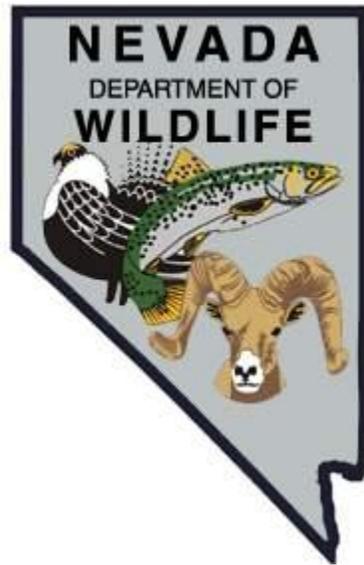


# NEVADA DEPARTMENT OF WILDLIFE STATEWIDE FISHERIES MANAGEMENT



## FEDERAL AID JOB PROGRESS REPORTS

F-20-48  
2012

## QUAGGA MUSSEL MONITORING EASTERN REGION



**NEVADA DEPARTMENT OF WILDLIFE, FISHERIES DIVISION  
ANNUAL JOB PROGRESS REPORT**

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**NEVADA DEPARTMENT OF WILDLIFE, FISHERIES DIVISION  
ANNUAL JOB PROGRESS REPORT**

**State:** *Nevada*  
**Project Title:** *Statewide Fisheries Program*  
**Job Title:** *Quagga Mussel Monitoring*  
**Report Period:** *January 1, 2012 through December 31, 2012*

**SUMMARY**

To monitor for the presence of quagga mussels in northeastern Nevada, artificial samplers were set out, veliger plankton tows were performed, and visual and tactile surveys were conducted. Beginning in June and ending in September, Wildhorse Reservoir, South Fork Reservoir, and Ruby Lake NWR were visited, with Cave Lake and Wilson Reservoir being sampled in August. A total of 93 samples were collected in 2012, with three samples at Wildhorse and two samples at Ruby Lake NWR coming back with Positive PCR test results. Two additional Wildhorse Reservoir samples were tested as “Unconfirmed QM” by BOR Lab in August, with the remaining 86 samples coming back negative. Further tests of the suspect samples were run by private labs and the California Fish and Game lab were unable to detect evidence of quagga mussels. Currently Wildhorse Reservoir and Ruby Lake NWR are listed as Watch List Waters due to these findings.

**BACKGROUND**

On January 6, 2007, quagga mussels were discovered at the Las Vegas Boat Harbor on Lake Mead. Water for Lake Mead Fish Hatchery production was taken from Lake Mead and quagga mussels were soon identified in the hatchery system. Due to the Department’s hatchery refurbishment projects, fish from Lake Mead Hatchery were transported to northern Nevada and stocked at three waters in 2006. Three loads of trout (April 26, May 4, and May 18, 2006) were stocked in Wildhorse Reservoir at the State Park boat ramp. One load of trout (September 28, 2006) was stocked in South Fork Reservoir at the main State Park boat ramp, and three loads of trout were stocked within the Ruby Lake National Wildlife Refuge at the main boat landing (September 28, 2006), Collection Ditch (October 3, 2006), and Narciss Boat Landing (October 5, 2006). In 2011, positive veliger samples at Rye Patch Reservoir and Lahontan Reservoir were detected, yet not confirmed by the presence of adult mussels.

Native to the Ukraine, the quagga mussel was transported to the Great Lakes Region where they have spread to new areas and negatively impacted recreational boating, commercial shipping and other raw-water using industries. They are prodigious filter feeders that can affect zooplankton abundance, biomass, and species composition. Under the right conditions, the quagga mussel is a prolific breeder, with fully mature female mussels capable of producing up to one million eggs per season, which are fertilized externally. Quagga mussels are known to attach to almost any substrate, whether hard or soft, natural or artificial. Research shows that quagga

mussels normally spawn at temperatures greater than 50°F, will tolerate a temperature range of 39°F to 86°F, and have been found at depths of 3 to 541 feet. Water chemistry values preferred by quagga mussels include calcium levels >25 mg/l, potassium levels <6 mg/l, oxygen levels >2 mg/l, pH levels >7.0, and alkalinity (CaCO<sub>3</sub>) levels >85 mg/l. Veligers can be transported alive in water (e.g., drifting in water currents or bilge water of trailered boats). Under temperate summer conditions, adult mussels can survive overland transport (e.g., on trailered boats) to any location within three to ten days drive of infested water bodies.

## **OBJECTIVES and APPROACHES**

Objective: General Sport Fisheries Management

Approaches:

- Sample Ruby Lake NWR, South Fork Reservoir and Wildhorse Reservoir for occurrence of quagga mussel veligers through plankton net tows conducted two to four times between June and September at up to three sites each.
- Conduct visual and tactile surveys of artificial and natural solid substrates in conjunction with veliger sampling.

## **PROCEDURES**

Three different survey techniques were utilized in the monitoring of quagga mussels including artificial substrate samplers, plankton tows, and snorkel surveys. Artificial samplers were constructed out of nylon rope, PVC and ABS pipe, and concrete cinder blocks. In areas with flow, such as the Collection Ditch at Ruby Lake NWR, metal screen was placed into the pipe to increase surface area for attachment. Samplers were set out shortly after the spring thaw to allow for the development of a biofilm. Samplers were checked visually and tactilely, paying particular attention to edges. Prior to ice up in the late fall; samplers were removed and thoroughly checked and scraped at the Elko field office.

Plankton net tows were conducted June through September for all three locations. A 63 µm mesh plankton net was used to take vertical samples at various depths. In shallow waters, such as Ruby Lake NWR, a pump was used to filter 1,000 liter water sample. These samples were then preserved in ethanol and sent off to a lab for analysis. Sample site locations are presented in Table 1.

Snorkel surveys were conducted once at the beginning of the sampling season and again at the end of the season as weather and visibility allowed. Areas with hard structures such as dams, boat ramps, boat docks, concrete structures, and associated substrates being of primary concern. Surveys were done tactilely and visually on all surfaces, paying particular attention to the underside of surfaces, cracks, and edges.

Due to the large monthly water fluctuation at Wildhorse Reservoir, exposed substrate surveys were substituted for snorkel surveys when limited by time. As the boat ramp docks at Wildhorse Reservoir and South Fork Reservoir are removed from the water at the end of the year, a thorough inspection can be made of the entire dock. Due to the high productivity of Wildhorse and South Fork Reservoirs, visibility was often a limiting factor during snorkel surveys.

**Table 1. Veliger Sample Sites.**

<b>Wildhorse Sites</b>	<b>UTM</b>		<b>Ruby Lake Site</b>	<b>UTM</b>
State Boat Ramp	599544 4613148		Brown Dike	629541 4447918
Sho-Pai Boat Ramp	599203 4614919		Main Boat Launch	627234 4443935
Mouth of Canyon	597287 4615355			
<b>South Fork Sites</b>	<b>UTM</b>			
Coyote Cove	605558 4501559			
Boat Ramp	604154 4504435			
Dam Outflow	602756 4504179			

## FINDINGS

### Wildhorse Reservoir

Wildhorse Reservoir was sampled on June 11, July 16, August 28, and September 17 by NDOW, with additional surveys occurring on August 1 and 2 by Idaho Department of Agriculture and Portland State University, respectfully. The June samples were processed by Bureau of Reclamation (BOR) Lab and resulted in positive PCR tests for quagga mussels. The extracted DNA from these samples was then processed by Pisces Molecular and produced a negative PCR result. Due to these suspect results, additional sampling was conducted on a monthly basis, with extra samples being sent to four different labs for testing. After the three positive PCR samples in June, a total of 44 individual samples came back negative, with two samples taken in August coming back from the BOR lab as “unconfirmed quagga mussels.” This test result was “due to a positive PCR without gene sequencing confirmation due to a weak band” as per BOR.

Tactile surveys conducted at the beginning and end of the field season, as well as checks of the two artificial samplers produced no evidence of quagga mussels. The rocky shoreline, which was quite extensive due to a low water year, and the boat dock also produced no quagga mussels. Due to the positive PCR tests in June and an “Unconfirmed QM” test result in August, Wildhorse Reservoir is currently listed as a Watch List Water, which requires continued and increased monitoring.

### South Fork Reservoir

Surveys were conducted on June 11, July 17, August 28, and September 17, which included checking two artificial samplers and plankton net tows at three separate

locations. A total of 16 individual samples were evaluated for the presence of quagga veligers, all of which came back as negative. Snorkel and tactile surveys at the main boat ramp were hampered by weather and visibility, but shoreline and boat ramp surveys were conducted, with no quagga mussels being observed. South Fork Reservoir currently has no priority listing, but will continue to be monitored due the proximity to other listed waters and the reservoir's recreational popularity.

### Ruby Lake NWR

Surveys were conducted on June 11, July 17, August 28, and September 17, which included checking four artificial samplers and plankton sampling at two separate locations. The June samples were processed by BOR Lab and resulted in positive PCR tests for quagga mussels. The extracted DNA from these samples was then processed by Pisces Molecular, which produced a negative PCR result. Due to these suspect results, additional sampling was conducted monthly, with extra samples sent to four different labs for testing. After positive PCR samples in June, a total of 22 individual samples came back negative. All visual and tactile surveys were also negative for quagga mussels. Due to positive PCR tests in June, Ruby Lake NWR is currently listed as a Watch List Water requiring continued and increased monitoring.

### Additional Waters

On August 28 samples were collected at Cave Lake and Wilson Reservoir. Two samples from each water were collected and processed by two separate labs, resulting in negative results.

A total of 93 samples were collected in 2012, with three samples at Wildhorse and two samples at Ruby Lake NWR coming back with positive PCR test results. A summary of samples can be seen in Table 2. Two additional samples were tested as "Unconfirmed QM" by BOR, with the remaining 86 samples coming back negative. This concluded the sixth year of sampling, with this year being the first year to produce positive results. It is critical to continue these sampling efforts to monitor all waters in Nevada, with additional attention being given to those waters that have had positive results.

## **MANAGEMENT REVIEW**

The approaches for quagga mussel monitoring were completed in 2012. Positive PCR tests for Wildhorse Reservoir and Ruby Lake NWR, and the associated increase in sampling, was coordinated and completed with the help of all fisheries personnel.

Table 2. Summary of quagga veliger sampling.

<b>Wildhorse Reservoir</b>			
	<b># Sampled</b>	<b>Labs</b>	<b>Results</b>
June	3	BOR	Positive PCR, Retested negative PCR by Pisces Molecular
July	9	CAF&G, EcoAnalysts, Pisces Molecular	All Negative
August	12	CAF&G, EcoAnalysts, Pisces Molecular, BOR	Two samples Unconfirmed QM, remaining 10 negative
September	12	CAF&G, EcoAnalysts, Pisces Molecular, BOR	All Negative
Additional	13	Idaho Dept. of Ag, Portland State University	All Negative
<b>South Fork Reservoir</b>			
June	1	BOR	All Negative
July	3	EcoAnalysts	All Negative
August	6	EcoAnalysts, Pisces Molecular	All Negative
September	6	EcoAnalysts, Pisces Molecular	All Negative
<b>Ruby Lake</b>			
June	2	BOR	Positive PCR, Retested negative PCR by Pisces Molecular
July	6	EcoAnalysts, Pisces Molecular	All Negative
August	8	CAF&G, EcoAnalysts, Pisces Molecular, BOR	All Negative
September	8	CAF&G, EcoAnalysts, Pisces Molecular, BOR	All Negative
<b>Cave Lake</b>			
August	2	EcoAnalysts, Pisces Molecular	All Negative
<b>Wilson Reservoir</b>			
August	2	EcoAnalysts, Pisces Molecular	All Negative

## **RECOMMENDATIONS**

- Continue monitoring for the presence of quagga mussels at Wildhorse Reservoir, South Fork Reservoir, and Ruby Lake NWR through means of artificial samplers, snorkel/scuba surveys, and veliger plankton tows.
- Increase public awareness through signage, personal communication, and publications.
- Expand monitoring protocols to include smaller, less utilized waters in northeastern Nevada as deemed necessary.

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