

Glossary of Terms

adfluvial - fish that live in the Great Lakes and use tributaries for spawning.

alewife - a small silver-colored fish that is not native to Lake Huron.

anthropogenic - of man-made origin, not occurring naturally.

areas of concern - specific areas of 42 tributaries to or bays in the Great Lakes where degraded environmental conditions have created an impairment to human or ecological use of the water body.

beneficial uses - uses of Lake Huron that are valued by society, such as water quality that is suitable for drinking, swimming, agricultural, and industrial uses; healthy fish and wildlife populations which support a broad range of subsistence, sport, and commercial uses; and aesthetics.

benthos - bottom-dwelling aquatic plants and animals.

bioaccumulation - the net accumulation of a substance by an organism as a result of uptake from all environmental sources. As an organism ages, it can accumulate more of these substances, either from its food or directly from the environment. Bioaccumulation of a toxic substance has the potential to cause harm to organisms, particularly to those at the top of the food chain.

bioavailability - the degree to which toxic substances or other pollutants are present in sediments or elsewhere in the ecosystem to affect or be taken up by organisms. Some pollutants might be "bound up" or unavailable because they are attached to clay particles or are buried by sediment. The amount of oxygen, pH, temperature, and other conditions in the water can affect availability.

biota - all living organisms that exist in an area.

burrowing mayflies - bottom-dwelling burrowing Mayfly larvae, (*Hexagenia*) are indicators of high water quality. In the 1950s, mayflies were wiped out in Lake Huron due to poor water quality. Low numbers of mayflies are an indicator of low amounts of dissolved oxygen. Also called Canadian soldiers, June bugs, fish flies.

carcinogen - something that causes cancer.

chlordane - used as a pesticide until banned by the United States in 1983 (except for use in controlling underground termites). Chlordane can accumulate in fish and wildlife tissue and is suspected to be a carcinogen.

Clean Water Act - Public Law 92-500. The United States federal law that set national policy for improving and protecting the quality of the Nation's waters. The law set a timetable for cleanup of the Nation's waters and stated they are to be fishable and swimmable. It also required all pollutant dischargers to obtain a permit and meet the conditions of the permit. To accomplish this pollution cleanup, billions of dollars have been made available to help communities pay the cost of building sewage treatment facilities. The Clean Water Act was amended in 1977, 1981, and 1989.

confined disposal facility - a facility built specifically for the disposal of dredged sediment. Often referred to by the acronym CDF.

consumption advisory - a health warning issued by a public agency recommending that people limit their eating fish or wildlife from certain areas based on the levels of toxic contaminants found in tissues.

dioxins - unwanted chemical byproducts of incineration and some industrial processes that use chlorine. Dioxins can accumulate in fish and wildlife and are suspected human carcinogens.

ecosystem - the complex of a living community and its physical and chemical environment, functioning together as a unit in nature, with some inherent stability.

ecosystem approach - the integration of water quality management and natural resources management, across jurisdictional boundaries, in order to protect and restore the beneficial uses of the Lake Huron ecosystem.

embayment - an area of water protected by land forming a bay such as Saginaw Bay.

environmental stressors - factors which cause, or have the potential to cause, impairments of beneficial uses of Lake Huron. These factors include chemical, physical, or biological influences on the Lake Huron ecosystem, as well as management practices.

eutrophication - the process by which a lake becomes rich in dissolved nutrients and deficient in oxygen, occurring either as a natural stage in lake maturation or artificially induced by human activities such as the addition of fertilizers and organic wastes from runoff.

Glossary of Terms (continued)

Great Lakes Water Quality Agreement - an agreement signed in 1978 by the United States and Canada and amended in 1987. Its purpose is to restore and maintain the chemical, physical and biological integrity of the waters of the Great Lakes Basin ecosystem.

habitat - The place or type of site where a plant or animal naturally lives.

heavy metals - A group of metals that might be present in municipal and industrial wastes that pose long-term environmental hazards if not disposed of properly. Heavy metals can contaminate ground and surface waters, fish, and food. The metals of greatest concern are arsenic, cadmium, chromium, copper, lead, mercury, selenium, and zinc.

International Joint Commission (IJC) - commission established by the Boundary Waters Treaty of 1909, consisting of representatives from both the United States and Canada. The Commission's role is to oversee activities common to the borders of the two countries, including water quality in the Great Lakes.

lead - a heavy metal that may be hazardous to health if breathed or swallowed. Lead can bioaccumulate in fish and wildlife.

loadings - the amount of pollutants being discharged or deposited into the lake.

macroinvertebrates - animals without backbones ("invertebrates") that are large enough to be seen with the naked eye ("macro"). Examples of macroinvertebrates include: crayfish, snails, clams, aquatic worms, leeches, and the larval and nymph stages of many insects, including dragonflies, mosquitoes, and mayflies. Macroinvertebrates are excellent indicators of water quality because they cannot move to a different section of water if the water they are in is uninhabitable.

mercury - a heavy metal that is a neurotoxin that is toxic if breathed or ingested at sufficiently high concentrations. Because of its common use, mercury is released during garbage incineration and through the combustion of fuels such as coal and wood for energy production. Mercury readily bioaccumulates in all aquatic organisms.

neurotoxin - a substance that is known or suspected to be poisonous to nerve tissue.

nonpoint source pollution (NPS) - pollution for which the sources cannot be traced to a single point such as a municipal or industrial wastewater treatment plant discharge pipe. Nonpoint sources include eroding farmland and construction sites, urban streets, and barnyards. Pollutants from these sources reach waterbodies in runoff, which can best be controlled by proper land management.

oligotrophic - the state of a poorly-nourished, unproductive lake that is commonly oxygen rich and low in turbidity.

omnivorous fish - fish, such as carp, that eat both plants and animals and are tolerant of poor water conditions.

organochlorines - a class of chemicals that contain chlorine, carbon, and hydrocarbon. Generally refers to pesticides and herbicides that can be toxic. Examples include PCBs and pesticides such as DDT and dieldrin.

polycyclic aromatic hydrocarbons (PAH) - PAHs are the result of incomplete combustion of organic compounds due to insufficient oxygen and are associated with oil, grease, and other components derived from petroleum products that can end up in sediments. Examples of compounds in the PAH group include benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, chrysene, phenanthrene and pyrene.

PCBs - polychlorinated biphenyls. A group of toxic, persistent chemicals used in transformers and capacitors. They often accumulate in sediments, fish, and wildlife and have been associated with health problems.

phytoplankton - plant microorganisms that float in the water, such as certain algae.

remedial action plan - a remediation plan being developed for each of the Areas of Concern. Often referred to as a RAP, its purpose is to restore all beneficial uses to the area.

sediment - soil particles suspended in and carried by water as a result of erosion. Particles are deposited in areas where the water flow is slowed, such as in harbors, wetlands, and lakes.

total phosphorus - the total concentration of phosphorus found in the water. Phosphorus is a nutrient and acts as a fertilizer, increasing the growth of plant life such as algae.

toxic substance - a substance that can cause death, disease, behavioral abnormalities, cancer, genetic mutations, or physiological or reproductive malfunctions or physical deformities in any organism or its offspring, or a substance that can become poisonous after concentration in the food chain or in combination with other substances.

Glossary of Terms (continued)

trophic - status characterization of the condition of a body of water as eutrophic, oligotrophic or mesotrophic. Indicators or certain characteristics of a lake are used to measure the productivity of a lake. Indicators can be chemical, physical or biological in nature.

watershed - the land area that drains into a lake or river.

wetlands - those areas which are inundated or saturated by surface or ground water at a frequency and duration sufficient to support a variety of vegetative or aquatic life. Wetland vegetation requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, fens, and bogs.

zooplankton - animal microorganisms that float in the water.

Acronyms

AOC	Area of Concern
CDF	Confined Disposal Facility
COA	Canada-Ontario Agreement
DDT	Dichlorodiphenyl-trichloroethane
GLWQA	Great Lakes Water Quality Agreement
HCB	Hexachlorobenzene
IJC	International Joint Commission
NPS	Nonpoint Source Pollution
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated biphenyl
RAP	Remedial Action Plan
SOLEC	State of the Lakes Ecosystem Conferences - U.S. Environmental Protection Agency and Environment Canada
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin

References

Adams, J., M. Fodale, D. Cuddy, R. Bergstedt, and G. Christie. 1999. St. Marys River Granular Baylucide Treatment - Initial Summary of Results. 1999.

Argyle, R., G. Curtis, and J. Schaeffer. Status of the Prey Fish Community in Lake Huron. 1998. U.S. Geological Survey.

Barbiero, R. P. and Tuchman, M.L. Status of Plankton Communities in Lake Huron. Lake Huron State of the Lake. 2002.

Bowerman, W.W. 1997. Bald Eagle Studies in Support of Saginaw River and Bay Natural Resources Damage Assessment.

Bruce-Grey-Owen Sound Health Unit. May 1997. Lake Huron Shoreline Tritium Pilot Project Study Summary. Owen Sound, Ontario.

Charlebois, P., L. Corkum, D. Jude, and C. Knight. 2001. The Round Goby (*Neogobius melanostomus*) Invasion: Current Research and Future Needs. J. Grt. Lks. Res. 27(3): 263-266.

Crawford, Stephen S. Personnel Correspondence. January 2002.

Day, R. and S. Walsh. 2000. Michigan Fish Contaminant Monitoring Program: 2000 Annual Report. Surface Water Quality Division, Mich. Department. of Environmental Quality Report #MI/DEQ/SWQ-00/122.

DeVault, D.S., R. Hesselberg, P.W. Rodgers and T.J. Feist. 1996. Contaminant Trends in Lake Trout and Walleye from the Laurentian Great Lakes. J. Grt. Lks. Res. 22(4):884-895.

Ebener, Mark. Successful Recovery of Lake Whitefish Populations. Personnel Communication. 2001.

Environment Canada, U.S. Environmental Protection Agency. 1994. Toxic Contaminants in the Great Lakes. Prepared for the State of the Lakes Ecosystem Conference, 1994.

Environment Canada, U.S. Environmental Protection Agency. 1994. Aquatic Habitat and Wetlands of the Great Lakes. Prepared for the State of the Lakes Ecosystem Conference, 1994.

Environment Canada, U.S. Environmental Protection Agency. 1994. Nutrients: Trends and System Response. Prepared for the State of the Lakes Ecosystem Conference, 1994.

Environment Canada, U.S. Environmental Protection Agency. 1994. Integration Paper. Prepared for the State of the Lakes Ecosystem Conference, September 1994.

Environment Canada, U.S. Environmental Protection Agency. 1995. State of the Great Lakes - 1995.

Environment Canada, U.S. Environmental Protection Agency. 1996. Conference Proceedings. Prepared for the State of the Lakes Ecosystem Conference, 1996.

Environment Canada, U.S. Environmental Protection Agency. 1996. Integration Paper. Prepared for the State of the Lakes Ecosystem Conference, 1996.

Environment Canada, U.S. Environmental Protection Agency. 1997. State of the Great Lakes - 1997.

Environment Canada, U.S. Environmental Protection Agency. 1997. Nearshore Waters of the Great Lakes. Prepared for the State of the Lakes Ecosystem Conference, 1997.

Environment Canada, U.S. Environmental Protection Agency. 1997. Coastal Wetlands of the Great Lakes. Prepared for the State of the Lakes Ecosystem Conference, 1997.

References (continued)

- Environment Canada, U.S. Environmental Protection Agency. 1997. Land by the Lakes: Nearshore Terrestrial Ecosystems. Prepared for the State of the Lakes Ecosystem Conference, 1997.
- Environment Canada, U.S. Environmental Protection Agency. 1997. Impacts of Changing Land Use. Prepared for the State of the Lakes Ecosystem Conference, 1997.
- Environment Canada, U.S. Environmental Protection Agency. October 1998. Biodiversity Investment Areas - Aquatic Ecosystems. Prepared for the State of the Lakes Ecosystem Conference, 1998.
- Environment Canada, U.S. Environmental Protection Agency. October 1998. Biodiversity Investment Areas - Coastal Wetland Ecosystems. Prepared for the State of the Lakes Ecosystem Conference, 1998.
- Environment Canada, U.S. Environmental Protection Agency. October 1998. Biodiversity Investment Areas - Nearshore Terrestrial Ecosystems. Prepared for the State of the Lakes Ecosystem Conference, 1998.
- Federation of Ontario Naturalists, 1998. Seasons, Vol. 38, No. 2, "How much is too much development?".
- Francis, G. R., J. J. Magnuson, H. A. Regier, and D. R. Talhelm. 1979. Rehabilitating Great Lakes Ecosystems. Great Lakes Fisheries Comm. Tech. Rep. 37:99 p.
- Great Lakes Fishery Commission. 1995. Fish - Community Objectives for Lake Huron. Special Publication 95-1.
- Great Lakes Fishery Commission. 1995. The State of Lake Huron in 1992. Special Publication 95-2.
- Hay-Chmielewski, Elizabeth M. and Gary E. Whelan. Lake Sturgeon Rehabilitation Strategy. Fisheries Special Report 18. 1997.
- International Air Quality Advisory Board. July, 1999. Linking Canada and United States Sources and Source Regions of Selected Persistent Toxic Substances to Deposition in the Great Lakes Basin: A Progress Report.
- International Joint Commission. Indicators to Evaluate Progress under the Great Lakes Water Quality Agreement. Indicators for Evaluation Task Force. April 1996. ISBN 1-895085-85-3.
- Lake Huron Technical Committee, Great Lakes Fishery Commission. 1999. Fish Stocking in the Lake Huron Basin, 1968 to 1998.
- Michigan Department of Community Health. 1998. Michigan Fish Advisory.
- Michigan Department of Natural Resources. 1988. Remedial Action Plan for Saginaw River and Saginaw Bay.
- Michigan Department of Natural Resources. 1997. Personnel Communication. (data unpublished)
- Michigan Office of the Great Lakes. 1997. State of the Great Lakes - 1997 Annual Report.
- Mills, E. et al., Journal of Great Lakes Research, 19(1):1-54. 1003, 1993.
- Mohr, Lloyd C. and McClain, Jerry R. The State of Lake Sturgeon (*Acipenser fulvescens*) in Lake Huron, 1995-1999. Lake Huron State of the Lake Symposium. 2001.
- Morse, D. 1995. A caged fish study of the Saginaw River and Major Tributaries, July 28-August 26, 1993. Surface Water Quality Division Mich. Department of Environmental Quality Report #MI/DEQ/SWQ-95/021.
- Nalepa, Tom and Tuchman Marc. Status and Trends in the Major Benthic Macroinvertebrate Groups in Lake Huron. Lake Huron State of the Lake Symposium. 2001.

References (continued)

Nester, R. T. and T. P. Poe. 1987. Visual observations of historical lake trout spawning grounds in western Lake Huron. *North Am. J. Fish. Manage.* 7:418-424.

Ontario Ministry of the Environment. 1989. Severn Sound Remedial Action Plan, Stage I Report.

Ontario Ministry of the Environment. 1993. Spanish Harbour Remedial Action Plan, Stage I Report.

Pierce, Ronald, D.M. Whittle. And J.B. Bramwell. 1998. Chemical Contaminants in Canadian Aquatic Ecosystems.

Saginaw Valley State University. 1994. Saginaw Bay Watershed: A Strategy for Wetland Restoration.

Schaeffer, Jeffrey; Curtis, Gary and Argyle, Ray. Status of the Prey Fish Community in Lake Huron: Are We Meeting Fish Community Objectives? *Lake Huron State of the Lake Symposium.* 2001.

Weseloh, D.V. Chip, F. Cuthbert, C. Pekarik, J. McKeearnen, T. Havelka, L. Wires. Contaminant and Population Levels of Fish-eating Birds of Lake Huron. *Presentation Lake Huron State of the Lake Symposium.* 2001.

Wilcox, D. A., Meeker, J. E. 1995. Wetlands in regulated Great Lakes. In: LaRoe, E.T., Farris, G.S., Puckett, C.E., Doran, P.D., Mac, M.J. (eds.) *Our Living Resources: A Report to the Nation on the Distribution, Abundance, and Health of U.S. Plants, Animals, and Ecosystems.* pp. 247-249. U.S. Department of the Interior, National Biological Service, Washington, D.C.

Zorn, Troy. Connectivity of Tributary Habitat to Lake Huron. Lake Huron State of the Lake Symposium. 2001.

Zorn, T.G. and S.P. Sendek, In press, Au Sable River Assessment. Michigan Department of Natural Resources, Fisheries Division. Special Report 20. Ann Arbor.