

Estimated Potential Economic Impact of Zebra and Quagga Mussel Introduction into Idaho

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Congressional researchers estimated that an infestation of zebra mussel in the Great Lakes cost the power industry alone \$3.1 billion in the 1993-1999 period, with a total economic impact on industries, businesses, and communities of more than \$5 billion. Given the well-documented impacts these species have had in the Great Lakes, many western states are on high alert to contain, control and prevent the spread of these mussels in the West. Nevada, California, Arizona, Colorado and Utah each have detected these species in critical water supply systems, and have launched aggressive eradication and control programs in an attempt to minimize impacts.

Zebra and quagga mussels have **not** been found in Idaho waters to date. In order to understand the potential impacts of these species to Idaho, staff examined existing databases and published research to generate estimates on comparable occurrences in Idaho. The results reflect an estimated cost due to direct and indirect impacts on infrastructure and facilities that use surface water. Most of the published data investigated does not report annual costs, however annual maintenance costs would be expected to increase for all of the categories examined. In some cases, economic impacts could not be estimated. For example, no comparable economic data exists for mussel impacts on irrigation systems, therefore they are excluded from the potential cost estimates. The estimates are considered conservative and for the most part are reported in 1997 dollars, not adjusted for inflation.

The following categories were examined:

- **Hydro Power:** These estimates were based on a Bonneville Power Administration-commissioned study that examined the estimated hydropower maintenance costs associated with zebra mussel by examining the Bonneville Dam First Powerhouse, costs associated with Asian clam control at Bonneville, and a survey of zebra mussel mitigation costs at other hydropower generation facilities in North America. The study estimated the costs for installing sodium hypochlorite systems and applying antifouling paint to 13 federal hydroelectric projects in the Columbia River Basin. The Idaho estimate was based on the BPA average cost per project (\$1.8 million) for the 26 hydropower dams in Idaho (Phillips et al. 2005).
- **Other Dams:** Other dams include water impoundment structures not associated with power generation. These structures will incur maintenance costs associated with mussel fouling of pipes and structures. Estimate based on figures from O'Neil (1997) for navigational lock structures (\$1,700 per structure) applied to 86 structures in the state.
- **Drinking Water Intakes:** The drinking water facilities included in this analysis are facilities that draw surface water for municipal or public drinking water use. Mussels foul intake piping and water processing infrastructure, increasing maintenance costs and degrading water flavor due to mussel waste and decomposition in water lines. Private single family home water intakes for drinking and irrigation are not included in this estimate. Estimates based on O'Neill (1997) figures from water treatment facilities (\$42,000 per facility) applied to 100 facilities in Idaho.
- **Golf Courses:** Golf courses are at risk for additional maintenance costs for irrigation systems. Fouling of pipes and pumps and clogged sprinklers are projected to increase operating expenses. Estimates based on O'Neill (1997) costs from golf courses (\$150 per facility) applied to 114 Idaho courses.
- **Boating Facilities:** Boating facilities include marinas, docks and boat launches. Increased cost estimates are based on maintenance associated with dock and boat launch fouling. Estimates based on O'Neill (1997) figures from marinas (\$750 per facility) applied to 380 Idaho facilities.
- **Fish Hatcheries and Aquaculture:** Hatcheries and aquaculture facilities are vulnerable to zebra / quagga mussel fouling. Pipes, pumps and raceway structures are all subject to increased operations and maintenance costs. Estimates based on O'Neill (1997) figures for hatcheries and aquaculture impacts (\$5,800 per facility) applied to 163 facilities in Idaho.

- **Boater Costs:** More than 90,000 motorized boats were registered in the state of Idaho in 2007. Potential increases in boater costs are based on estimates for anti-fouling paints and increased per-boat maintenance costs. Estimates based on Vilaplana et al. (1994) for increases in boater maintenance costs (\$265 per boat).
- **Fishing Use:** Recreational fishing is a \$430 million industry in Idaho. Research on impacts of mussels on fisheries is limited but reductions of fish numbers are likely. Vilaplana et al. (1994) found a 4% decrease in boater recreation because of mussel introduction. Estimate based on a 4% reduction of use applied to 2,917,972 Idaho fishing trips a year averaging \$150 per trip (IDFG 2003).
- **Irrigation:** 56,175 points of diversion (POD) were identified in Idaho by the Idaho Department of Water Resources. Multiple points of use (POU) may be associated with each POD. Each POD and POU could be affected by the introduction of zebra or quagga mussels. These mussels can grow up to 0.5mm / day under ideal conditions and could impact water conveyances that are seasonally dry. Fouling from mussel establishment is cumulative and increased fouling and flow reduction would occur in ditches, pipes, pumps, fish screens and diversion structures over time. Published research on mussel related flow reduction in irrigation systems is minimal, but mussel establishment in pipes and pumps is well documented. The true impacts of zebra and quagga mussel introduction on irrigated agriculture in Idaho are uncertain, but there is a high likelihood that these mussels will increase maintenance costs for operations that rely on surface water for irrigation.

Facility	Number	Estimated Cost Per Unit	Estimated Cost State-Wide	Citation
Hydro Power	26	\$1,817,000.00	\$47,242,000.00	Phillips et al. 2005
Other Dams	86	\$1,730.00	\$148,700.00	O'Neil 1997
Drinking Water	100	\$42,870.00	\$4,287,000.00	O'Neil 1997
Golf Courses	114	\$150.00	\$17,100.00	O'Neil 1997
Boat Facilities	380	\$750.00	\$285,000.00	O'Neil 1997
Hatcheries/Aquaculture	194	\$5,860.00	\$1,136,800.00	O'Neil 1997
Boat Maintenance	90,000	\$265.00	\$23,850,000.00	Vilaplana andHushak 1994
Angler Days (4% reduction)	2,917,927	\$150.00	\$17,507,500.00	Vilaplana andHushak 1994
Irrigation POD	56,175			Little current published data
Total Estimate			\$94,474,000.00	

Literature Cited

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