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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 13 juvenile/adult samples and analyses of the remaining samples are underway.
- Both research projects are well underway with 14 sample sets collected for Veliger abundance and settlement at different depths of Lake Mead and 12 samples collected for Growth of adult quagga mussels within Las Vegas Wash/Las Vegas Bay.

Project 2

- Annual summary sheets are under development for the topics listed within the Limnological and Aquatic Resource Monitoring and Research Plan for Lakes Mead and Mohave.
- All requested content for Lake Mead NRA primary Lake Science web pages have been delivered to the NPS Lake Mead NRA Visual Arts Office with subsequent review and approval; pages are in the design phase at Lake Mead NRA.
- All associated deliverables from NPS project partners are continuing to be collected for a close-out report to SNPLMA on all Water 2025 Conservation Initiative-funded projects (Rounds 4, 5, and 7).

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 and Ross Hayley. With regard to juvenile and adult mussels, the following samples were analyzed in the first quarter of 2011 (Table 1).
Table 1. List of quagga mussel juvenile/adult analyses conducted during Y2/Q1 on I-MAP hard and soft substrate samples collected in Y1/Q4

<table>
<thead>
<tr>
<th>Sample</th>
<th>Location</th>
<th>Sampling Date</th>
<th>Depth (ft)</th>
<th>Substrate Type</th>
<th>Mussels/m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Black Island</td>
<td>8/31/2010</td>
<td>80</td>
<td>Hard</td>
<td>9248.0</td>
</tr>
<tr>
<td>2</td>
<td>Boulder Island</td>
<td>9/1/2010</td>
<td>20</td>
<td>Hard</td>
<td>1216.0</td>
</tr>
<tr>
<td>3</td>
<td>Boulder Island</td>
<td>9/1/2010</td>
<td>40</td>
<td>Hard</td>
<td>7792.0</td>
</tr>
<tr>
<td>4</td>
<td>Boulder Island</td>
<td>9/1/2010</td>
<td>60</td>
<td>Hard</td>
<td>7664.0</td>
</tr>
<tr>
<td>5</td>
<td>Boulder Island</td>
<td>9/1/2010</td>
<td>80</td>
<td>Hard</td>
<td>1920.0</td>
</tr>
<tr>
<td>6</td>
<td>CR346.4</td>
<td>2/24/2010</td>
<td>370</td>
<td>Soft</td>
<td>1462.0</td>
</tr>
<tr>
<td>7</td>
<td>CR346.4</td>
<td>2/24/2010</td>
<td>360</td>
<td>Soft</td>
<td>692.3</td>
</tr>
<tr>
<td>8</td>
<td>CR351.7</td>
<td>3/17/2010</td>
<td>368</td>
<td>Soft</td>
<td>903.8</td>
</tr>
<tr>
<td>9</td>
<td>CR351.7</td>
<td>6/2/2010</td>
<td>282</td>
<td>Soft</td>
<td>1557.0</td>
</tr>
<tr>
<td>10</td>
<td>CR351.7</td>
<td>9/15/2010</td>
<td>199</td>
<td>Soft</td>
<td>57.7</td>
</tr>
<tr>
<td>11</td>
<td>VB 250</td>
<td>12/16/2009</td>
<td>247</td>
<td>Soft</td>
<td>19.2</td>
</tr>
<tr>
<td>12</td>
<td>VB 250</td>
<td>12/8/2010</td>
<td>237</td>
<td>Soft</td>
<td>1519.0</td>
</tr>
<tr>
<td>13</td>
<td>Overton Arm</td>
<td>12/19/2010</td>
<td>86.9</td>
<td>Soft</td>
<td>192.3</td>
</tr>
</tbody>
</table>

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.

Summarization of I-MAP veliger data from other agencies by the project group is slightly delayed in that these data have not yet been received. It is D. Wong’s understanding that he will receive U.S. Bureau of Reclamation-collected veliger data in the upcoming quarter. Following QA/QC, he will prepare the data summary.

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

During this quarter, S. Comeau collected veliger samples from different depths at the Sentinel Island sampling site, and conducted analyses. Since 01/01/2010, 98 veliger weekly samples have been collected for 14 total sample sets (i.e., 7 samples/week * 14 weeks = 98 samples). A sample set comprises collection at depths of 5, 10, 20, 30, 40, 50, and 60m. The samples collected between 06/16/2010 and 12/28/2010 have been analyzed and will be part of S. Comeau’s Master’s thesis. A description and update on the progress of this project was provided at the Interagency Quagga Mussel Meeting (02/15/2011).

C.1(c) Research Project: 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. Twelve samples along the Las Vegas Bay were collected this quarter with the assistance of NPS staff. Laboratory analysis of the samples is underway. Please note that within the title of this task, the use of the
word “Non-growth” was replaced with “Growth” because quagga mussels have begun colonizing this area as data from this project demonstrates.

Figure 1. Sampling locations along Las Vegas Bay.

In sampling location #1 (Fig.1), it is noted by S. Rainville that there are extremely high numbers of quagga mussels present (Figure 2).

Figure 2. The Ponar Grab sample collected from location #1 (Photo by S. Rainville).

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 quarterly Interagency Quagga Mussel Meeting took place on 02/15/11. 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. Extensive meeting notes are taken, presented to speakers for approval, and distributed following each meeting. 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

The original objective of this task was to acquire existing, current protocols relevant to the Long-term Limnological and Aquatic Resource Monitoring and Research Plan for Lakes Mead and Mohave. Discussions among the project group, K. Turner, and members of the Interagency Monitoring and Research Coordination Meeting (referred to as “Interagency Water 2025 Meetings”) revealed that collection of the protocols is not desirable because the authoring agencies tend to update and modify the protocols based on need. It would be best if researchers seeking use of a given protocol were to obtain the most recent version directly from the source agency. Therefore, J. Miller was asked to compile citations or information about protocols applicable to each category within the plan drawing from relevant publications and communications with agency members. To date, protocols have been identified and cited the following categories: Category 1 (Water Quality and Limnology); Category 2 (Fish and Aquatic Biota); Category 3 (Abiotic and Biotic Stressors); and Category 5 (Birds). J. Miller has requested additional information about protocols relevant to Category 2 (Fish and Aquatic Biota) from the Nevada Division of Wildlife and about Category 6 (Riparian Resources) from the U.S. Bureau of Reclamation Lower Colorado River Multi-Species Habitat Conservation Program. Information is being organized into a table format for inclusion into the plan as Appendix 7.

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

This task is ongoing; a focus during this quarter has been to complete the reports according to this strategy, and based on materials provided by agency partners. Following their completion, they will be provided to the NPS Visual Arts Office for inclusion with the web content described below. As of this reporting, the following topic areas have been completed: Water Quality and Limnology (with graph generation by Southern Nevada Water Authority); Fish and Aquatic Biota; and a portion of Stressors [with graph generation by Craig Palmer (UNLV; Project PI)]. A report has been drafted for Sediment, but is pending review; Birds and Riparian topics depend upon further discussions with K. Turner in the upcoming quarter.

This task also overlaps with C.2(e), below 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 deliverables collected represent the monitoring data and key findings of partner organizations.
The first installment of deliverables was to be those funded through Rounds 4 and 5. This quarter, Round 7 was added. As described previously, J. Miller reviewed the applicable task agreements between NPS and its partners, and prepared an Excel spreadsheet organizer for 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. This task has required numerous communications with project leads as task components have changed in title, completion date, or other aspect. Reports are still outstanding from two partner agencies; it is expected that the spreadsheet will be completed early in the upcoming quarter.

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

This task is ongoing; this quarter, J. Miller prepared and e-mailed content ready to be inserted into the web content management system template to Andrew Cattoir (NPS Lake Mead NRA, Visual Arts). The final content for Category 3: Stressors and introductory paragraphs for the Lake Science page were provided. Word documents with built-in links to external sites embedded along with figures, tables, photos, and photo suggestions were provided. Throughout the Word documents were notes to the designer to clarify web-design needs. These files finalized delivery of all the agreed upon primary web page content representing Lake Mead NRA Limnology. Also during this quarter, K. Turner reviewed and approved each page, providing some comments for revision. J. Miller met with A. Cattoir to review and adjust all designed pages accordingly. Content for pages featuring annual reports will be delivered in the upcoming quarter; the content completed to date has been reviewed by K. Turner and members of the Interagency Monitoring and Research Coordination Meeting this quarter and will be revised by J. Miller accordingly in the upcoming quarter.

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

The Interagency Monitoring and Research Coordination Meeting (referred to as “Interagency Water 2025 Meetings”) took place on 01/19/2011. Continued from the 2010 meetings, the major topics of discussion were the future of the group; review of tasks C.2(b) and (e) of this task agreement; and 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 4/14/2011.

**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). As described previously [and as discussed above in C.2(b)], J. Miller reviewed the applicable task agreements between NPS and its partners, and prepared an Excel spreadsheet organizer for 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. This task has required numerous communications with project leads as task components have changed in title, completion date, or other aspect. Reports are still outstanding...
from two partner agencies; it is expected that the spreadsheet will be completed early in the upcoming quarter.

The SCOP/BBAMP meetings previously attended by D. Wong as part of the task agreement have been ended with the discontinuation of the SCOP project; the decision was made final during this quarter.

Submitted by: Margaret N. Rees, Project Administrator

04/29/2011 Date