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January 4, 2010

## DECISION MEMORANDUM

**TO:** Council members

**FROM:** Terry Morlan  
Director, Power Planning

**SUBJECT:** Council Decision on IEAB Task to Analyze the Potential Economic Effects of a Quagga or Zebra Mussel Infestation.

**PROPOSED ACTION:** The proposed action is to approve a task order to allow the IEAB to conduct an analysis of the potential economic effects of a quagga or zebra mussel infestation of the Columbia River system, with a focus on the Federal Columbia River Power System.

**SIGNIFICANCE:** Both the federal power system and the fish and wildlife of the Columbia River could be adversely affected by an infestation of quagga or zebra mussels. Avoiding an infestation, or delaying it, will involve substantial investment by the region. Part of the decision to make that investment depends on the possible costs of not making the investment. The IEAB would provide the Council and region with useful information about the potential damage and related costs of a mussel infestation compared to the potential cost of programs to avoid or delay infestations in the Columbia Basin.

## BUDGETARY/ECONOMIC IMPACTS

The estimated cost of this task is \$19,500. Funds are available in the IEAB budget for the task.

## BACKGROUND

This task resulted from discussions between the Fish and Wildlife Division and the IEAB. There is growing concern about the danger posed by a possible spread of invasive mussels into the waters of the Columbia River Basin. The Council has had various presentations about the experience with infestations in other regions, particularly in the lower Colorado River of the Southwest, and on the actions being taken or proposed to be taken by states in the Pacific

Northwest to avoid, or at least delay such infestations.<sup>1</sup> This proposed task would provide additional information about the potential effects of mussel infestations and their costs, and compared to information about the cost of prevention and mitigation. Additional background is included in the attached task order.

## **ANALYSIS**

The statement of work describes the approach to be taken in this task and the types of information that will be provided. There is, however, some additional background that is relevant to the Council decision on this IEAB task. The charter of the IEAB expired in June 2009 although it has continued to function in the interim pending a discussion and decision by the Council on the future role of the IEAB. That discussion is scheduled for the February meeting. As background for that discussion, the IEAB, working with Council members and the Fish and Wildlife staff, has proposed several possible tasks for future work. The proposed task is one of those.

Since the future of the IEAB will be discussed in February, this proposed task on quagga and zebra mussels is an interim project that can be completed within 4 to 6 months. In the interim, it would provide the IEAB with a productive and relevant task and analysis, but at the same time leave the longer term role subject to further Council discussion and decision.

## **ALTERNATIVES**

Alternatives for this decision are: (1) approve the proposed task; (2) delay a decision until the February Council discussion about the future of the IEAB; or (3) modify the task order through Council discussion. The staff recommends approval of the proposed task. It will provide important and timely information to the Council and the region about the economics of the quagga-zebra mussel issue regardless of the future role of the IEAB.

## **ATTACHMENTS**

A proposed task order including background, statement of work, deliverables, and budget is attached.

## **TABLES, GRAPHS, CHARTS, FIGURES, OTHER GRAPHICS**

Not applicable.

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<sup>1</sup> At its December 2009 meeting, the Council had a briefing of the actions contained in the Quagga-Zebra Mussel Action Plan for Western U.S. Waters, prepared by the Western Regional Panel on Aquatic Nuisance Species.

## Independent Economic Analysis Board

### Proposed Task

#### Investigative Study for the Economic Risk Associated with the Potential Establishment of Zebra and Quagga Mussel Populations

January 2010

### BACKGROUND

The invasive zebra and quagga mussels (*Dreissena* species) pose a potential threat to the Columbia River Basin. Estimates of invasion potential in the Columbia Basin range from low (Whittier et al. 2008) to imminent (CRBT 2008). While the biological assessment of mussels becoming established is still evolving<sup>1</sup>, it is clear that the costs of established mussels would be important (Connelly et al. 2006). There has been some progress on modeling the economic impacts of a mussel invasion in the Pacific Northwest (Warziniack et al. 2006) and guidance for more in-depth review is provided by Radtke et al. (2000), Cusak et al. (2009) and Keller et al. (2009).

Economic costs of established mussels result from removal, diminished or lost use of facilities, and reduced biological productivity.<sup>2</sup> The Council's responsibilities related to power generation and fish/wildlife conservation could be affected significantly if the mussels become established. Additional funding would have to be raised or funds diverted from ongoing programs, and the effectiveness of fish and wildlife mitigation projects could decrease. An economic study of risk and costs of *Dreissena* mussel colonization in the Columbia River Basin could prove valuable to policy deliberations about avoidance programs (education, prevention, monitoring, rapid response), and containment and control actions if establishment occurs.

### STATEMENT OF WORK

This task will review and summarize current opinion about the risk of mussels becoming established, summarize avoidance, containment and control techniques and their costs, and estimate potential costs of invasion by reviewing relevant literature and surveying facility managers and other experts. Where possible, costs of avoidance programs and the risk of establishment will be compared to potential containment, control and damage

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<sup>1</sup> Research has found several factors can limit the distribution of the mollusks, notably calcium needed in the early life cycle growth stages. Calcium levels west of the Cascades are generally quite low and considered by some studies to be below the levels that can sustain the mollusks. The Basin's east side has slightly higher calcium levels, but still not very high. The other limiting factors that singularly or in combination can effect population growth are water temperatures, salinity, substrate size, nutrients, and acidity levels.

<sup>2</sup> Facilities related to Council responsibilities that can be impacted include any submerged components and conduits of the Federal Columbia River Power System (FCRPS) including juvenile and adult fish passage and monitoring facilities, navigation locks, hydropower facilities, raw water distribution systems for hatcheries, turbine cooling, and water supply; trash racks, diffuser gratings, and drains. Non-FCRPS irrigation, municipal water supply and other infrastructure could also be affected, and a mussel invasion also has the potential to collapse the existing food chain.

costs. This study will coordinate with some other ongoing economic studies (Lodge, 2009) but will emphasize potential effects on Fish and Wildlife Program costs.

First, the state of the science regarding potential and scope of mussel invasion will be summarized. In particular, dissolved calcium may be too low in some parts of the basin to support the mussels (Whittier et al 2008).<sup>3</sup> The IEAB will work with biological scientists to characterize the potential for invasion in the mainstem Columbia and important tributaries. This potential is expected to range from very low to high.

Next, where potential for invasion is more than very low, the IEAB will inventory the resources at risk, the potential damage costs (costs of diminished or lost use), and potential containment and control costs. Emphasis will be placed on resources or facilities owned by the FCRPS or funded by the Council. For example, costs incurred by commercial barge traffic and private water users will be summarized only if available, but costs at Council-funded hatcheries will be developed and summarized with more detail. Emphasis will be placed on resources or facilities where the risk of invasion is highest.

Costs of established mussel colonies include control and containment costs, and damage costs. In general, pest infestations result in both types of costs. Damage costs are usually lost use costs such as loss of power generation and productive fish habitat, and the lost use of hatchery facilities, water diversion facilities, and monitoring equipment. The costs of lost habitat and reduced fish survival might be estimated by use of alternative costs to restore fish survival or replace damaged habitat. The costs, effectiveness and side-effects of various control and containment strategies will be summarized.<sup>4</sup>

The IEAB will also scope the potential costs and effectiveness of programs intended to avoid or delay establishment of mussels in the Basin. Programs would target the most likely sources of infestation, such as boats originating in infested areas, and might include inspection, education, and monitoring. Many potential actions have been scoped in the Quagga-Zebra Mussel Action Plan for Western U.S. Waters (2009), but need to be broken out for the states in the Columbia Basin.

Finally, the costs and merits of the avoidance programs will be compared to potential damage, control and containment costs. This comparison should yield insights regarding

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<sup>3</sup> A Bonneville-funded study by PSU researchers is underway to determine whether quagga mussels can survive and grow in Columbia River water, and how levels of calcium may affect mussel growth.

<sup>4</sup> Identified techniques include chemical treatment, thermal shock, freezing, oxygen starvation, desiccation, UV radiation, predation and electrical and acoustic deterrents. The USBR has a high priority research program underway to develop effective mussel control strategies including use of a common (dead) bacteria, water jetting, filtration, coatings, use of copper-nickel alloys for screens, and physical modification of water intakes. There is concern that while the techniques can be effective, there may be collateral damage to native fish. Some of these techniques may have to be foregone or there may have to be significant additional mitigation necessary to avoid deleterious impacts to desirable species.

where scarce funds might be best spent to avoid higher costs of established mussel colonies.

An advisory committee will be utilized in the task. Three scientists and managers have shown interest in serving on the committee: Mark Sytsma (Center for Lakes and Reservoirs, Portland State University), Stephen Philips (Pacific States Marine Fisheries Commission staff and chairman of the 100th Meridian Initiative Columbia River Basin Team), and Samuel Chan (Oregon State University Sea Grant). The IEAB will work closely with Tony Grover and Jim Ruff, Director and staff member of the Fish and Wildlife Division, respectively.

## **DELIVERABLES**

The results of the investigation will be documented in draft and final reports. The report will highlight avoidance programs that appear to be most desirable, and important scientific uncertainties will be discussed. It is expected the draft will be completed by April 30, 2010. Depending on the extent of the review and comment period, a final report could be completed by June 30, 2010.

## **LEVEL OF EFFORT**

### Budget

Labor: 170 hours IEAB member time @ \$90/hour	\$15,300
Travel and other (compensation for scientists)	\$4,200
Total	\$19,500

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