

9-30-2010

Limnological Assistance for Lake Mead National Recreation Area: Quarterly Report, Period Ending September 30, 2010

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Rees, M. N. (2010). Limnological Assistance for Lake Mead National Recreation Area: Quarterly Report, Period Ending September 30, 2010. 2-9.

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Date: October 31, 2010

To: Kent Turner, Chief of Resource Management
National Park Service - Government Technical Representative

E-copy: Dr. Chris Lauver, NPS CESU Research Coordinator
Kate Hansen, SNAP Executive Director
Project Team (Drs. Shawn Gerstenberger, Jennell M. Miller, Craig J. Palmer, and David Wong)

From: Dr. Margaret N. Rees 
Executive Director, Public Lands Institute

Re: Year 1, Quarter 3 Report:
Task Agreement # J8360100020

Enclosed please find the Annual Report for the project titled: "Limnological Assistance for Lake Mead National Recreation Area."

The enclosed quarterly report reflects activities commenced during the second quarter of the first year of this project.

If you have any questions after reviewing this report, please do not hesitate to call me at (702) 895-3890.



QUARTERLY REPORT
University of Nevada, Las Vegas
Period Ending September 30, 2010

Cooperative Agreement Number H8360090007
Task Agreement Number J8360100020

Limnological Assistance for Lake Mead National Recreation Area

Executive Summary

Project 1

- Technical assistance with the implementation of the *Interagency Monitoring Action Plan (I-MAP) for Quagga Mussels* is ongoing. During this quarter, analysis was completed for 11 adult/juvenile samples from the winter 2009 – spring 2010 sampling. Two manuscripts related to the I-MAP were submitted to the peer-reviewed journal, *Aquatic Invasions*.

Project 2

- Topics and analyses have been approved for annual report development as prescribed by the *Limnological and Aquatic Resource Monitoring and Research Plan for Lakes Mead and Mohave*.
- Content, including links and photos for the front page, four limnology category web pages, and one associated page have been delivered to the NPS Lake Mead NRA Visual Arts Office and are in the design phase.
- A framework for the close-out report to SNPLMA on all Water 2025 Conservation Initiative-funded projects (Rounds 4 and 5) has been prepared and all associated deliverables from NPS project partners are being collected.

Project 1 Technical Assistance Related to Quagga Mussels

C.1(a) Provide technical assistance in the implementation of the Interagency Management Action Plan (I-MAP)

I-MAP implementation is ongoing; this work is carried out by David (Wai Hing) Wong, Ph.D. and UNLV graduate students, Scott Rainville and Sean Comeau, in collaboration with NPS staff members Bryan Moore, Ross Hayley, and Emily Austin. Regarding juveniles/adults, the third quarterly sampling was completed for various depths at three I-MAP-specified sites (soft substrate: LVB 3.15, LVB 9.04, and CR 346.4 and hard substrate: none this quarter). The next soft substrate-sampling event will occur at CR 351.7 and is scheduled for November. Sample analyses, which represent the major portion of staff time on this project (compared to sample collection), include the following measures: density; mean density by depth; length; length frequency; shell length to weight ratio; shell length to tissue weight ratio; and nutritional status. As of 9/30/10, 11 additional samples have been analyzed in the lab (see Table 1).

Table 1. List of quagga mussel juvenile/adult analyses conducted during Q3 on I-MAP hard and soft substrate samples collected during Q1 and Q2.

Samples	Locations and Collection Dates	Depth (ft)	Substrate Type
1	Black Island 05/26/10	20'	Hard
2	Black Island 05/26/10	40'	Hard
3	Black Island 05/26/10	60'	Hard
4	Black Island 05/26/10	80'	Hard
5	Boulder Island 12/30/09	20'	Hard
6	Boulder Island 12/30/09	40'	Hard
7	Boulder Island 12/30/09	60'	Hard
8	CR346.4 2/24/2010 (SENT 10, Study only)		Soft
9	LVB 7.3 10/21/2009	149.5'	Soft
10	LVB 7.3 10/21/2009	277.1'	Soft
11	CR346.4 12/01/2009	102'	Soft

Veliger monitoring funded through this task agreement is described below [Task C.1(b)], all other I-MAP veliger monitoring is conducted by other NPS partners.

The complete results and relevant data from other agencies, as available, will be summarized within the *FY2010 Annual NPS Quagga Mussel Monitoring Activities and Findings Report* due in December 2010. All I-MAP samples collected as part of this task agreement are archived frozen at UNLV in S. Gerstenberger's laboratory.

Veliger monitoring funded through this task agreement is described below [Task C.1(b)], all other I-MAP veliger monitoring is conducted by other NPS partners.

D. Wong and Jennell Miller, Ph.D. concentrated this quarter on preparing and revising the following manuscript documenting the quagga mussel adult and veliger monitoring design within the I-MAP for submission to the peer-reviewed journal, *Aquatic Invasions*, which is in the process of compiling a special issue focused on quagga mussels in the western United States:

- Wai Hing Wong, Shawn L. Gerstenberger, Jennell M. Miller, Craig J. Palmer, and Bryan Moore. *A standardized design for quagga mussel monitoring in Lake Mead, Nevada-Arizona*

They assisted Kent Turner (NPS Lake Mead NRA; ATR) in the submission and revision of the following manuscript for the same journal:

- Kent Turner, Wai Hing Wong, Shawn L. Gerstenberger, and Jennell M. Miller. *Interagency Monitoring Action Plan (I-MAP) for Quagga Mussels in Lake Mead, Nevada-Arizona, USA*

A presentation titled “Invasive Quagga Mussels in Lake Mead, AZ-NV and Their Associated Environmental Problems” is in preparation by S. Rainville and co-authors for presentation at the National Public Health Association Conference, which will be held next quarter on 10/01/2010.

C.1(b) Research Project: Veliger abundance and settlement at different depths of Lake Mead

This research project is being conducted by S. Comeau as master’s thesis work under the direction of Shawn Gerstenberger, Ph.D. and D. Wong. During this quarter, S. Comeau assisted D. Wong with task C.1(a), above, collected veliger samples from different depths at the Sentinel Island sampling site, and conducted analyses. Since June 16, 2010, a total of 91 veliger weekly samples have been collected for 13 total sample sets (i.e., 7 samples/week * 13 weeks = 91 samples). A sample set comprises collection at 5, 10, 20, 30, 40, 50, and 60m. Approximately 46% of the samples have been fully analyzed.

Updates on the progress of this project will be provided at Interagency Quagga Mussel Meetings as available.

C.1(c) Research Project: Non-growth of adult quagga mussels within Las Vegas Wash/Las Vegas Bay

This research project is being conducted by S. Rainville as master’s thesis work under the direction of S. Gerstenberger and D. Wong. Sampling for this project was intended to begin in September 2010, as reported previously. It was put on hold this quarter pending application for and granting of the necessary NPS Research Permit for this project.

Updates on the progress of this project will be provided at Interagency Quagga Mussel Meetings as available.

C.1(d) Facilitation of Interagency Quagga Mussel Meetings

The Interagency Quagga Mussel Meeting took place on 7/15/10. The meeting was facilitated by S. Gerstenberger and documented by J. Miller. Agendas were distributed prior to the meeting and CDs containing the previous meeting’s PowerPoint files were provided. Related activities included updating the list-serve developed for this group with new members and sending out informational e-mails at the request of members.

Project 2 Technical Assistance Related to Ecological Monitoring of Lakes Mead and Mohave

C.2(a) Additions to the Ecological Monitoring Plan for Lakes Mead and Mohave

This task is ongoing under the direction of Craig Palmer, Ph.D. The purpose of this task is to acquire existing, current protocols relevant to the *Long-term Limnological and Aquatic Resource Monitoring and Research Plan for Lakes Mead and Mohave*. Applicable protocols identified will be included as part of the annual reports [C.2(b)].

C.2(b) Implementation of the Ecological Monitoring Plan for Lakes Mead and Mohave

At the 7/14/2010 Interagency Monitoring and Research Coordination Meeting [“Water 2025” Meeting; see C.2(d) below], the draft strategy reported in Q2 report for the first annual report development was presented, revised based on participant suggestions, and approved (Appendix 1). A major focus during the upcoming quarter is to complete the reports according to this strategy.

C.2(c) Coordination of Web Organization and Content for Lake Mead NRA Limnology

This task is ongoing; on 10/01/2010, a CD containing some of the content ready to be inserted into the web content management system template was delivered to Andrew Cattoir (NPS Lake Mead NRA, Visual Arts). Four lake science sub-pages were provided (Water Quality, Fish and Aquatic Biota, Sediment, and Birds) as Word documents with built-in links to external sites embedded. Associated with each document were folders containing any associated files that should be made available for download from the page in question as well as some photos. Throughout the Word documents, were notes to the designer to clarify web-design needs. Content for a new Lake Mead NRA Research Permits page, which had been reviewed and approved by K. Turner and Michael Boyles (NPS Lake Mead NRA, Research Permits Office) was also provided on the CD. Additional pages will be provided to the NPS Visual Arts Office in the upcoming quarter.

C.2(d) Facilitation of Interagency Monitoring and Research Coordination Meetings

The Interagency Monitoring and Research Coordination meeting (formerly referred to as “Interagency Water 2025 Meetings”) took place on 7/14/2010. Continued from the 5/6/2010 meeting, the major topics of discussion were review of tasks C.2(b) and (e) of this task agreement as well as development of a circular synthesizing the state of science knowledge of various limnological and ecological resources within Lakes Mead and Mohave, which will be carried out by the U.S. Geological Survey with input from various NPS Lake Mead NRA partners. The next meeting is scheduled for 10/20/2010.

C.2(e) Technical Assistance to Lake Mead NRA with other Monitoring Programs

The major aspect of this task has been defined as assistance to Lake Mead NRA in close-out report organization for submission to the Southern Nevada Public Land Management Act (SNPLMA) of deliverables from all projects funded through implementation of Lake Mead NRA’s Water 2025 SNPLMA Conservation Initiatives (Meeting the Challenge of Water 2025 Initiative: Balancing Water Quality, Community Needs & Water-Based Recreation for Lake Mead and Lake Mohave). The first installment of deliverables will be those funded through Rounds 4 and 5. J. Miller has reviewed the 10 applicable task agreements between NPS and its partners and has prepared an Excel spreadsheet organizer for Rounds 4 and 5 projects itemizing all project deliverables. She has been in communication with all project leads and has either downloaded from partner web pages or requested electronic copies of deliverable products. Once gathered, all provided deliverables will be organized within folders named according to each task agreement and hyperlinked to from the Excel spreadsheet organizer. K. Turner has given a deadline of January 2011 to the partner agencies by which date to have the majority of materials delivered to J. Miller.

Submitted by:



Margaret N. Rees, Project Administrator

10/31/2010

Date

ATTACHMENTS

ATTACHMENT 1

Strategy for First Annual Report Development

Long-Term Limnological and Aquatic Resource Monitoring and Research Plan for Lakes Mead and Mohave

Category 1 – Water Quality and Limnology

Report Focus: Graphs of selected water quality constituents (pp. 28-29) as available for the following six sites (see map), which provide representation of each basin and other key areas.

- (1) Las Vegas Bay – LVB4.95
- (2) Boulder Basin – CR346.4
- (3) Additional Boulder Basin – CR342.5
- (4) Overton Arm – VR13.4
- (5) Virgin Basin – CR360.7
- (6) Gregg Basin – CR390.0

Analyses will be conducted for all plan-prescribed parameters for which data are stored by SNWA; data analyses should be limited to the epilimnion and plotted as averaged monthly values over time. UNLV will investigate potential to work with SNWA's Warren Turkett/Peggy Roefer to create an appropriate query of the SNWA database.

Category 2 – Fish and Aquatic Biota

Report Focus: Data analysis will include a tabularization of available data as prescribed on p. 34. UNLV proposes to obtain shad data from Eric Loomis' thesis; sportfish population data from NDOW (Annual Reports/Mike Burrell); razorback sucker data from USBR-LCR (Mohave - James Stolberg) and BioWest

(Mead - Paul Holdren). Description of results will be noted. Benthic data will also be included in this category.

Category 3 – Stressors

Contaminants Report Focus: Linkage to SNWA Annual Report / CWC Report (Shane Synder). Will include figures and descriptions of mercury results from Sara Muetting's thesis.

Quagga Mussel Report Focus: Relevant figures generated through the I-MAP Program describing hard and soft transects, and abundance vs. size analyses. New Zealand mud snail data will be included. Description of results will be noted.

Climate Change Report Focus: Graph generation based on monthly averages of USBR reservoir level data and monthly averages of USGS atmospheric temperature data for daytime highs and overnight lows.

Note that analysis will only be able to establish a picture for 2009 for future comparison; analyses will not reveal any climate change information in and of themselves.

Aquatic Invasive Plants Report Focus: Listing of NPS watch species.

Category 4 – Sediment

Sediment Contamination Report Focus: To be determined; linkage with forthcoming USGS publications.

Sediment Characterization Report Focus: To be determined; consider sediment composition information (USGS); sedimentation rates (SNWA); USGS work (David Twichell); UNLV work (Mark Rudin).

Category 5 – Birds

Report Focus: Presentation of relevant figures generated by UNLV (Joe Barnes/Jef Jaeger) through MSHCP work. Considering Christmas Day Wash Survey by Audubon Society; Las Vegas Wash Committee work (Keiba Crear, SNWA); and NDOW data from Overton Management Area (Cris Tomlinson). Description of results will be noted.

Category 6 – Riparian Resources

Report Focus: Presentation of data analyses resulting from Clark County MSHCP work, data analysis from any applicable data from the Weed Sentry Program (Vanessa Truitt, NPS). Description of results will be noted.