



ECOLOGICAL RESEARCH PROGRAM

DNA ANALYSIS TOOLS HELP TO PROTECT NATION'S WATERWAYS

Issue:

Assessing the status of our nation's watersheds and waterways and identifying potential threats to them is often hampered by the lack of assessment tools. Evaluation of environmental risk is critically dependent on our ability to identify biological species. Yet many species are difficult or impossible to identify correctly based just on physical appearance.

Development of new DNA-based tools that increase the accuracy and efficiency of species identification is important to environmental risk assessment.

Science Objective:

Scientists in the U.S. Environmental Protection Agency's Office of Research and Development are developing novel genetic analysis tools to monitor and protect our waterways and the aquatic life in them. They

have developed genetic tools referred to as "DNA barcodes" that are leading to faster and more accurate detection of foreign mussels and crabs, and other uninvited aquatic animals. Similarly, a DNA barcode database is being developed for native aquatic invertebrates to help states monitor the biological integrity of their streams.

Application and Impact:

Genetic assessment tools are increasingly seen as valuable resources that allow states to protect the biological integrity of the nation's waters. In one recent application, EPA scientists used DNA information to confirm the presence of the quagga mussel in the Duluth-Superior Harbor. If allowed to thrive, these thumbnail-sized mussels could seriously threaten the harbor and Lake Superior. Using more advanced genetic assessment tools, scientists have been able to trace the spread

of another invasive species, the European green crab, from Europe to both coasts of the United States. EPA scientists also have documented that genetic analyses of aquatic species used as indicators of stream condition differentiates species, subspecies, and populations much more precisely than visual inspections can.

References:

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Darling, J.A. and Blum, M.J. DNA-based methods for monitoring invasive species: a review and prospectus. *Biological Invasions*, online January 2007.

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June 2007