

Phil Rockefeller
Chair
Washington

Tom Karier
Washington

Henry Lorenzen
Oregon

Bill Bradbury
Oregon



Northwest Power and Conservation Council

W. Bill Booth
Vice Chair
Idaho

James Yost
Idaho

Pat Smith
Montana

Jennifer Anders
Montana

December 7, 2015

MEMORANDUM

TO: Council members

FROM: Jim Ruff – Manager, Mainstem Passage and River Operations

SUBJECT: Presentation on aquatic invasive species in the Columbia River Basin

BACKGROUND:

Presenters: This briefing will be presented by Stephen Bollens of Washington State University's (WSU) School of the Environment and Timothy Counihan of the U.S. Geological Survey (USGS) Columbia River Research Laboratory.¹

Summary: The briefing will review two aspects of the presenters' recent research. First, they will review the causes and consequences of Asian copepods invading the Columbia River and other water bodies throughout the Pacific Northwest, including their likely food web impacts, e.g., on higher trophic levels such as juvenile salmon. Second, they will review a recent project funded by the Bonneville Power Administration² in 2012-2015 to support WSU and USGS to work collaboratively on enhanced monitoring and early detection of invasive quagga and zebra mussels. This project had the following specific objectives: 1) contribute to the coordination of regional early detection efforts; 2) summarize past efforts in the context of risk assessment data; 3) provide a framework for prioritization of boat cleaning stations; 4) assess the use of new detection technology (e.g., the

¹ Other collaborators on this project include Gretchen Rollwagen-Bollens, Caren Goldberg and Julie Zimmerman of WSU, as well as Jill Hardiman of the USGS.

² The funding for this project was cost-shared between Bonneville Power Administration's Technology Innovation Project, WSU and USGS.

FlowCam and environmental DNA) to process mussel veliger monitoring samples from the Columbia River Basin; and 5) conduct research that will help to assess the causes and effects of biological invasions in the CRB. Although tremendous progress was made during 2012-15, additional early detection research and sampling is needed to reduce the risk of introduction and establishment of aquatic invasive species, especially quagga and zebra mussels, in the mainstem Columbia River and other Pacific Northwest water bodies.

Relevance: One of the principles in the non-native and invasive species sub-strategy in the Council's 2014 Fish and Wildlife Program states that "regional prevention and management efforts for non-native and invasive species should aim to: 1) detect the presence of these species early and respond rapidly; 2) educate the public; and 3) prevent, monitor, control and stop or minimize the spread of non-native and invasive species where these pose both a direct threat to the hydropower system, to native fish, or to wildlife species." Preventing the establishment of aquatic invasive species, including quagga and zebra mussels, is a key measure identified in the invasive species sub-strategy in the Council's program. The Program states "the Council encourages federal and other regional entities to prevent non-native and invasive species introductions by: a) monitoring and managing the various pathways that could introduce additional aquatic nuisance species into the Columbia River Basin; and b) developing strategies and public outreach tools to educate the public about regional prevention and management of invasive species."

Work plan: Invasive species prevention is identified as a high priority in the Fish and Wildlife Division's work plan. Preventing invasive species introductions in the Columbia Basin, and in particular detecting and preventing an infestation of quagga or zebra mussels, will help protect past Program investments.

Background: Aquatic invasive species (AIS) have caused severe ecological and economic damage to native ecosystems and infrastructure across the globe. The two most striking examples of this are the ctenophore *Mnemiopsis leidyi* (comb jellyfish) invading the Black and Caspian Seas, and the invasion of *Dreissenid spp.* (quagga and zebra) mussels in the Great Lakes of North America. Both of these invasions caused billions of dollars of economic damage, and fundamentally altered the native ecosystems, resulting in the collapse of food webs and important commercial fisheries.

There is regional concern that the Columbia River Basin may be invaded next by dreissenid mussels. A major challenge for the federal action agencies and regional hydroelectric project operators to the effective operation of Federal Columbia River Power System (FCRPS) and other hydropower projects in the basin is the presence and colonization of AIS, which can potentially reduce project efficiency and require significant and

costly mitigation efforts. While in recent years zebra and quagga mussels have invaded many western water bodies causing extensive economic and environmental damage, the Pacific Northwest³ is the only region of the United States and Canada that does not have established populations of dreissenid mussels. The estimated cost associated with failing to prevent an invasion of quagga or zebra mussels in the Pacific Northwest states and western Canadian provinces exceeds \$500 million annually. Pacific Northwest states and western provinces, as well as several key western states that are source states for dreissenids, are spending more than \$13.2 million annually on monitoring and prevention efforts.

The Columbia River Basin has already experienced the recent invasion of several species of Asian copepods (small planktonic crustaceans) that are suspected of impacting native food web structure and function. Moreover, these successful invaders may increase ecosystem stress and reduce ecosystem resiliency in a way that makes additional invasions – perhaps most notably, by zebra and quagga mussels – more likely in the future.

More Info: The presenters will share the final report for this project when it is completed by the end of 2015. Below is a link to a general description of this technology innovation project on BPA's web site:
<http://www.bpa.gov/Doing%20Business/TechnologyInnovation/TIPProjectBriefs/2015-TIP-276.pdf>



Quagga mussels coating a spillway gate at Davis Dam. Source: USBR.



Quagga mussels on Hoover Dam trash rack. Source: USBR.

w:\jr\ww\ais\12-7-15 memo on wsu-usgs presentation on ais rme in crb.docx

³ The Pacific Northwest (PNW) region, for the purposes of a dreissenid mussel defense strategy, includes the four U.S. states of Washington, Oregon, Idaho, and Montana, as well as the western Canadian provinces of British Columbia and Alberta.