

SRP and Mussel Invasion in the Southwest

Background:

- Zebra and Quagga Mussels arrived in the Great Lakes around 1988 in ballast water of cargo ships from Europe.
- Can attach to almost any hard surface and cause bio-fouling of intakes and other structures.
- Huge reproductive capability: 30,000 veligers per female per cycle.
- No significant predators.
- Highly adaptable to new environments.

Quagga Mussel Spread

- Dneiper River drainage, Ukraine 1890
- Great Lakes, 1988 (via ballast water)
- New Orleans, 1993
- Lake Mead- Jan. 2007
- Lower Colorado River, 2007 Spring/Summer
- Lake Pleasant- Dec. 2007
- Veligers in SRP canals-
June, 2008
- Adults in CAP/SRP Interconnect-
Oct. 2008
- First adults found in SRP canals July, 2013.







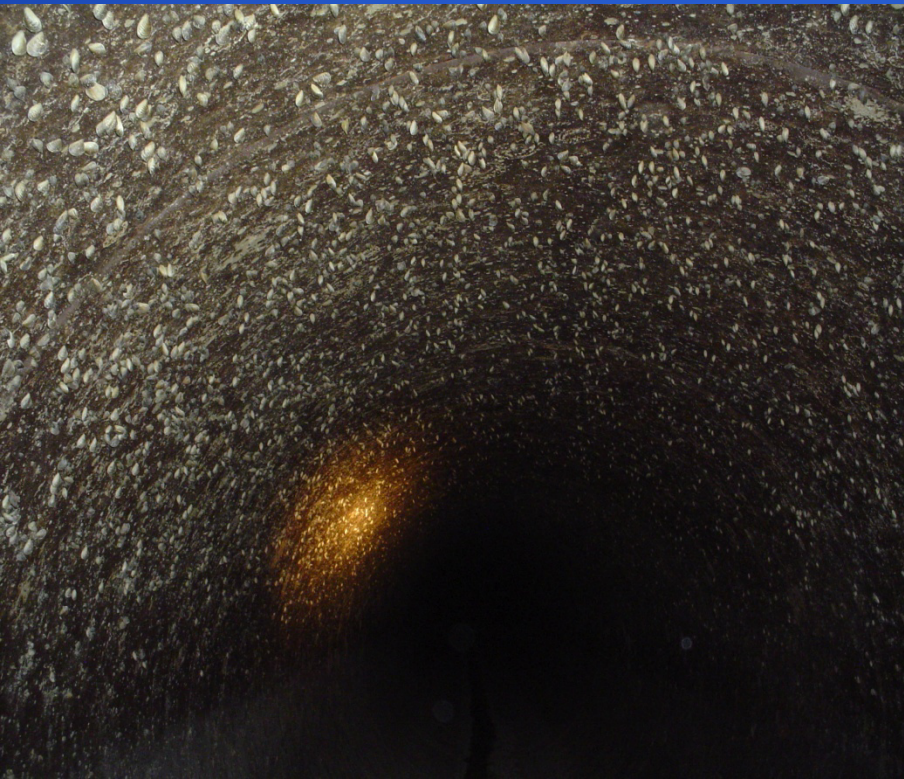
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Temperature Tolerance

- Range of 53° F to 86° F for reproduction.
- Mortality starts around 86° F, with some surviving into low 90's for short periods.
- Upper temperature range for SRP canals is around 85° F.
- Hot water +104° F kills the adult mussels in about one minute.

Parker Dam Trash Rack (2-26-09)

(USBR website photo)



Siphon pipe from CAP
canal to cone valves.
(June 2009)

Rapid Increase in Population Density Parker Dam, Lake Havasu

August/07



November/07





01/12/2014



01/13/2014

Control Methods

- EarthTec QZ, copper based molluscicide.
- Zequanox, bacteria based molluscicide. (not yet labeled for use above Water Treatment Plants)
- Anti-Fouling Coating studies. (USBR)
- Pressure washing.
- Hot water. (140 -160 degrees, lethal in seconds)
- Mechanical scraping.

Current Plan

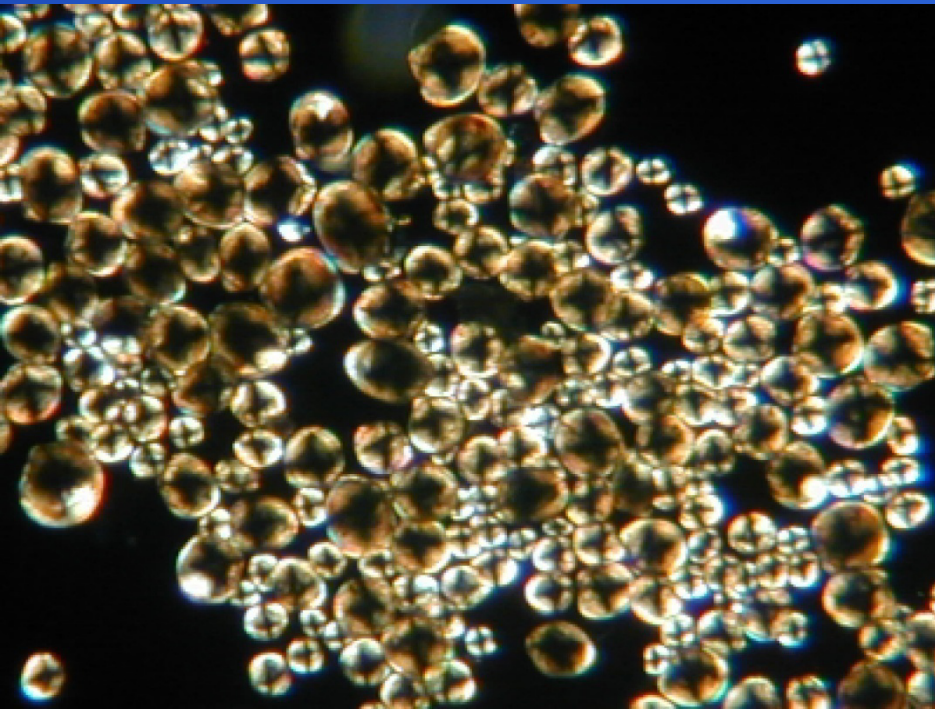
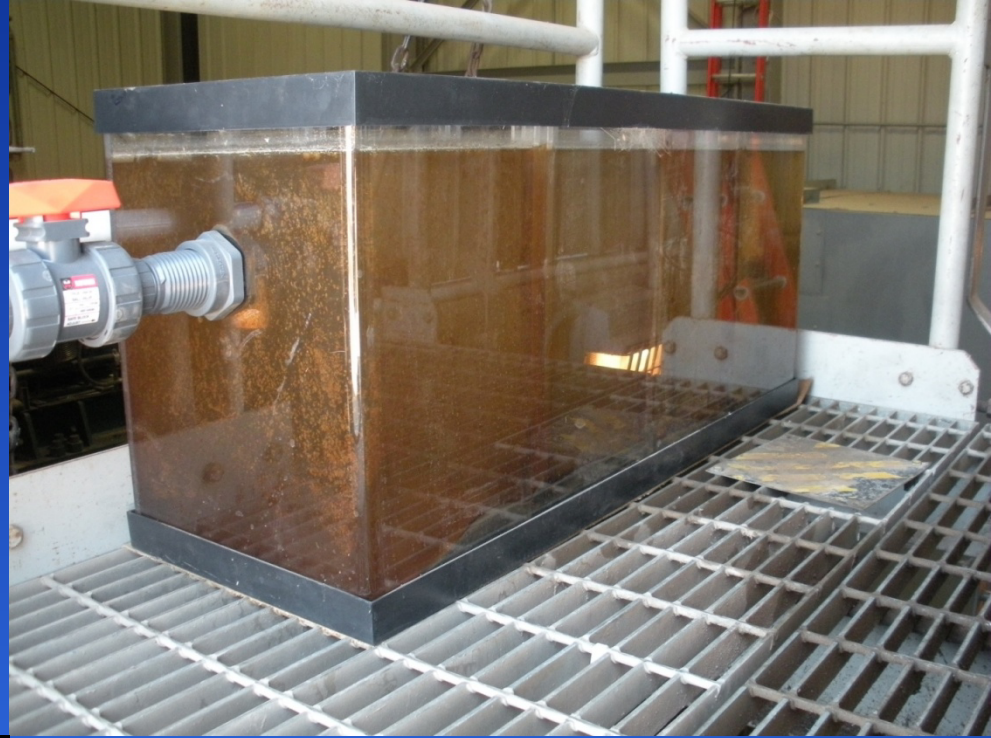
- Contracted USBR to continue sampling of the SRP reservoirs for microscopic and PCR (DNA) detection.
- Canal monitoring for adults and veligers using substrates and underwater video camera (newest tool).
- Inspect drained canal sections during canal dryup.
- Continue Outreach materials and coordination.

Working with Az. Game and Fish, USBR, CAP and the U.S. Forest Service.

Current Plan continued

- Evaluate EarthTec QZ for compatibility with White Amur fish at low concentrations.
- Mechanical scraping on limited basis during canal dryup.
- Follow new treatment developments:
 - High sheer turbulence device.
 - UV
 - Anti-fouling coatings. (USBR testing products at Parker Dam.)

Bio-box



Cross-polarized
light microscopy.

Equipment of Concern

- Gates and measuring weirs
 - Stilling wells and level gauges
 - Fish grates and trash grates
 - Hydroelectric equipment
 - Piped laterals/pipes within WTPs
 - Intake structures: potential for reduced capacity
 - Canal/basin linings: potential for reduced capacity
- Basically any hard surface to which mussels could attach

Secondary Impact:

- Increased vegetation growth, resulting in plugging of intake structures.
- Blue-green algae blooms, resulting in increased Taste and odor complaints.



Outreach to Boaters

- “Clean, Drain and Dry” message to boaters to prevent spreading mussels to other lakes.
- 100th Meridian Initiative.org website has calculator for boat drying time based on geographic location. (April dry time is 11 days for Phoenix area.)
- Must complete “Boat Inspection Form” and comply with cleaning /drying protocol for Interstate transport of your boat. Form must be faxed to Az. Game and Fish Dept. and they will forward to other State Invasive Species Coordinators along your route.
- Zebra mussels (close cousin) like shallow warmer water and could occupy slightly different habitat.

DON'T MOVE A MUSSEL

Lakes Havasu, Mead, Mohave, Pleasant and the Lower Colorado River are infected with quagga mussels.



These pests damage boats, fisheries, recreation areas and water systems!

Before launching in this or other body of water, please:

- Thoroughly dry the boat, engine, livewells and bilge spaces or
- Power-wash the hull of the boat.
- Flush engine, live wells and bilge spaces with 140° water or household vinegar.

Before leaving this lake, please:

- Drain the water from boat, livewell and the lower unit.
- Clean and remove all plant and animal material from the hull and trailer.
- Dry the boat and inspect all exposed surfaces.

For boat wash locations, please call the Forest Service 928-467-3200.

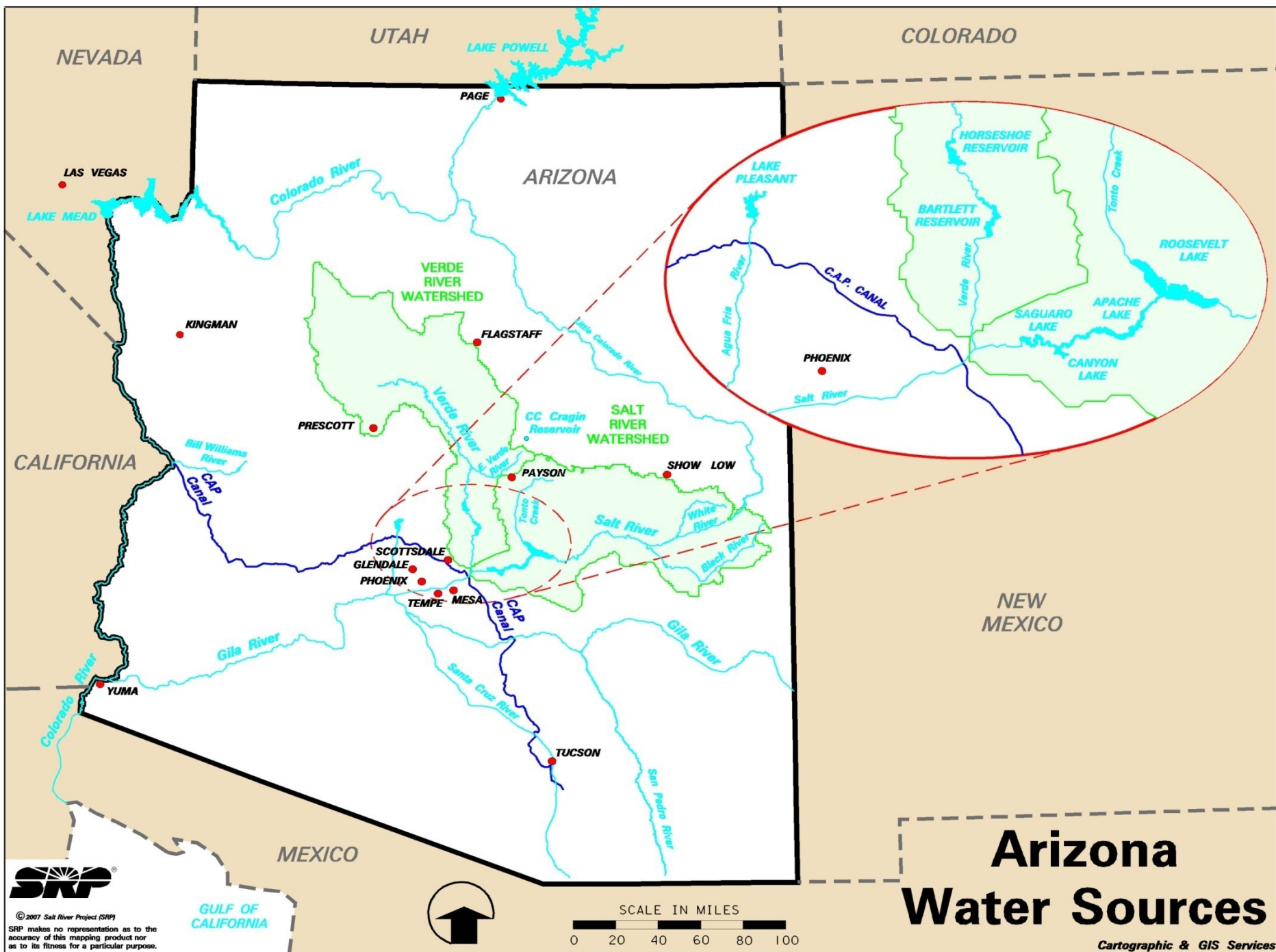


Visit www.azgfd.gov/mussels for more information.

Summary:

- Invasion has arrived in some waters, but is occurring at a slower rate than seen in the Colorado River Reservoirs.
- Delaying mussel expansion, is also delaying increased maintenance costs and buying time while treatment options are advanced. Outreach is still a high value.
- Still early in the infestation process. Currently only quagga mussels being seen; zebra mussels could still be introduced and occupy different niche.

Questions?



Arizona Water Sources

Parker Dam- Penstock Gate Inspection 7/23/2008

