is no way to fully eradicate the species. Preventing introduction is crucial.


Mussel shell covered beach


Quagga Mussels at various sizes

COMMON CAUSES OF QUAGGA MUSSEL INTRODUCTION INTO WATER SUPPLIES

QMs were carried to the Untied States (US) in ship ballast tanks and were introduced to the Great Lakes region in 1989.

For nearly 20 years, QMs have spread across the US and have entered California waterways (Attachment 1). In January 2007, QMs were discovered in Lake Mead and the Colorado River system. Recently QMs have been found in 20 South West lakes and water ways (Attachment 2).


QMs attached to a boat motor


QMs can live on aquatic plants and be transported to non-infested waters

QMs are commonly spread by the following methods:

- Living adult mussels adhere themselves to boat hulls, engines, and propellers;
- Microscopic larval may survive in boat bilges, water tanks, bait tanks, fish tanks, the hull, and the trailer;
- Aquatic plants, where adult mussels and larva live, attach themselves to boats, anchors, ropes, and trailers. The attached aquatic plants are carried to other non-infested lakes and water ways;
- Infested fish hatcheries can transport adult mussels and larva in tanker trucks when stocking a lake with fish.

LOCAL CONCERNS

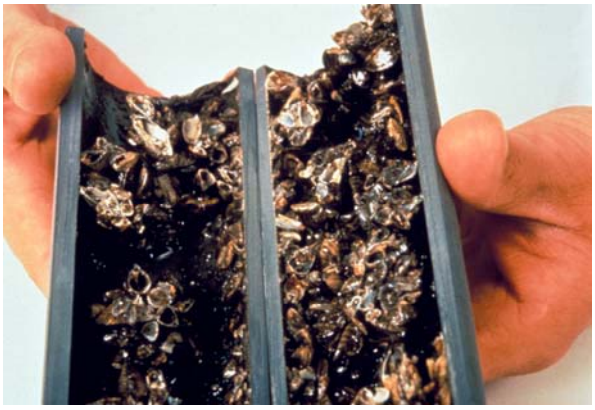
Lopez Lake and Santa Margarita Lake are at greatest risk during a bass fishing tournament. Bass boats travel from lake to lake competing and can potentially expose our lakes to QMs and their larva. If a bass boat enters a tournament at a QM infested lake, they could carry the adult mussel or larva to one of our regional lakes.

Out of county boaters are of equal contamination risk (especially if recently visiting Lake Mead, the Colorado River, or any other infected water body).

Vessels docked or stored at non-infested lakes pose very little to no threat of spreading QMs. Also, vessels that are NOT introduced to infested lakes pose little to no threat of spreading QMs.

DAMAGE CAUSED BY QUAGGA MUSSELS

QMs colonize pipes, docks, locks, ship hulls, water intake pipes, other mollusks and cause extensive damage to water treatment facilities.



QMs clog pipes and intake structures causing severe damage that requires heavy annual maintenance

For Great Lakes water users with lake water intake structures, Park and Hushak (1999) report that total monitoring and control costs were $149 million from 1989 to 1994, and averaged $37 million annually from 1992 to 1994.

According to the Agricultural and Resource Economics Review (April 2006), A number of sources report the general costs of the mussel to be around $6.5 billion for a 10-year period (1990-2000) in the Great Lakes.

However, another estimate puts the cost of damages over 10 years to intake pipes, water filtration equipment, and power plants at $3.2 billion.

In addition to damaging water systems, QMs disrupt the food chain by consuming nutrients used by other species. Due to massive populations, QMs can consume so much plant life that water begins to clear up. Parks personnel in the Great Lakes region report that water once visible to depths of 6 to 12 inches have been clearing up to astonishing depths of 10 to 12 feet.

Clearer water negatively affects aquatic ecosystems. Many small aquatic animals no longer have sufficient nutrients. For example, the average weight of a Whitefish in the Great Lakes has gone from 5 lbs. in 1988 to 1.6 lbs. in 2006. Also, clearer water allows a deeper penetration of sunlight that can stimulate the growth of blue-green algae causing taste and odor problems in drinking water. This is cause for specific concern for SLO County reservoirs since both Santa Margarita Lake and Lopez Lake provide drinking water to agencies throughout the county. Some fear that if QMs are not kept out of local reservoirs, water customers will end up paying for additional cleaning and filtration systems.

QMs are filter feeders that absorb heavy metals, trace elements, toxins, and chemical contaminants in their tissues. These absorbents can be passed up the food chain when QMs are eaten by water fowl and other organisms. There have been massive die-offs of water fowl in the Great Lakes region due to Quagga and Zebra Mussels.

WHAT ARE OTHER AGENCIES DOING TO PROTECT THEIR WATER SUPPLIES?

Boat Inspections and Quarantines

Natural resource and recreation agencies across North America conduct boat entry inspections (even where mussels have invaded). Inspections are also conducted by the CA Department of Food and Agriculture at the California border.

California Department of Food and Agriculture Boat Inspection

Boat Inspection Points

Santa Barbara County Parks staff began verbally screening boaters entering Cachuma Lake in January 2007. The screening provides information about recent lakes visited by boaters. By December 2007, Parks staff received training and began conducting visual boat inspections at Cachuma Lake. In March 2008, following a temporary lake closure prompted by the threat of QM infestation, Cachuma Lake began requiring all private

boats to undergo a pre-launch inspection and high pressure decontamination wash. Santa Barbara County Parks also require an on site, 14 day quarantine prior to reservoir access if a boat is longer than 24 feet, has out-of-state stickers/passes, or is registered in close proximity to a quagga infested lake.

Casitas Lake has also inspected boats since late 2007 and is believed to be the only other California lake conducting boat inspections and quarantining suspect vessels.

Specially trained dogs have been used at the California border to sniff out and detect QMs, Zebra Mussels and their larva. 82,000 vessels crossed the California border last year and 104 were found carrying these species. These vessels were subsequently inspected and quarantined.

It is in the interest of all resource and recreation agency managers of all uninfected lakes in California to conduct thorough boat inspections, quarantine boats that have attached mussels or are otherwise suspect, and establish boat decontamination stations.

Restricting Access/Lake Closures

Several California lakes and reservoirs have implemented temporary closures. Shore fishing and day use (camping, picnics, hiking, swimming, etc.) have remained unaltered and boats that have been stored at the lake (on dock or dry storage), including rental boats, have been allowed lake access.

Currently, the following California lakes and reservoirs have closed to outside vessels and are allowing local (restricted) access only:

- Camanche Reservoir (San Joaquin, Amador, and Calaveras Counties);
- Pardee Reservoir (Amador and Calaveras Counties);
- Lake Castias (Ventura County);
- Westlake Lake (Ventura County);
- Lake Wolford (San Diego County);

Decontamination

Vessel decontamination in high pressure washing stations is effective at killing QM larva and either killing or removing adult mussels. Decontamination stations are in use by the Department of Food and Agriculture at the California/Arizona border and have been installed at Lake Mead and will likely be installed soon in Southern California by the Metropolitan Water District.

Hydro Engineering Inc. Decontamination Station

Santa Barbara County Parks are actively researching boat washing stations and is in contact with two companies that have provided products to the National Park Service at Lake Mead and to Montana Fish, Wildlife, and Parks. Eight to ten weeks is required to complete installation and training. Cost estimates range from just under $70,000 for portable stations to $175,000 to $300,000 for permanent stations.

Boater Screening/Public Education

The value of public outreach cannot be overemphasized. Among natural resource individuals in Minnesota, Wisconsin, and Oklahoma at lakes with established mussels, education was considered crucial to containment of spread. Since February 2007, Santa Barbara County Parks has promoted the following outreach:

- Signs posted at the Park entrance, boat launching area, bait and tackle shop, and fish cleaning stations;
- Fliers about the invasive mussel distributed to all boaters entering the Park;
- Promote to boaters the guidelines of the national Stop Aquatic Hitchhikers campaign:
    - Remove vegetation, mud and animals from the boat, motor and trailer;
    - Drain water from live wells, bait wells, bilge and motor;
    - Rinse the boat and trailer with hot water OR let it dry for five days.
- Boaters verbally screened to determine whether they had been in any infected waters;
- Boats inspected (since December 2007);

Monitoring and Sampling

Monitoring protocols for early detection of QMs and Zebra Mussels have been established by the Center for Lakes and Reservoirs, Portland State University, and adopted by the California Department of Water Resources and Department of Fish and Game. All manner of submerged surfaces are inspected visually and tactilely, including docks, loglines, boats, anchor cables, etc. QMs are described as feeling like sandpaper.

In addition, a sampling device, a "Portland Sampler" has been designed for agencies to reproduce and use in monitoring stations. The samplers are suspended at different depths to provide surface for any QM larva to colonize.

Portland Sampler

Inspections can also involve collecting samples of plankton to analyze for QM larva, in which the samples are sent to specific labs for analysis. This is ideal, and it could mean early detection, however it is costly, as QM larva are microscopic and difficult to identify. An increasing number of agencies are arranging training and analyzing their own samples.

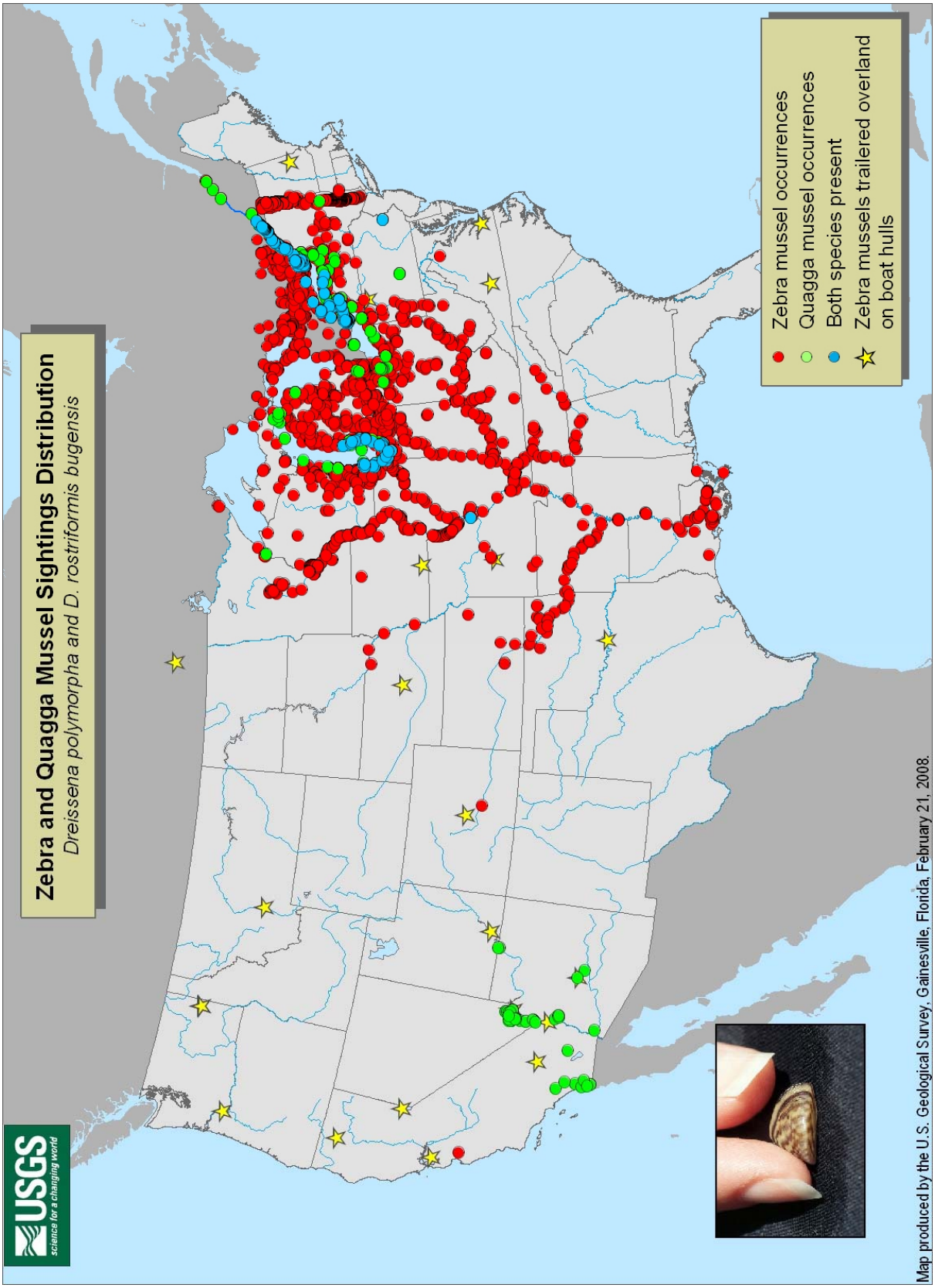
State Protections

It's imperative that funding at the state level be secured to support prevention programs such as monitoring, inspections, and public education. Minnesota set an excellent example by galvanizing efforts to stall spread from the beginning of infestations of Zebra Mussels. After 20 years of Zebra Mussels, only a handful of inland lakes have become infested. Minnesota imposed a surcharge on boating licenses to fund education, monitoring, and inspections. The costs of managing infestations far outweigh, by orders of magnitude, the costs of prevention.

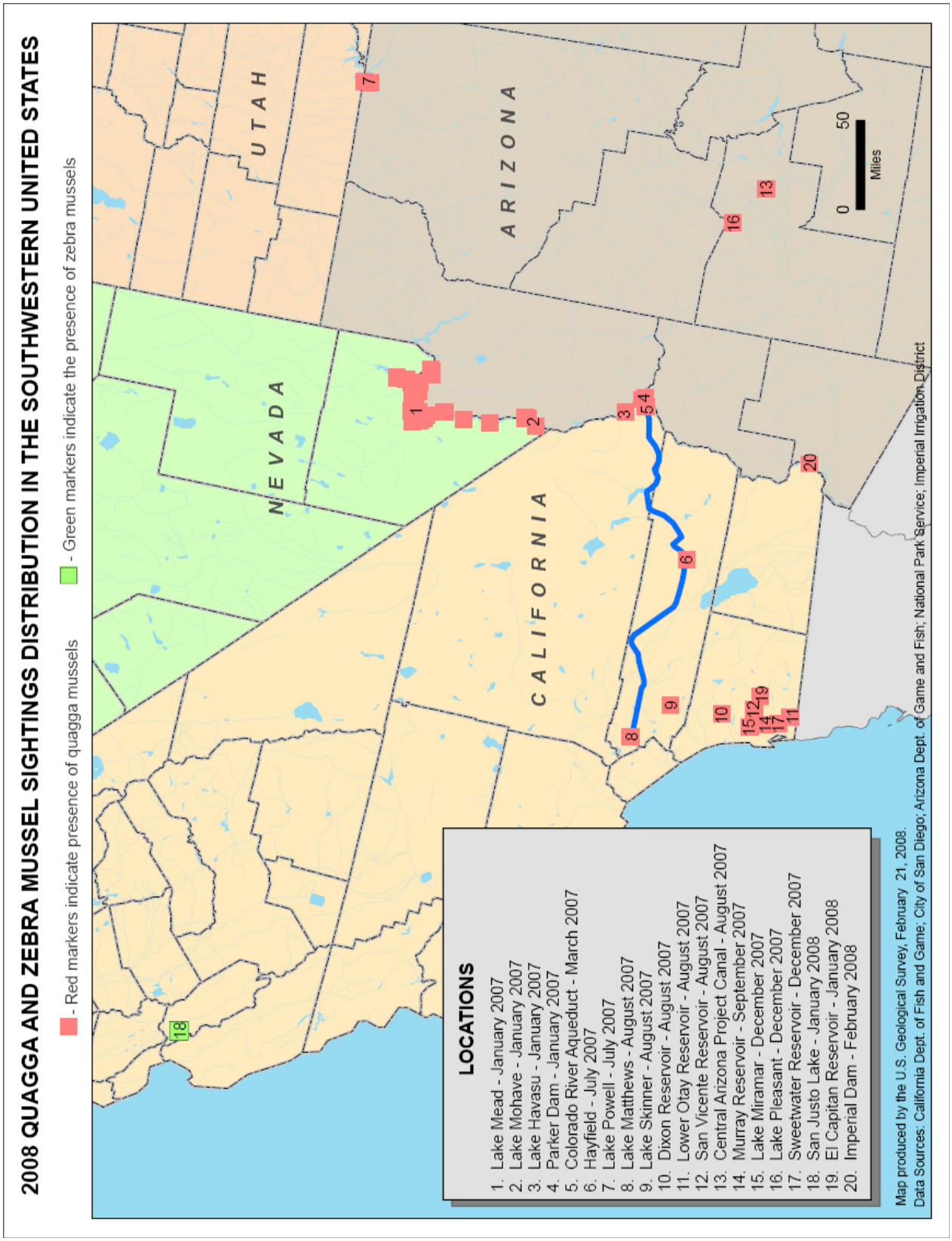
Brief, Encouraging, Closing Words (Santa Barbara County Parks Department)

Three biologists who have been involved in quagga and zebra mussel management for many years, and with whom Santa Barbara County Parks staff had detailed conversations, are not dispirited. To the question, "Are the mussels inevitable?" each individual replied, "No."

ATTACHMENT 1



ATTACHMENT 2



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