

while the existing coastal or fresh water is pumped or pushed out through another opening. As defined by the Coast Guard, a volume of water equal to three times the ballast tank capacity must be pumped for a flow-through exchange.

### Regulatory Evaluation

This proposed rule is a “significant regulatory action” under section 3(f) of Executive Order 12866, Regulatory Planning and Review, and does require an assessment of potential costs and benefits under section 6(a)(3) of that Order. The Office of Management and Budget has reviewed it under that Order. It is “significant” under the regulatory policies and procedures of the Department of Homeland Security (DHS). A full Regulatory Evaluation is available in the public docket for this rulemaking.

This Regulatory Evaluation identified the vessel population affected by the proposed rule and provides cost and benefit models for the current principle option of ballast water management (BWM) provided for under the rule—ballast water exchange. BWM is applicable for any vessel equipped with ballast tanks entering U.S. waters from outside the EEZ. The vessel population was categorized by vessel type under the assumption that vessels in different cargo services and of different sizes likely manage ballast water in different ways. We estimated that approximately 7,420 vessels will be affected and approximately 11,500 ballast water exchanges will be performed annually. Annual costs totaled approximately \$15.8 million. The 10-year present value cost for this rule is \$116.7 million.

The benefit assessment expanded on the analysis conducted for costs by focusing on the probability of viable organisms being introduced into U.S. waters through ballast discharge, both before the proposed rule and following the implementation of mandatory BWM. A probability of a reduction in the number of invasions of NIS was calculated using data on voyages, vessel types, ballast water volumes, and exchange effectiveness, as well as order-of-magnitude assumptions about the probabilities of inoculations, introductions, and invasions resulting from ballast water discharges. The calculations indicated the proposed rule may result in avoiding approximately 10 inoculations that result in invasions for each year the rule is in effect. While there is considerable uncertainty in these calculations and the order-of-magnitude assumptions (referred to as the “rule of 10s” in the Regulatory Evaluation) are admittedly an

oversimplification of a complex problem, we believe their simplicity and transparency are compelling. To date, there is no national estimate of the rate of aquatic NIS, and we cannot compare our baseline invasion estimate to other, more limited estimates regarding invasions. Our findings are broadly consistent, however, with other estimates of the rate of NIS invasions. One study finds that in the San Francisco Bay and Delta, invasions have increased from one new species every 55 weeks (1851–1960) to one new species every 14 weeks (1961–1995) (Cohen and Carlton, 1998). Another study posits that invasion rates may have increased in the San Francisco Bay and the Great Lakes over the past several decades (Mills, *et al.*, 1993). Finally, some researchers believe that the increase of initial invasions is best described by an exponential function (Ruiz, *et al.*, 2000). Using our simple methodology, we found that an invasion occurs somewhere in the United States about twice every 3 weeks.

There is considerable difficulty in estimating monetized damages resulting from NIS invasions. Some species impose significant, long-term damages on marine industries and infrastructure. Other species may create subtle disturbances in ecosystems that are difficult to quantify. Still others may be relatively benign. There have been attempts to estimate monetized damages for a few species, most notably the zebra mussel. One study estimated costs to Great Lakes water users, mostly due to fouling of intake structures, of \$120 million over the time period 1989 to 1994 (Hushak, 1996). Another estimated cumulative zebra mussel impacts of \$750 million to \$1 billion over the time period 1989 to 2000 (Carlton, 2001). Other species for which monetized damage estimates have been developed include the Asian clam (\$1 billion per year, OTA, 1993) and European green crab (\$44 million per year, CRS, 1999). Eight Federal agencies that sit on the Invasive Species Council collectively spent \$514 million in 1999 and \$631 million in 2000 for the control and management of NIS (GAO, 2000).

We have not reviewed the methodologies used to produce these estimates in detail, though all of them (except expenditures by Federal agencies) involve considerable uncertainty. They are indicative, however, of the magnitude of damages that may result from particularly destructive invasions. It is likely, however, that most invasions would result in considerably lower damages than the numbers reported in these studies. Because of the lack of data on

damages potentially associated with any but the most destructive invasions, we have not tried to monetize the benefits of the proposed rule. If the proposed rule resulted in avoiding even one invasion of this magnitude over the course of several decades, however, the benefits of the rule would most likely justify the costs. The Coast Guard requests comment on its benefits estimation methodology and on possible approaches for monetizing benefits associated with avoiding future invasions.

### Small Entities

Of the affected population of all vessels arriving at U.S. ports, we estimate that 21 vessels of the 171 U.S. flag vessels, are owned by 10 small businesses. Approximately 35 large companies own the remaining 150 U.S. flagged vessels. We estimate all vessels will choose the alternative of conducting a mid-ocean ballast water exchange. The cost of complying with the proposed rule is the cost of exchanges performed by the vessel added to the cost of additional maintenance required for the ballast water pumping system. The cost per exchange is a function of vessel type. Each vessel's costs will be a function of the cost of exchange for that vessel type multiplied by the number of trips into U.S. waters from outside the U.S. EEZ. Thus the annual impact on the revenue for a small business will vary with the number of entries the vessel makes from outside the U.S. EEZ. In order to estimate the upper bound of that impact, we calculated the cost of exchange for the maximum number of exchanges possible for the years 1999 and 2000. We then assumed that weather conditions and transit tracks allowed exchanges for all of these entries. For the annual cost of the rule, the number of vessels owned by each small business is multiplied by the number of exchanges performed, and the resulting product is then multiplied by the cost of exchange for the particular vessel type, and added to the maintenance cost of 10 percent of the capital cost of the ballast pump. Of the 10 small businesses that own vessels affected by the rule, we found revenue for 9. For the remaining company where no revenue information was available, we assumed revenue of \$1 million for the purposes of the analysis. Table 1 gives the effect of the rule on the average annual revenues for the small business affected. For more detailed information, refer to the Regulatory Evaluation in the docket.