

United States
Environmental
Protection Agency

Office of
Research and
Development

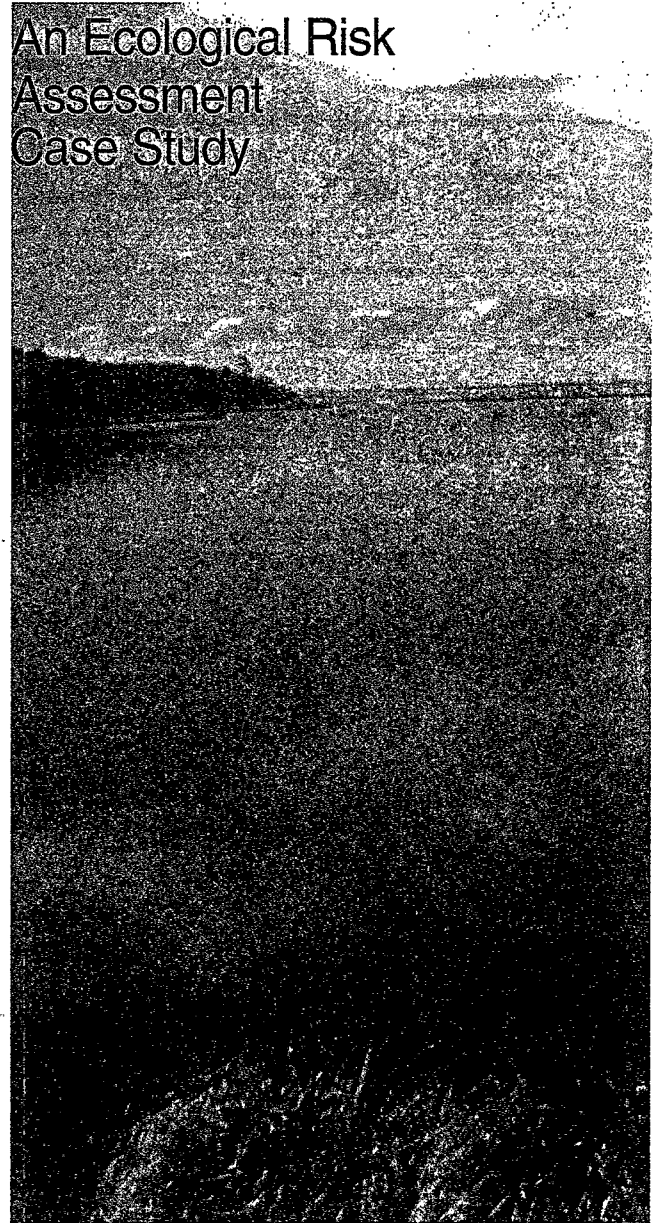
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Water

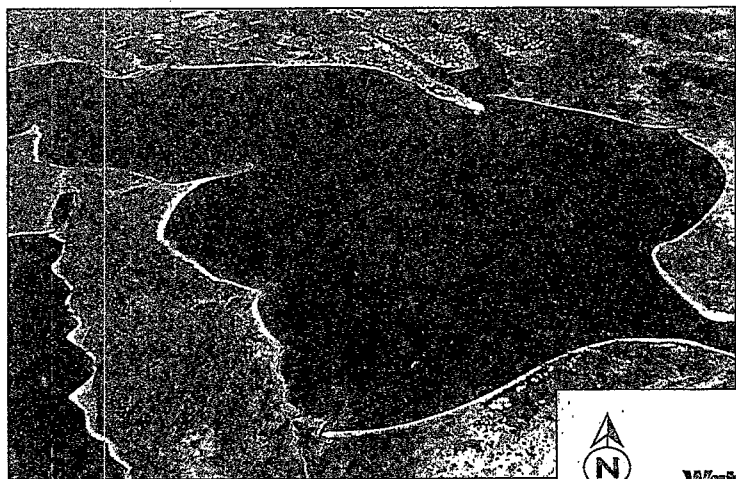
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Waquoit Bay Watershed

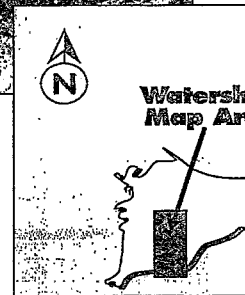
An Ecological Risk
Assessment
Case Study





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The watershed consists of freshwater streams and ponds, saltwater ponds and marshes, pine and oak forests, barrier beaches and open estuarine waters.



What is an ecological risk assessment?

An ecological risk assessment evaluates the potential adverse effects of human activities on the plants and animals that make up ecosystems. The risk assessment process provides a way to develop, organize and present scientific information so that it is relevant to environmental decisions. When conducted for a particular place such as a watershed, the ecological risk assessment process can be used to identify vulnerable and valued resources, prioritize data collection activities, and link human activities with their potential effects. Risk assessments provide a focal point for cooperation among local communities and state and federal government agencies, and a basis for comparing different management options.

Why is Waquoit Bay special?

Waquoit Bay is a shallow Cape Cod estuary fed by groundwater and freshwater streams. Because the Bay is close to the mixing zone between the warm waters of the Gulf Stream and the colder waters of the Labrador Current, many important fish species are found in the Bay. Alewives, bluefish, striped bass, winter flounder, menhaden, and tautogs all reside in the Bay for at least part of the year. The Commonwealth of Massachusetts has

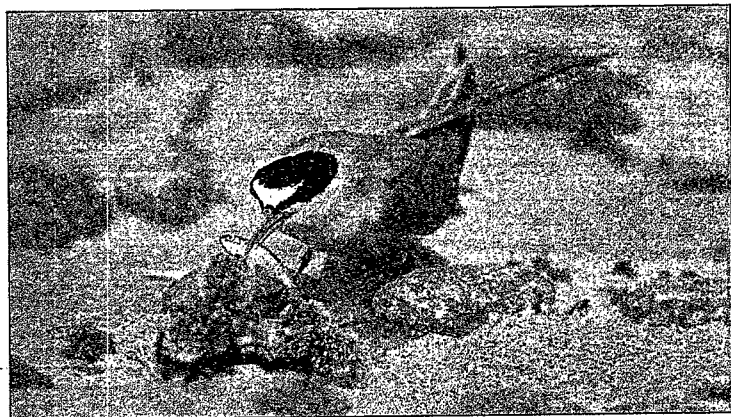


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Cape Cod, Massachusetts with the Waquoit Bay area highlighted. The Waquoit Bay watershed covers 53km² (21m²) on the south shore of Cape Cod.

designated Waquoit Bay as an Area of Critical Environmental Concern. The Bay has also been designated as a National Estuarine Research Reserve. These designations help reduce existing and future human disturbances to the Bay's watershed. Federal, state

and local resource agencies, various regional and local citizen interest groups, and academic organizations are working together to preserve and restore the quality of the Waquoit Bay estuary and its associated freshwater ponds and rivers.



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Many Federally-protected birds, such as the Least Tern (pictured here) nest or forage along Washbyrn Island in Waquoit Bay.

How can this valuable resource be protected?

The waters of Waquoit Bay and its associated rivers and ponds show signs of degradation such as eutrophication, habitat loss and resource depletion. Stressors in the Waquoit Bay watershed result from land use practices along the coast and from upland areas. This ecological risk assessment will analyze the stressors and resulting ecological effects in the Waquoit Bay watershed. The assessment promotes community awareness of ecological problems in the watershed and will provide information to resource managers, including government officials, organizations and the public so they can make more ecologically informed decisions. These activities promote environmentally beneficial results.

Key stressors under evaluation are:

nutrient enrichment
(nitrogen loading)

suspended sediments

changes in water
flow patterns

inputs of toxic
chemicals

physical alterations
of habitat

How is the ecological risk assessment being done?

Interested organizations collectively developed a management goal and a scientific study approach. Because many of the ecological effects observed in the Waquoit Bay watershed are related to loss of the once extensive eelgrass beds, the risk assessment research will focus on the causes of this loss, and ways to halt or reverse it. Relationships between nutrient enrichment and eelgrass loss are being analyzed. This will provide information to estimate risks associated with land-use decisions. A report describing the management goals for the Waquoit Bay watershed and the analysis plan for the assessment will be available upon completion of the analysis described above.



Eelgrass beds, once extensive in Waquoit Bay are home to numerous fish, shellfish and other invertebrates. Eelgrass is highly susceptible to water quality conditions, requiring clear water that allows light to penetrate for photosynthesis.

How will the results be used?

The Waquoit Bay Ecological Risk Assessment will help resource managers predict how changes in land use and human activity in the watershed will impact eelgrass growth. This will enable resource managers to make decisions based on more information. This project is co-sponsored by the USEPA's Office of Water and Office of Research and Development as an effort to bring the science of risk assessment into the local community decision-making process.

The U.S. Environmental Protection Agency thanks the following for their participation in this case study:

Waquoit Bay National Estuarine Research Reserve (WBNERR)
Association for the Preservation of Cape Cod
Cape Cod Commission
Citizens for the Protection of Waquoit Bay
Massachusetts Coastal Zone Management
Massachusetts Department of Environmental Protection
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
US Fish and Wildlife Service
Waquoit Bay Watershed Intermunicipal Committee
US Geological Survey
Massachusetts Division of Fisheries and Wildlife
Buzzards Bay Project
Town of Mashpee
Town of Falmouth

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