



Great Lakes Science Center Research Conducted in Collaboration with Other USGS Divisions

USGS Research Partnerships

The Great Lakes Science Center (GLSC), as a unit of the USGS Biological Resources Division (BRD), provides unbiased scientific information on Great Lakes biotic and habitat resources and determines the effectiveness of resource management and ecological restoration efforts. Although the GLSC has a long history of collaborative research with other agencies and institutions, a weak link often has been the lack of integration of physical and biological sciences. The creation of BRD allows for the joining of physical and biological scientists in USGS to link the long-standing expertise available in both fields of science and provide research outcomes that are useful to our resource management partners in the Department of the Interior, other U.S. and Canadian Federal agencies, and State, Provincial, and Tribal agencies.

Lake Michigan Mass Balance Study

PCBs (polychlorinated biphenyls) and other toxic chemicals have been under regulatory bans for many years in Lake Michigan and throughout the Great Lakes region. Monitoring by GLSC reveals that concentration of contaminants in fish consistently declined until the mid-1980s, but since then the downward trend has leveled off. Concentrations in fish such as the lake trout at the top of the food chain are still too high because these toxic chemicals are causing reproductive problems in some fish and fish-eating birds and animals, and health advisories caution against human consumption of many species of Great Lakes fish. The GLSC and USGS/WRD are major collaborators on an inter-agency investigation, called the Lake Michigan Mass Balance Study, designed to answer questions that will help resource managers make well-informed, scientifically based decisions on further reducing toxic pollutants in Lake Michigan. This study is based on a comprehensive watershed model of the Lake Michigan basin, and is determining the sources, transport, and fate of contaminants from atmospheric deposition, tributaries, water, sediment, and biota. GLSC is collecting fish and other biological specimens, determining fish diets, and analyzing organic contaminants in forage and predator fish. The USGS/WRD in cooperation with the four Lake Michigan states, is coordinating the most comprehensive enhanced and event tributary loads monitoring program ever conducted in the Great Lakes.

HAZMAT Cleanup of Grassy Island in the Detroit River

As part of the National Performance Review, Grassy Island on the Wyandotte National Wildlife Refuge in Michigan has been selected as an Interior Hazardous Materials Management (HAZMAT) demonstration cleanup site. The 72-acre island is a confined disposal facility built by the Army Corps of Engineers and filled by them with polluted dredge spoils from the Detroit River area. Under the direction of a Technical Oversight Team with representation by GLSC, USGS/WRD, and USFWS, collaborative research was begun in spring, 1996 to determine the extent of contamination on the island and if contaminants are leaking from the island. Investigation of contaminant movement in ground waters by the USGS, kinds and amounts of contaminants on the island by the USFWS, and effects of the contaminants on the quality of habitat for fish and wildlife on and near the island by GLSC is being funded from the USFWS Refuge Cleanup Fund and USGS/BRD Eastern Region.

Metzger Marsh Restoration

The GLSC study of wetland restoration at Metzger Marsh in Ottawa National Wildlife Refuge (western Lake Erie) is being augmented by collaboration with USGS. This project, which also involves numerous state and private organizations, incorporates an ecosystem approach into an existing plan to dike the marsh. The dike has been

constructed to replace the eroded barrier beach that once protected the wetland from wave attack. However, a water-control structure will now be placed in the dike to mimic natural hydrologic connection with the lake following restoration of plant communities. The USGS Coastal Center in St. Petersburg is funding a 5-yr cooperative agreement with the Ohio Geological Survey (OGS) on Lake Erie coastal erosion. A wetlands component of this study is allowing OGS to participate and provide valuable geological and hydrologic input into the overall ongoing project. GLSC staff are conducting field studies of wetland vegetation and mapping vegetation types from aerial photographs for entry into a Geographic Information System. We are also using greenhouse seedbank studies and paleoecological studies to develop predictions of post-restoration plant community composition and to guide land managers in decisions regarding active restoration by seeding or planting. Additional studies of the faunal communities in the wetland are also being funded by USGS/BRD.

Global Climate Change--Wetlands

The GLSC study of the effects of climate change on Great Lakes wetlands is being augmented by collaboration with USGS. The USGS/GD funded work conducted by the Indiana Geological Survey (IGS) that is a critical component in this study of rows of beach ridges and intervening wetlands at several sites on Lake Michigan that formed as lake levels receded in response to climate change. IGS staff used vibra-coring and coastal sedimentology techniques to study the formation of the beach ridges and to develop a 4000-year record of lake-level changes. GLSC staff used field studies to determine differences in plant communities in the sequence of wetlands of different ages and paleoecological studies of sediment cores from individual wetlands to determine past vegetation changes associated with the documented changes in climate and lake level.

Lake Ontario Bottom Sediment Contamination

The GLSC is collaborating with USGS/WRD (NY) on a bottom sediment survey in Lake Ontario off Rochester, NY. Equipment and ordinance of World War II and Korean War era was dumped in Lake Ontario. Work is being conducted with side-scan sonar and remotely operated vehicle to determine the extent of material that has been dumped off the Rochester coastline and its

contamination potential. The GLSC is conducting the field work and assessing biota and habitat conditions in the disposal site, and USGS/BRD is determining physical substrate conditions and overseeing chemical analyses of bottom sediments and biota. Other cooperating agencies are USEPA (Region II) and the New York Department of Environmental Conservation.

Large River Sampling Methods Development for the National Water Quality Assessment Program

The USGS National Water Quality Assessment Program (NAWQA) is based on sampling the wadable portions of the Nation's rivers and streams. The non-wadable portions are much more difficult to sample but are often the most ecologically and economically important river courses that receive the greatest amount of human impact and degradation. The GLSC is assisting the NAWQA Program by developing sampling methods for algae, benthic macroinvertebrates, fish, and habitat in large rivers. This is based on experience developed while GLSC staff conducted research on the Great Lakes connecting channels (St. Marys, St. Clair, and Detroit Rivers). This work is directly applicable to NAWQA study units nationwide with non-wadable streams and to the Lake Erie-St. Clair Basin Study Unit in particular where the Detroit River contributes 95% of all tributary inflows and the Maumee River is the single largest source of sediment, fertilizers, and pesticides to Lake Erie.

Landslide Research -Lake Michigan Coastal Dunes

GLSC and USGS, and Marine Geology, Pacific-Arctic Branch scientists are working collaboratively on a study in the National Parks Service's Sleeping Bear National Lakeshore, where landslide activity has repeatedly dumped thousands of tons of lakefront dune bluff material into Lake Michigan. The study will attempt to discover what caused the landslides and to describe the effects of the most recent slide on the fish and bottom-dwelling invertebrate communities in the nearshore waters of the lake adjacent to the slide site.