

Glossary

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

alvar - rare landscape on glaciated horizontal limestone or dolomite bedrock along the Lake Erie shoreline. They are at their southernmost range on the Marblehead peninsula and Kelleys Island. Historically there were more, but have since been destroyed, primarily by quarrying. Alvars are populated by drought resistant calcium loving plant species (combination of boreal and prairie species) which are maintained in an open state by drought, wave action and ice formation. These factors retard soil accumulation and the growth of woody species.

ambient - surrounding; usually in reference to existing environmental conditions. For example, ambient water quality would refer to the current water quality conditions in the lake.

anoxia - a condition where dissolved oxygen in the water column is totally depleted.

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

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

Binational Executive Committee - group of senior managers from the Parties (U.S.EPA and Environment Canada) and other federal, state and provincial agencies which oversees the implementation of activities by the Parties to meet the goals of the Great Lakes Water Quality Agreement.

beneficial uses - uses of Lake Erie that are valued by society, such as water quality that is suitable for fishing, 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 organisms.

bioaccumulation - the process whereby a contaminant increases in an organism over time in relation to the amount consumed in food or absorbed from the surrounding environment.

biological contaminant - A biological contaminant is a compound produced by an organism rather than by an industrial process. In the Lake Erie LaMP, in regard to the ecosystem objective concerning the control of biological contaminants, the definition also includes pathogens and bacteria.

biomagnification - a cumulative increase in the concentration of a persistent substance in successively higher trophic levels of the food chain.

burrowing mayflies - bottom-dwelling burrowing mayfly larvae (*Hexagenia*), are indicators of high water quality. In the 1950s, mayflies were wiped out in Lake Erie 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.

Bythotrephes - a cladoceran, or water flea. *Bythotrephes longimanus*, the spiny water flea, is a non-indigenous invasive species with a barbed tail spine that competes with fish for zooplankton. The tail spine makes it unattractive to other predators and it has flourished.

carcinogen - a substance that causes cancer.

Cercopagis - a cladoceran related to *Bythotrephes*, which is a zooplankton predator. It is another non-indigenous invasive species poised to enter Lake Erie.

Ceriodaphnia - type of *cladoceran*. Helpful in bioassay studies to determine chemical water quality standards for NPDES permits.

chemical contaminants - naturally occurring, anthropogenic or synthetic chemicals.

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

chlorophyll *a* - the pigment that makes plants and algae green. Measurement of chlorophyll *a* is used to determine the quantity of algae in the water.

cladocerans/copepods - zooplankton that together make up a major component of the zooplanktonic community. They live in the water column and eat phytoplankton, serving as a link between plants and fish.

Cladophora - a long filamentous type of green algae that attaches to hard surfaces, particularly near the shoreline. Abundant growth is an indicator of phosphorous enrichment.

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

critical pollutants - substances that persist in Lake Erie waters and bioaccumulate in organisms living in or near the lake at levels that cause or are likely to cause impairment of beneficial uses.

Diporeia - an amphipod that is an important food source for whitefish, lake trout and smelt, has declined dramatically in the eastern basin due to impacts from the quagga mussel.

diatoms - group of microscopic algae that have rigid cell walls composed of silica. They are an important part of the food chain.

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

dissolved oxygen - the amount of oxygen measured in the water.

Echinogammarus - an exotic amphipod that has replaced *Gammarus fasciatus*, another exotic, in many regions in Lake Erie.

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 - a comprehensive and holistic approach to understanding and anticipating ecological change, assessing the full range of consequences, and developing appropriate management responses. It integrates water quality management and natural resources management.

ecosystem indicators - measures of progress towards meeting ecosystem objectives. Indicators can range in type from administrative measures of activities such as number of permits issued, to environmental measures such as water chemistry or fish populations.

ecosystem objectives - statements describing the desired conditions within an ecosystem to be attained and maintained (such as: *clean drinking water*). These statements can include specific descriptions of the desired state of the biological, chemical, and physical components of the ecosystem.

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

environmental contaminants - substances foreign to a natural system or present at unnatural concentrations. They may be chemicals, bacteria or viruses, or the products of radioactivity. Some contaminants are created by human activities while others are the result of natural processes.

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

eutrophic - the state of a well-nourished, productive lake that typically exhibits low levels of dissolved oxygen.

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.

exposure - any contact between a substance and an individual who has touched, breathed or swallowed it.

exposure pathways - the pathway a contaminant may take to reach humans or other living organisms, and includes drinking water, recreational water and fish/food consumption.

exposure routes - The three major routes that chemical and microbial pollutants enter the human body are by ingestion (water, food, soil), inhalation (airborne), and dermal contact (skin exposure).

food web - the process by which organisms in higher trophic levels gain energy by consuming organisms at lower trophic levels. Humans are at the highest level of many food webs.

forage fish - fish species utilized as principal food sources for major sport and commercial fishes.

fostering - practice of removing an unhatched egg from one nest, hatching it artificially, and placing the chick in a new nest (referred in LaMP 2000 in regard to bald eagles).

Gammarus fasciatus - a non-indigenous invasive amphipod.

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

guideline - a recommended limit for a substance or an agent intended to protect human health or the environment that is not legally enforceable (Health Canada, 1998).

hacking - practice of raising animals in captivity, acclimating them to natural conditions and then releasing them into the wild (referred to in LaMP 2000 in regard to bald eagles).

Hexagenia - see burrowing mayfly.

human health - “a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity” (World Health Organization, 1984).

hypolimnion - the cooler, lower most layer of water in a thermally stratified lake.

International Joint Commission - 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.

keystone species - a species that has the ability to structure food webs.

lake effect zone - the area within the tributary where the water of Lake Erie and the river are mixed. This is typically the point at which the tributary reaches lake level. The size of the lake effect zone for every river is different and also varies with rising and falling lake levels. The following is the approximate distance, in miles, of the lake effect zone for each Ohio tributary to Lake Erie: Ottawa River 6.8; Maumee River 14.8; Crane Creek 2.9; Turtle Creek 5.6; Toussaint River 10.0; Portage River 15.7; Muddy Creek 5.2; Sandusky River 15.4; Huron River 4.6; Old Woman Creek 1.3; Vermilion River 1.5; Black River 4.1; Rocky River 0.5; Cuyahoga River 4.5; Chagrin River 0.9; Grand River 3.3; Ashtabula River 1.8; and Conneaut Creek 1.2.

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

Leptodiptomus sicilis - type of copepod.

Limnocalanus macrurus - large calanoid native to Lake Erie that has declined due to smelt.

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. Examples of macroinvertebrates include: crayfish, snails, clams, aquatic worms, leeches, and the larval and nymph stages of many insects, including dragonflies, mosquitoes, and mayflies.

macrophyte - plants of lakes, streams and wetlands that are visible with the naked eye.

mercury - a heavy metal that is a *neurotoxin* and harmful if inhaled or ingested at sufficiently high concentrations. Mercury readily *bioaccumulates* in all aquatic organisms.

mesotrophic - the trophic state of a lake that is in between eutrophic and oligotrophic.

microbial contaminant - micro-organisms (e.g. bacteria, viruses, and protozoa such as *cryptosporidium*) that can cause disease

microcystin - a naturally-occurring, potent liver toxin produced by the algae *Microcystis*.

Microcystis - a blue-green algae that causes algae blooms under eutrophic, high phosphorus conditions. It can be toxic to aquatic life and humans if ingested in sufficient quantities due to the presence of microcystin.

Mysis relicta - freshwater shrimp found primarily in the Great Lakes. A primary food source of lake trout.

natural land - undisturbed, naturally occurring landscapes. Habitat.

neurotoxin - a substance that is known or suspected to impact the nervous system.

nitrogen to phosphorus ratio - nitrogen and phosphorus are both nutrients. The ratio that exists between the two can affect the composition or community of algal species in the water column.

non-native species - species that are not native to an area. They could be exotics, that originate in foreign country, or transplants into a region to which they are not native, but still within their country of origin.

non-native invasive species – species not native to an area that rapidly spread/reproduce and replace native species in the habitat.

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.

pelagia - biological community existing in the open waters. Includes organisms floating in the water column or at the surface, as well as free-swimming organism.

persistent bioaccumulative toxic chemicals - chemicals that do not breakdown easily, persist in the environment, and bioaccumulate in plant, animal and human tissues.

piscivores - fish eating fish.

planktivores - plankton feeding fish.

pollutants of concern - in addition to the critical pollutants designated by the Lake Erie LaMP, a second, more comprehensive list of pollutants called pollutants of concern has been developed. For more information on this list, see Section 5.2 of this LaMP document.

polychlorinated biphenyls - A group of toxic, highly persistent and bioaccumulative chemicals used in transformers and capacitors (PCBs). A Lake Erie LaMP critical pollutant for priority action.

polynuclear aromatic hydrocarbon - A petroleum or coal combustion by-product often associated with elevated levels of tumors in fish (PAH).

public health agencies - for Lake Erie, includes the State Departments of Health for Michigan, New York, Ohio, and Pennsylvania; the Ontario Ministry of Health (Provincial); Health Canada (Federal); U.S. Agency for Toxic Substances and Diseases Registry (ATSDR, Federal); U.S. Centers for Disease Control (Federal); Public Health Units (municipalities in Ontario); Public Health Departments (State counties).

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

remedial action plan - (RAP) a plan developed and implemented to protect and restore beneficial uses in Great Lakes areas of concern, as required under the Great Lakes Water Quality Agreement.

secchi disk - a black and white patterned disk lowered into the water column to measure water clarity.

sentinel species - a species used as an indicator of overall environmental conditions, particularly contaminants. For example, mayflies (*hexagenia*) and bald eagles.

soluble reactive phosphorus - the part of total phosphorus that bioavailable.

standard - a legally enforceable limit for a substance or an agent intended to protect human health or the environment. Exceeding the standard could result in unacceptable harm.

strategic objective – a big picture more qualitative goal

tactical objective – a more hands-on, measurable, more quantitative goal to track the progress toward meeting the strategic objectives.

total phosphorus - the total concentration of phosphorus found in the water.

toxicological profiles - fact sheets prepared by the U.S. Agency for Toxic Substances and Disease Registry (ATSDR), “for hazardous substances which are most commonly found at facilities on the CERCLA National Priorities List and which pose the most significant potential threat to human health, as determined by ATSDR and the Environmental Protection Agency” (U.S. Department of Health and Human Services, 1992).

toxic substance - a substance which can cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological or reproductive malfunctions or physical deformities in any organism or its offspring, or which can become poisonous after concentration in the food chain or in combination with other substances (IJC, 1987).

Acronyms

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trophic - having to do with various nutritional levels of the food chain.

trophic guilds - groups of organisms that are similar in their nutritional requirements and feeding habits, such as planktivores, piscivores, omnivores, etc.

weight of evidence approach - the weight of evidence approach considers all high-quality scientific data (i.e. the overall evidence) on adverse health effects from wildlife studies, experimental animal studies, and human studies in combination, toward hazard identification and in weighing the actual and potential adverse health effects of environmental contamination in human populations.

zooplankton - animal microorganisms that float in the water.

Acronyms

AOC - area of concern
AMLE – Adjusted Maximum Likelihood Estimator
ANS -aquatic nuisance species
ATSDR - U.S. Agency for Toxic Substances and Disease Registry
BEC - Binational Executive Committee
BMP – Best Management Practice
BTS - Great Lakes Binational Toxics Strategy: Canada - United States Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes
BUI - beneficial use impairment
BUIA - beneficial use impairment assessment
CA – Conservation Authority (Canada)
CDF - confined disposal facility
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
CRP - Conservation Reserve Program
CREP - Conservation Reserve Enhancement Program
CSO - combined sewer overflow
DFO – Canada Department of Fisheries and Oceans
EC - Environment Canada
ECA - ecosystem alternative
ECCS – Extensive collaborative comprehensive survey
EJ - environmental justice
EOSC - ecosystem objectives subcommittee
FCGO - fish community goals and objectives as developed by the Lake Erie Committee of the Great Lakes Fishery Commission.
FCM - fuzzy cognitive map model
FIELDS - fully-integrated environmental locational decision support system
GLFC - Great Lakes Fishery Commission
GLI - Great Lakes initiative (Great Lakes water quality guidance - U.S.)
GLNPO – Great Lakes National Program Office (U.S.EPA)
GLSLB - Great Lakes St. Lawrence Basin project (Canada)
GLWQA - Great Lakes Water Quality Agreement
HCB - hexachlorobenzene
IADN - Integrated atmospheric deposition network
IFYLE – International Field Year on Lake Erie
IJC - International Joint Commission
IPCC - Intergovernmental Panel on Climate Change
LaMP - Lakewide Management Plan
LEC - Lake Erie Committee of the Great Lakes Fishery Commission
LEL – lowest effect level
LEMN - Lake Erie Millennium Network
LOEC - lowest observable effect level
LTCP – Long term control plan for combined sewer overflows
MAC - maximum acceptable concentration (used for Canadian guidelines)
MCL - maximum concentration limit (used for U.S. standards and guidelines)
MDEQ - Michigan Department of Environmental Quality
MDNR - Michigan Department of Natural Resources
MISA – Canada’s municipal/industrial strategy for abatement
NAWMP - North American Waterfowl Management Plan
NAWQA - National water quality assessment program
NCWQR – National Center for Water Quality Research (Heidelberg College)
NIS - non-indigenous invasive species

NOAA - National Oceanic and Atmospheric Administration
NPDES - National Pollutant Discharge Elimination System
NPRI - National pollutant release inventory (Canada)
NRDC - Natural Resources Defense Council
NSERC - Natural Sciences and Engineering Research Council
NSI - national sediment inventory (U.S.)
NWRI - National Water Research Institute (Canada)
NYSDEC - New York State Department of Environmental Conservation
NYSDOH – New York State Department of Health
ODNR - Ohio Department of Natural Resources
ODH – Ohio Department of Health
OEPA - Ohio Environmental Protection Agency
OMNR – Ontario Ministry of Natural Resources
OSI - Ohio sediment inventory
PAH - polynuclear aromatic hydrocarbon
PEC – Probable effect concentration
PBT - persistent, bioaccumulative toxic chemicals
PCB - polychlorinated biphenyl
PCS – Permit Compliance System (U.S.)
POP – persistent organic pollutant
RAP - remedial action plan
SEL – severe effect level
SOLEC - State of the Lakes Ecosystem Conference
SSO - separate or sanitary sewer overflow
STAR - Science to Achieve Results grant program of U.S.EPA Office of Research and Development
STP - sewage treatment plant
TEC – Threshold effect concentration
TMDL - total maximum daily loads
TRI - toxics release inventory
U.S.EPA - United States Environmental Protection Agency
USGS - United States Geological Survey
WHO - World Health Organization
WWTP - wastewater treatment plant