Lake Roosevelt Table-Top Exercise
September 21-22, 2010, Spokane, Washington
After Action Report

I. Overview

This document is the after action report on the Lake Roosevelt Table-Top Exercise, the fall, 2010 exercise testing Washington's implementation of the ***Columbia River Basin Interagency Invasive Species Rapid Response Plan (CRB Plan)***. It includes an overview of the exercise, outcomes, recommendations, and summary.

The exercise scenario included a confirmed finding of dreissenid adults in Lake Roosevelt Reservoir near Davenport, Washington. The exercise was conducted over two days. The morning of September 21 consisted of training, including a review of the CRB Plan, and an overview of the ICS Planning Process. After the training, the participants divided into two groups, the Incident Management Team (IMT), and the CRB MAC Group Coordination and Support Staff (C&S). The IMT's objective was to develop the Incident Action Plan for the first Operational Period of response to the infestation. The Coordination and Support Staff focused on the treatment options. These activities carried through into the next day, and concluded with the presentation to the MAC Group, hot-wash, and closeout.

Methodology-The table-top exercise was developed by an interagency design team including representatives from the affected agencies within the State of Washington, and the 100th Meridian Initiative Columbia River Basin Team. The design team included:

Stephen Phillips	Pacific States Marine Fisheries Commission
Paul Heimowitz	US Fish and Wildlife Service
Maureen Gallagher	US Fish and Wildlife Service
Allen Pleus	Washington Department of Fish and Wildlife
Eric Anderson	Washington Department of Fish and Wildlife
Wendy Brown	Washington Invasive Species Council
Scott Lund	US Bureau of Reclamation
Marty Huseman	National Park Service
Matthias Herborg	British Columbia Ministry of Environment
B.J. Kieffer	Spokane Tribe
Bret Nine	Colville Tribes

The table-top exercise was facilitated by Margaret Dimmick of Incident Concepts and Stephen Phillips of the Pacific States Marine Fisheries Commission. A participant list is included as Appendix A.

The evaluation process included a self-evaluated "Hotwash," additional post-exercise input from participants, and assessment by the facilitators. Results are described in ***Section II: Outcomes***, and ***Section III: Recommendations***.

Goals and Objectives-

- To test and further refine the rapid response protocol and mechanism(s) specific to reviewing and approving an eradication strategy under the *Columbia River Basin Interagency Invasive Species Response Plan: Zebra Mussels and Other Dreissenid Species* (Plan). Clarify the process for identifying and obtaining permits and completing environmental documentation required by the scenario and the Plan.

This goal is identified as part of the 2008-2013 exercise strategy associated with the CRB Plan.

The exercise objectives included:

1. Provide an overview of roles and responsibilities under the Plan and the ICS planning process.
2. Identify the roles and responsibilities of state, federal, tribal and local agency leadership in obtaining permits and other environmental compliance documentation necessary to proceed with a chemical treatment of quagga mussels.
3. Identify and describe the process to approve, obtain permits, and complete all necessary environmental compliance documents for a proposed chemical treatment of an incipient invasive mussel infestation in Lake Roosevelt.
4. Complete the planning process and develop a draft Incident Action Plan to implement the proposed chemical treatment of the invasive mussel infestation.
5. Engage the Province of British Columbia, and other Canadian authorities as warranted, in the multi-jurisdictional response structure established in the Plan.
6. Through creation of an *After Action Report*, refine the Plan and stimulate further planning specific to Lake Roosevelt. Use products and lessons learned from the exercise to determine gaps in eradication protocols and procedures.

II. Outcomes

General Observations (collected from participant and facilitator feedback):

- The exercise tested both the IMT and the Coordination and Support Staff in "real time." Both organizations were able to demonstrate that the structure worked well, although at times there was some confusion about how the two groups should relate.
- Limitations, restrictions, and shortfalls identified in the exercise can be taken back to home agencies and used to enhance planning and intergovernmental agreements. Some agreements currently in place (such as the Lake Roosevelt Cooperative Management Agreement (also called Lake Roosevelt Five Party Agreement) could be expanded to include emergency response to invasive species.
- The CRB Team members should be more aggressive in taking their "show on the road" to encourage more participation by entities that would be affected by this scenario.
- The Coordination and Support Staff demonstrated its value to on-scene incident management. Even with the artificialities inherent in an exercise environment, the C&S developed realistic tactical recommendations, cost analyses, and resource location and procurement products.

- The exercise forced participants to consider issues that had not been looked at significantly, such as how to address potential contamination of net pens and cultured fish located within the detection site.
- The exercise further developed relationships between and among participants. In the long run, this increases confidence in the process and in each other.
- The exercise facilitated new connections with the Park Service, Spokane Tribe, Colville Tribes, and Washington Invasive Species Council that will benefit overall rapid response capacity in the Columbia Basin.
- Confusion over roles still exists, although that improved by the end of the event. The "near miss" experienced by Idaho in 2009 helped clarify authorities under the Plan and provided good issues to test in this exercise. Between the two, roles and processes are gaining additional clarity.
- The exercise was too short; 2 full days plus one half would have allowed for a more complete exercise
- Still not convinced that we are ready for a real event, we need more practice.
- It was not clear that an actual treatment operation would have proceeded, but the exercise made real progress in resolving logistical and environmental compliance issues that will surface in a real event.
- The overall process was smoother than in the past -The decisions we came up with and how they seemed to be adequate for the "situation"
- We had a good turnout of local entities, good engagement of Tribal groups.
- Need more realism...like the mock disaster exercises that law enforcement and public service folks hold, complete with victims with fake but realistic injuries. Maybe the next exercise could be a complicated and highly controversial situation like having ESA listed species affected.
- The exercise structure promoted collaboration and communication between the two entities.
- There needs to be a more complete review session after the whole exercise.

Objective-Specific Comments

Objective-specific Comments and observations made by the participants and evaluators have been listed under the most appropriate objective.

1. Provide an overview of roles and responsibilities under the Plan and the ICS planning process.
   Met ___X___ Did not meet _____ Not observed _____

   - Met during the training portion of the exercise.
   - While the presentation of the ICS Planning Process was an adequate overview, and met the objective. ICS training for the agencies represented continues to be an issue that needs follow up (see additional discussion under ***Recommendations*** below).

2. Identify the roles and responsibilities of state, federal, tribal and local agency leadership in obtaining permits and other environmental compliance documentation necessary to proceed with a chemical treatment of quagga mussels.

Met ___X___ Did not meet _____ Not observed _____

- Some questions about process and timelines remain, but key contacts were confirmed and utilized effectively.
- NOAA/NMFS does not participate effectively in the planning process or in the exercise. Time is wasted while tracking them down for input.
- It was difficult to get all the parties to participate on the MAC call because they knew it is an exercise, there is concern that they might not have the overall awareness when it is not a drill.

3. Identify and describe the process to approve, obtain permits, and complete all necessary environmental compliance documents for a proposed chemical treatment of an incipient invasive mussel infestation in Lake Roosevelt.
   Met ___X___ Did not meet _____ Not observed _____

   - Some questions about process and timelines remain, but key contacts were confirmed and utilized effectively.

4. Complete the planning process and develop a draft Incident Action Plan (IAP) to implement the proposed chemical treatment of the invasive mussel infestation (see **Appendix B** and **C** for C&S Treatment options document and IMT report to MAC).
   Met _____ Met Partially ___X____ Not observed _____

   - The IMT conducted an "exercise within an exercise" to complete the planning process and draft its initial IAP. The planning process was discussed at length, but the group did not demonstrate its capability to complete the process.
   - The IMT reviewed the ICS IAP forms, and identified how the information for the written IAP would be developed and documented, but did not complete the written IAP.
   - The IMT demonstrated the ability to request and incorporate technical information developed by the Coordination and Support Staff into its planning process.
   - The Unified Command demonstrated its ability to develop a consensus on the treatment option.
   - The General Staff demonstrated its ability to identify the tasks and responsibilities required to implement Command direction.

5. Engage the Province of British Columbia, and other Canadian authorities as warranted, in the multi-jurisdictional response structure established in the Plan.
   Met ___X___ Did not meet _____ Not observed _____

   - While the structure of the exercise and the scope of the scenario did not require extensive coordination with the Province of British Columbia, effective contact was established, and the Province participated in the MAC Group Meeting.

6. Through creation of an *After Action Report*, refine the Plan and stimulate further planning specific to Lake Roosevelt. Use products and lessons learned from the exercise to determine gaps in eradication protocols and procedures.
   Met ___X___ Did not meet _____ Not observed _____

III. Recommendations

Recommendations, shortfall category, and responsible entity are identified in the following table.

Issue/Recommendation	*Shortfall Category*	*Responsible Entity*
Plan Membership/Participation The CRB Plan needs to clarify its path to membership and participation. There are a significant number of entities who did not participate in the initial Plan development, who would like to be included in the continuing process. At the same time, it is impossible to identify and include in advance, all entities that could potentially be affected by an infestation within the CRB. A 3-tiered approach could be structured as follows: • Standing Membership-Entities who agree to ongoing responsibilities for planning, training and exercise, and response under the Plan, and who can assume to have responsibilities for response regardless of where in the CRB an infestation is found. • Membership by Concurrence-Open to any entity within the CRB likely to be affected under the Plan. "Concurrence" would mean the entity recognizes the CRB Plan structure, and agrees to assume responsibilities, including participation on the MAC Group and other response structures in the event an infestation is found within or affects its jurisdiction. Membership by Concurrence also recognizes the responsibility for ongoing participation in planning, training, and exercises conducted by the CRB Team. Process to add plan cooperators should be developed in near future. • Ad Hoc Membership-There needs to be a process to add ad hoc members to the MAC for perhaps through an incident-specific, limited duration memorandum of understanding recognizing and adopting the CRB Plan structure and	Planning	CRB Team

process when an actual incident occurs that affects it.		
Coordination and Support Staff • The effectiveness of the Coordination and Support Staff depends to a large degree on its status as a neutral conduit for technical information to the Agency Administrators of the entity experiencing the incident, the assigned IMT, and the MAC Group. While there is no specific action recommended for this observation, it is important that CRB Team Members recognize its importance when they provide staff to this part of the organization. • The Coordination and Support Staff provides valuable technical support to both the MAC Group and the IMT. There is a limited number of staff with the skills and knowledge to be members of the Coordination and Support Staff. What is the best physical location for the C&SS? The Plan is silent on the best location for this part of the organization, with the IMT, or with the MAC Group.	Planning/Response	CRB Team
On-scene incident management • The CRB Plan was developed with the assumption that member agencies had ready access to, or were already providing ICS Training for personnel who would be expected to provide on-scene incident management. Over the past four years of exercises, this has proved to be a faulty assumption. The CRB Team needs to take a more active role in facilitating such training, and reinforcing the training with IMT components in the CRB Team's annual exercises. While an invasive species incident may lack the time constraints and life-safety issues associated with other ICS applications, additional training in the system would enhance performance, clarify roles and responsibilities, and reduce frustration. • While certain ICS positions are best filled by the agencies with Command authority for the specific incident, others	Training/Planning	CRB Team

could be filled by trained personnel from other agencies. The CRB Plan should consider indentifying a pool of personnel trained to assume ICS roles under the Plan, or developing a system to access all-risk personnel and enhance their ability to assist in invasive species incidents. • The use of the formal delegation of authority for Unified Command needs to be further explored for this scenario.		
Permitting • Member agencies in the CRB may have different permitting requirements and processes for the same incident. The Unified Command should identify the entity with the most efficient process, and use it facilitate permitting. • Most permitting processes require the same information. Where possible, create a generic justification/background document that can be used to facilitate the permitting process • Legislation may be required to streamline application for emergency exemptions	Planning	CRB Team
Role Definition There is by design a certain amount of overlap between the Coordination and Support Staff and the IMT. These roles need additional study and definition through training and exercise.	Training and Exercise	CRB Team

IV. Summary

This exercise was the first thorough test of the relationship between the Incident Management Team and the Coordination and Support Staff under the ***CRB Rapid Response Plan***. Both organizations performed very well. The IMT demonstrated its ability to apply the principles of Unified Command to the scenario in order to identify, design, and agree to implement an appropriate treatment option. The Coordination and Support Staff demonstrated its ability to provide timely, detailed technical support to the IMT. Both organizations demonstrated their ability to advise and inform the actions of the CRB MAC Group.

Appendix A: Exercise participant list (*participated by phone; (1) MAC conference call participant)

Name	Organization
Paul Heimowitz (1)	US Fish and Wildlife Service
Amy Ferriter	Idaho Department of Agriculture
Allen Pleus	Washington Department of Fish and Wildlife
Bill Tweit*(1)	Washington Department of Fish and Wildlife
Eric Anderson	Washington Department of Fish and Wildlife
Wendy Brown	Washington Invasive Species Council
Ned Gruenhagen*	US Bureau of Reclamation
Mark Miller*	US Fish and Wildlife Service
Marty Huseman	Lake Roosevelt National Recreation Area
Scott Lund	US Bureau of Reclamation
Ken Hyde	Lake Roosevelt National Recreation Area
Matthias Herborg*(1)	Province of British Columbia
Bret Nine	Confederated Tribes of the Colville Reservation
BJ Kieffer	Spokane Tribe of Indians
Matt Voile	Idaho Department of Agriculture
Deanne Pavlik-Kunkel	Spokane Tribe of Indians
Madelyn Martinez	US Army Corps of Engineers
Stephen Phillips	Pacific States Marine Fisheries Commission
Marcel Howard*	Environmental Protection Agency
Kathy Hamel*	Washington Department of Ecology
Julie Edwards	Confederated Tribes of the Colville Reservation
Eileen Ryce(1)	Montana Fish, Wildlife, and Parks
Blaine Parker(1)	Columbia River Intertribal Fish Commission
Lloyd Knight*(1)	Idaho Department of Agriculture
Virgil Seymour	Confederated Tribes of the Colville Reservation
Keith Kutchins	Upper Columbia United Tribes
Mike Watkins*	US Army Corps of Engineers
Margaret Dimmick (Facilitator)	Incident Concepts

Appendix B: Coordination and Support Staff technical information and notes on treatment and containment options for Lake Roosevelt Two River Marina quagga mussel infestation. This was provided to the Incident Management Team.

Treatment	**Pros**	**Cons**	**Cost per acre**	**First possible treatment date**	**Other information**
Copper Sulfate	Very effective at killing all life stages of dreissenid mussels.	Possible impacts to non-target organisms, including fish and T&E species. Copper will exist within the system and continue to cycle around potentially causing long term impacts.	Target concentration is 1 mg/L of Cu. $28,125 for 20 acres, 150 ft averaged depth.	Availability unsure.	Washington Department of Ecology willing to allow use if we have issues getting a chelated copper product. Copper expected to bind with clay substrates in treatment area which will prevent it entering into Anadromous fish areas, NOAA does not want copper used near anadromous fish.
Cutrine Plus (chelated copper)	Effective on zebra mussels less than a year old, possibly effective on zebra mussels older than one year old although effectiveness is uncertain.	Possible impacts to non-target organisms, including fish and T&E species. Copper will exist within the system and continue to cycle around potentially causing long term impacts.	Target concentration is 1 mg/L of Cu. Chemical cost is $284,000 for 20 acre treatment area, average depth 150 ft.	Available in 3 to 4 days.	Need an exemption from EPA, 1-2 weeks based on information from Washing State, could be faster if agency directors push the issue. Application costs need to include an

		Questionable effectiveness on adults. May take up to 3 applications to control all veligers, although currently only concerned about killing adults. May not be possible to achieve contact time.			injection system and a barge. Contact time for adults 96 hours, 24 hours for veligers. Copper expected to bind with clay substrates in treatment area which will prevent it entering into Anadromous fish areas, NOAA does not want copper used near anadromous fish.
Captain (chelated copper product)	Labeled for snails. Assumed effective for veligers and adults	Possible impacts to non-target organisms, including fish and T&E species. Copper will exist within the system and continue to cycle around potentially causing long term impacts.	Target concentration is 1 mg/L of Cu. Chemical cost is $284,000 for 20 acre treatment area, average depth 150 ft.	Available in 3 to 4 days.	Need an exemption from EPA, 1-2 weeks based on information from Washing State, could be faster if agency directors push the issue. Application costs need to include an injection system and a barge. Contact time for adults 96 hours, 24 hours for veligers. Copper expected to bind with clay substrates in treatment area which will prevent it entering into Anadromous fish areas,

					NOAA does not want copper used near anadromous fish.
Potash	Effective at killing zebra mussels	Volume of material required to be effective maybe logistically difficult to obtain. Long contact time is necessary, may not be an option due to long necessary contact time.	Need 160,000 to 200,000 pounds (based on 20 acres). Estimated cost $0.60/lb. $96,000 to $120,000		EPA exemption required to apply, can take up to 90 days to obtain??
Zequanox©	Little to no known secondary impacts on non-target organisms.	Not appropriate for this type of treatment, still in testing phase. More suitable for control rather than eradication.	unknown	unknown	

Containment Options

	Description	**Cost**	**Other information**
Physical barrier	5000 ft long, 200ft deep, 10 oz poly weave tarping. 200 pound lead line on bottom. Floats every other foot on surface. ¾ inch steel cable strung across top.	**Total $600,000**	Would need to be built, estimated 6 weeks. Estimated weight of tarp 91,000 pounds. Would require significant man power to install, estimated 100 people for 5 days.
Bubble barrier	Not currently an option for the depth we would need.		

Other Information and Notes:

Bureau of Reclamation: can maintain level of reservoir for 2 to 4 days during treatment.

USGS: will be brought in to determine flow rate at time of treatment. USGS is also initiating studies to determine lethal effects of compounds on mussels.

USFWS: Bull trout not likely to adversely be impacted due to minimal presence during time of treatment.

Material Safety Data Sheet (MSDS) for Copper Sulfate reflects 2.5 mg/l is LD50 for Rainbow trout, Texas Parks and Wildlife study shows 86% survival of Rainbow Trout at 1 mg/l.

Pesticide applicator available in Coeur d'Alene, $5,000 estimated one day for application of Copper based compound.

Offutt Base Lake application: Using Copper Sulfate mean concentration was 0.7 mg/L Cu, 2 days after treatment concentration had dropped to 0.25 mg/L, 4 weeks later it was 0.1 mg/L.

EPA – On section 18 permit if USFWS or NOAA has issue with pesticide impact this would be considered in issuance of Section 18 EPA permit

Appendix C: Incident Management Team Briefing to Multiagency Coordination Group.

Incident Name: Quagga Mussels -- Two Rivers Marina /Mouth of Spokane River, Lake Roosevelt

Date/Time: September 22, 2010. @ 1300

Operational Period: Initial operation - Sept 21 to October 3

Unified command:
Allen Pleus, WDFW
Marty Huseman, LRNRA
BJ Kieffer, Spokane Tribe
Julie Edwards, Colville Tribes

Situation Overview:

1. Found, confirmed, appears no establishment outside marina
2. UC/IMT established 9/21
3. Estimating initial operational period of 12 days with unknown chemical and monitoring timeline
4. Eradication strategy using physical and chemical operations
5. Monitoring ambient conditions and veliger presence/densities daily

Operational Overview:

1. Tactics
    a. Physical removal operation in progress
    b. Chemical – moving forward on logistics to implement copper sulfate operations
    c. Assessing short-term options for veliger control
    d. Assessing reopening conditions for normal operations of marina during mussel spawning seasons
    e. Developing long-term monitoring program
2. Cost: Estimated total costs to complete eradication: $400,000 to $500,000
3. Pros & cons:
    a. Relatively containable situation and evidence of no spread outside marina area
    b. Flow conditions minimal and may be able to be reduced with lake level maintenance
    c. Decision to use copper sulfate due to
        i. Short-term exposure required,
        ii. Less copper used vs. chelated varieties
        iii. Known effectiveness/toxicity with Z/Q mussels
        iv. Short weather/seasonal window and ability to maintain long-term lake operations
    d. Potential anadromous fish contact minimum risk
    e. No known cultural resources risks
    f. Net pen fish must be euthanized due to pathway risk if released and no quarantine storage options
    g. Minimal potential economic impacts to casino operations
    h. Limited economic impacts to marina operations, possible up to 1 month loss of revenue
4. Assistance needed
    i. Facilitate approval by permitting agencies

    j. Continued technical support from the coordination and support staff
    k. Are there any regional/public concerns we need to address?
    l. Assuming MAC is handling public relations
5. Questions?
6. Seek MAC concurrence