

**Statement for 16 July 2008 press conference on  
Costs of ship-caused invasive species in the North American Great Lakes**

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I am David Lodge, an ecologist at the University of Notre Dame. The goal of Notre Dame's Center for Aquatic Conservation, which I direct, is to foster research that can inform management practices and policy decisions on major environmental issues. One of the most globally important causes of environmental change is invasive species. And as we show today, environmental change causes a loss of the ecosystem goods and services that are important drivers of economic change. For the North American Great Lakes one of the most important vectors delivering invasive species has been ocean-going ships, which have had access to the upper lakes since the opening of the St. Lawrence Seaway in 1959. Any policy-maker considering steps to reduce invasions into the Great Lakes may wish to know how much ship-borne invasions are currently costing.

Such a complicated issue requires a multidisciplinary team and a multipronged research approach. The leaders of our team include Roger Cooke of Resources for the Future, an expert in risk assessment and in a research approach called Structured Expert Judgment (because Cooke is overseas, he could not join us today); David Finnoff of the University of Wyoming, an expert in natural resource economics; John Rothlisberger, a graduate student in biology at the University of Notre Dame, who is integrating the various components of the study; and me. Funding to support this research has come from NOAA Sea Grant and the Environmental Protection Agency. The basic goal of this on-going project is to estimate the cost to the Great Lakes regional economy of the invasive species introduced by ocean-going ships since the opening of the St. Lawrence Seaway in 1959. We provide only a partial answer today because a more complete answer is not yet available.

Because previous ecological and economic studies on this topic have not provided all the guidance that policy-makers would like, we adopted a method that has not previously been applied in invasive species research. We used Structured Expert Judgment to estimate the impact of ship-borne invasive species on activities in four economic sectors: commercial fishing, sport fishing, wildlife watching, and raw water use (by industries, municipal water supplies, etc). Experts provided their estimates and their uncertainty around those estimates of the impact of invasive species on the activities in each economic sector. For the most part, experts were not asked to estimate impacts in dollars; rather they were asked to provide estimates on metrics like pounds of fish caught. John Rothlisberger will provide more details on this aspect of the study.

Using the estimates from experts, we have begun to estimate the economic consequences in dollars. Consumer surplus, the benefits to consumers of the markets involving these activities, is the measure we have estimated so far for the fishing and wildlife watching sectors. (We estimated a different measure, increased costs, for raw water users). As David Finnoff will

explain, these measures are a subset of several important components of a full economic analysis, and the only one on which we are now ready to report. Our approach to the economic analysis produced conservative estimates of losses of economic benefits. An earlier estimate, which John Rothlisberger presented at this spring's IAGLR meeting, was based on a replacement cost method, an approach that David Finnoff will also describe. The numbers we are releasing today represent the continued development of our on-going analyses.

None of these analyses are submitted for publication yet. At this stage of the research project, some of the things that we can say include:

- Results from our survey of experts suggest that if ship-borne species had not been introduced into the Great Lakes, the Great Lakes would be providing society with substantially higher harvests in both commercial and recreational fisheries, with estimates ranging from 11%-35% depending on which lake and which sort of fishery one considers. In other words, the goods and services that the Great Lakes would now be providing us would be much higher if it weren't for invasive species delivered by ships. These are the first estimates of the aggregate impact of ship-borne invasive species on Great Lakes fisheries.
- Because the U.S. sport fishery is much larger than the U.S. commercial fishery, our economic models suggest that a conservative estimate of these losses was about \$124 million for the sport fishery and \$2 million for the commercial fishery in 2006.
- The experts also estimated that the ability of the Great Lakes region to sustain wildlife watching—including various ecotourism-related activities—is about 1% lower than it would have been without ship-borne invasive species. Because this is such a large (and growing) industry, our economic models suggest that even a conservative estimate of this impact is quite large, about \$47 million for 2006.
- Experts and our economic analyses suggested that the increased costs for raw water users totaled about \$27 million for 2006.
- To total it all up, our conservative estimate for lost ecosystem goods and services totals about \$200 million for 2006. At this stage in our analyses we cannot anticipate what intermediate or maximum estimates of impact may emerge from more complete analyses. We do anticipate that \$200 million will remain near the low end of our plausible range of estimates, and that the \$300 million (based on replacement costs) that we presented at the IAGLR meeting will be contained in a fuller range of plausible estimates that will emerge as the research progresses.

It is important to remember that our current results are low because:

- Our estimates do not consider ecosystem goods and services in Canada. The same four economic sectors with which we dealt exist in Canada.

- Our estimates do not consider lost goods and services that are in the U.S. but outside the Great Lakes region. Many of the species considered in this study, including zebra and quagga mussels, have already caused substantial damage in other parts of the country, increasingly including western waterways. Unlike other forms of pollution, these living species will continue to increase in abundance, spread, and further reduce ecosystem goods and services throughout the country. The Great Lakes are simply the first stop for many ship-borne species on a journey that can eventually include most of the waters of North America. The current damages being inflicted in Lake Mead and California, for example, are attributable to shipping in the Great Lakes in the 1980s.
- Our estimates consider only consumer surplus (economic benefits to consumers) and damages to raw water users; a more complete analysis would include producer surplus and interactions among different economic sectors. We will be incorporating these aspects into our work in the coming months.

In summary, what we are providing today are the median estimates of changes in ecosystem services estimated by experts, and the low end of financial losses to the U.S. Great Lakes economy that have been inflicted by species delivered to the lakes by ocean-going ships. The \$200 million sum represents the opportunity cost that has likely been absorbed by U.S. society as a result of the cumulative effects of almost 50 years of ocean-going vessels in the Great Lakes. If invasive species stopped arriving in the Great Lakes tomorrow, the costs we estimated would unfortunately continue because the species already present will likely continue to have the same, or greater, impacts they are having today. The benefits from any new management or policy initiatives, therefore, will derive from the prevention of potential future invasions, and their potential cost to society.