

6~ PROGNOSIS FOR THE GREAT LAKES



Thirty years of pollution controls and fisheries management have driven a recovery process in the Great Lakes. However, as pointed out in the most recent State of the Great Lakes report, while a number of indicators are trending positive (e.g., meeting of phosphorus targets in all lakes but Erie, recoveries of bald eagle populations on Great Lakes shorelines), the introduction of non-native species has dramatically disrupted the Great Lakes ecosystem already, and threatens to grow worse.¹²⁵ The combination of invasive species and other threats to the ecosystem will make meeting the goals of the Great Lakes Water Quality Agreement that much more difficult. And a lack of sophisticated management tools combined with the complexity of the system will make management of the system challenging.¹²⁶

PREDICTING IMPACTS

Predicting the impacts of new invasive species requires taking into consideration how the species will interact with the new environment as well as with other species, both native and non-native. Additionally, forces such as climate change may make determining the challenges of future Great Lakes system management even more challenging.¹²⁷ Sometimes the identification and management of new nuisance species may not occur for an extended period of time after initial exposure. Based on records of deliberate species introductions, it may take several years before the invader is detected in the system, depending on the speed of dispersal and type of organism.¹²⁸ This additional passage of time may obscure the linkage between the species and the damage it is causing, particularly since this link may not be direct or linear.¹²⁹

Scientific predictions suggest that the Great Lakes and St. Lawrence River system will continue to receive new and potentially more damaging invasions from Eurasia.¹³⁰ As each new species becomes established, the ecosystem will respond to these new relationships. These changes will continue to challenge our innovative ability to adapt, especially in light of additional pressures on the Great Lakes ecosystem.

THE GREAT LAKES WILL DRAMATICALLY CHANGE IF WE DON'T TAKE ACTION

Unless additional action is taken quickly, the number of invasive species entering the Great Lakes will likely continue to dramatically increase. Researchers use considerations including potential donor regions with growing economies, trade patterns, attributes of species likely to facilitate invasion, and history of successful invasions in order to identify new species that could potentially invade the Great Lakes.¹³¹ An important characteristic is examining species in regions from which successful Great Lakes species invasions have occurred. One study identified 56 fish species from the Ponto-Caspian region of Eurasia as potential invaders to the

BOX 6

CLIMATE CHANGE AND THE GREAT LAKES - POTENTIAL TO EXACERBATE PROBLEMS FROM INVASIVE SPECIES

Climate change is being increasingly recognized as a serious problem for the Great Lakes. Computer models indicate that the climate in general could be as much as 7 degrees warmer by the end of this century. The models also indicate widely varying predictions on impacts of climate change on lake levels in the Great Lakes, ranging from as much as a 1.38 meter (4.6 ft) drop in Lakes Michigan and Huron by 2090 to a 0.35 meter (1.2 ft) increase in levels for the two lakes. The different predictions are generally due to difference in predicted precipitation levels and increases in air temperature. Other computer modeling predicts that the lakes would be warmer and more static for longer periods of the year (e.g. stratified with warmer water on top during warmer months), which could lead to reductions in nutrient cycling as well as lower penetration of oxygen to the deeper waters in the lakes. Though the potential food web repercussions of these changes are not clear, potential effects include reduced primary production (e.g., the production of algae), reduced generation times for most invertebrates, and reduced habitat for coldwater fish such as trout and salmon due to lower oxygen levels in deeper waters.¹³²



Great Lakes dock

Great Lakes.¹³³ Two additional studies looked at invertebrate species; one determined that 16 species were “high risk” out of the 63 species¹³⁴ studied and the other identified 17 “high risk” species out of 59 species.¹³⁵ Similar studies have not yet been conducted for other groups of plants or animals.

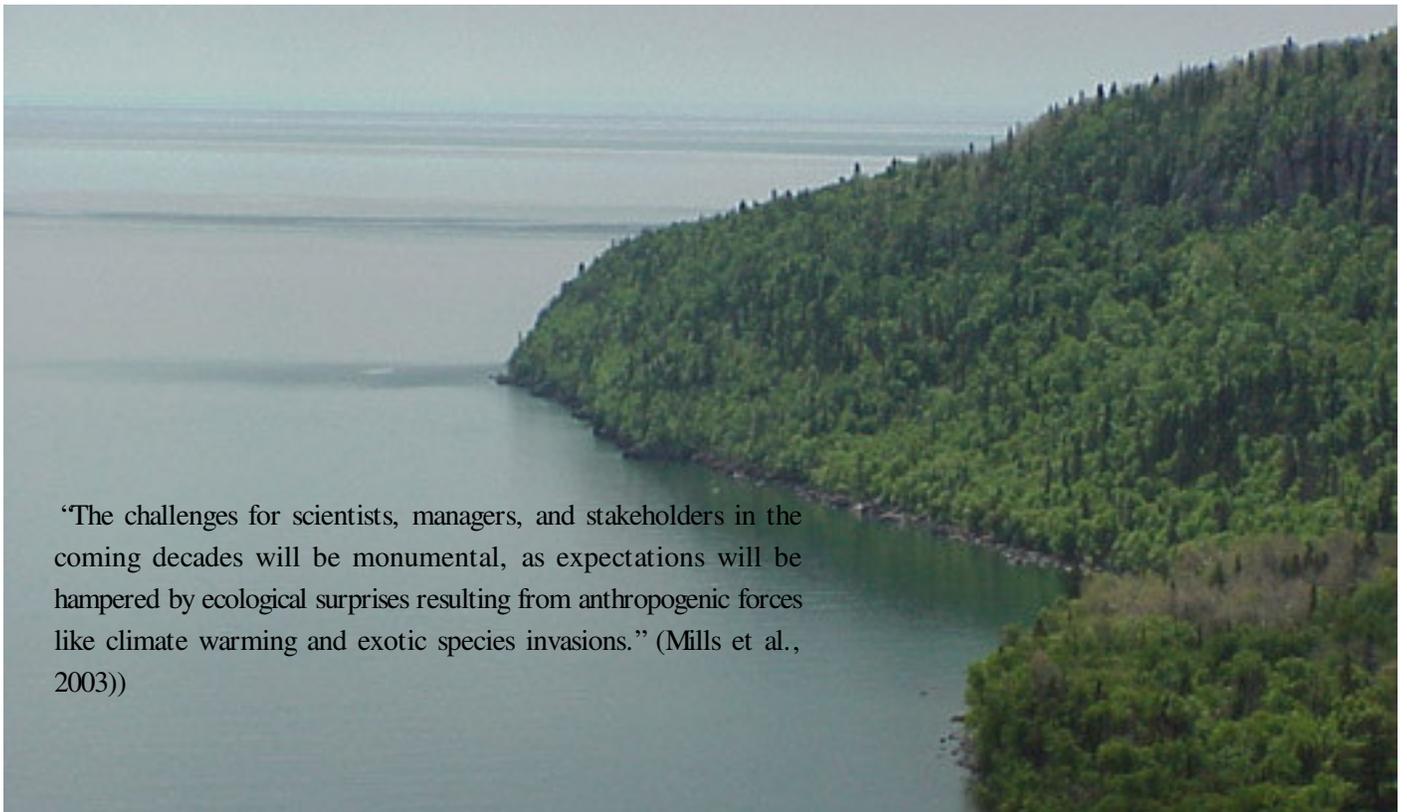
SHUTTING THE DOOR ON AQUATIC INVASIVE SPECIES: AN OUNCE OF PREVENTION IS WORTH A POUND OF CURE

We have a greater chance of slowing the impact of invasions if we can determine ways of preventing their entry and by taking quick action to eradicate new populations before they are established. Determining which species pose the highest risks and then focusing prevention and control efforts on the pathways that bring those species may be the most effective strategy.

With advanced information on invasive and potentially

harmful organisms, control measures such as quarantines and import restrictions could be established.¹³⁶ Additionally, resources could be better allocated to increase the chances of early detection and rapid response.¹³⁷ A process known as bioeconomical modeling uses a framework to evaluate the risks posed by invasive species to both economic activity and the environment and could be used to assist in identifying optimal management strategies.¹³⁸

The Great Lakes ecosystem has been affected by invasive species and other stresses for over two centuries, and the fish communities have changed significantly during this time. Yet the potential for even more significant changes via an invasional meltdown of Great Lakes food webs is real.¹³⁹ Research is increasingly showing the potential for “mutualistic interactions” to occur—that is where two or more invasive species interact to mutual benefit for each involved. Acknowledging this threat means addressing ballast water introductions and other methods of invasive species transport. It means focusing on the benefits of educational programs. It means supporting research, technologies and regulations that control, reduce and prevent the spread of invasive species.



“The challenges for scientists, managers, and stakeholders in the coming decades will be monumental, as expectations will be hampered by ecological surprises resulting from anthropogenic forces like climate warming and exotic species invasions.” (Mills et al., 2003))

Great Lakes shoreline