

18. Overall Discussion

Monitoring to Support LaMP Indicators

One of the main purposes of this project is to determine if the current monitoring coverage is sufficient to support indicators proposed in the Lake Michigan LaMP. The findings and understanding gained through this project were applied to each of these indicators and a simple assessment of each was made. The LaMP describes a set of indicators in three categories — state indicators, which together describe the state of the ecosystem; pressure indicators, which describe pressures and possible causes of ecosystem degradation; and human activity indicators, which describe human activities that may lead to positive ecosystem impacts. The table on the following pages (Table 1) lists only the state and pressure indicators, since these are the ones this report addresses. In the table, each relevant open water, nearshore, human health, land use, and coastal wetlands indicator is listed, along with a rating for the ability of the current monitoring infrastructure to provide sufficient data to assess the indicator. The rating does not reflect any assessment of the infrastructure in place to consolidate, coordinate, or assess the monitoring data across the Lake Michigan basin, nor does the rating represent an assessment of actual data for the indicator. The following scale is used:

Rating	Meaning
A	Monitoring programs prevalent; geographic coverage extensive; characteristics measured are relevant to the indicator.
B	Monitoring programs prevalent; geographic coverage contains major gaps; characteristics measured are relevant.
C	Monitoring programs prevalent; geographic coverage unknown; characteristics measured are relevant.
D	Some monitoring programs known to exist; geographic coverage unknown; characteristics measured are relevant.
E	Some monitoring programs known to exist; geographic coverage unknown; characteristics measured may not be relevant or specific to indicator.
F	Monitoring coverage nonexistent.
NA	Not enough information to form an assessment.

This assessment is admittedly subjective. It is a first attempt at assessing monitoring sufficiency, and is meant to be used as a launching point for further discussion. The ratings reflect the information collected for this report. It is likely that some monitoring programs were missed by the inventory and information on others may be incomplete. The ratings thus reflect the absence of complete information on such programs. The indicators are ordered by rating.

Table 1. Assessment of Monitoring Infrastructure for Tracking LaMP State and Pressure Indicators		
LaMP Indicator	Rating	Comments
Wastewater pollution	A	
Air quality	A	Small number of air quality indicators are extensively monitored.
Concentration of contaminants in sediment cores	A	
Phosphorus concentrations and loadings	A	Phosphorus concentrations well monitored; point sources well covered; non-point source loadings being modeled.
Incidents of boil-water advisories	A	
Drinking water quality (chemical and microbial)	A	
Stream flow and sediment discharge	A	Stream flow well monitored. Sediment discharge monitored to a limited extent.
Atmospheric visibility	A	
Wastewater pollution	A	
Sea lamprey	A	Extensive basinwide monitoring. Assessment by USFWS through Great Lakes Fishery Commission.
Coliform levels of nearshore recreational waters	A	
Economic prosperity	A	Wide array of indicators of economic prosperity.
Global warming: ice duration on the Great Lakes	A	
Concentrations of contaminants in offshore waters	B	LMMB coverage mostly. Limited to a few contaminants.
Contaminant exchange between media: air to water and water to sediment	B	LMMB coverage only. Limited to a few contaminants.
<i>E. coli</i> levels in nearshore recreational waters	B	
Nitrates and total phosphorus into coastal waters	B	Nutrient monitoring in some wetlands is lacking.
Wetland area by type	B	Wetland delineation generally defined. More specific definition in progress.
Benthos diversity and abundance	B	Benthos monitoring coverage fluctuates across watersheds.
Contaminants in fish (including edible and recreational fish and young of year spot-tail shiners)	B	Much of northern tributaries not monitored except at outflows to Lake Michigan.
Atmospheric deposition of toxic chemicals	B	LMMB coverage only known monitoring – limited to nearshore.
Phytoplankton populations	B	12 locations sampled annually by GLNPO.
Zooplankton populations	B	12 locations sampled annually by GLNPO.
Fish community health	B	Lakewide assessment coordinated through the GLFC - Lake Michigan Committee.

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LaMP Indicator	Rating	Comments
Salmon and trout	B	Lakewide assessment through the GLFC - Lake Michigan Committee.
Preyfish populations	B	Annual Lakewide coverage by USGS, Great Lakes Science Center.
Acid rain	C	
Threatened species	C	
Water consumption	C	
Lake trout and scud	C	Lakewide assessment of lake trout through the GLFC; extent of coverage of scud information unknown.
Sport fishing	C	Sport harvest census programs conducted by each state and reported lakewide through the GLFC, though extent of coverage unknown.
Nearshore species diversity and stability	D	Some monitoring of populations. Extent of diversity and stability assessments unknown.
Breeding bird diversity and abundance	D	
Contaminants affecting productivity of bald eagle	D	
Aquatic habitat	D	Few programs discovered. Limited to specific sites within watersheds.
Wetland-dependent bird diversity and abundance	D	Some basinwide programs in existence.
Deformities, Erosion of fins, Lesions, and Tumors (DELT) in fish	D	
Amphibian diversity and abundance	D	Some monitoring in wetlands.
Nearshore plant and wildlife problem species	D	Some monitoring of invasive species. Full coverage unknown.
Contaminant in colonial nesting waterbirds	D	
Presence, abundance, and expansion of invasive plants	E	Some programs monitoring purple loosestrife on a limited basis.
Extent and quality of nearshore natural land cover	E	Land cover monitoring complete. Quality monitoring unknown.
Nearshore land use intensity	E	Land use coverage complete, though intensity of use is unknown.
Habitat fragmentation	E	Land use/land cover monitoring complete; habitat delineation coverage unknown; fragmentation analysis unknown.
Urban density	E	Extent of urban land use well monitored by satellite data. Density monitoring unknown.
Native unionid mussels	E	Many programs monitoring macroinvertebrates, but specificity to unionid mussels unknown.

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LaMP Indicator	Rating	Comments
Habitat adjacent to coastal wetlands	E	Land cover monitored by satellite. Extent of habitat delineation unknown.
Invertebrate community health	E	Invertebrate monitoring programs exist, but extent of coverage and community health specificity unknown.
Sediment available for coastal nourishment	NA	
Water level fluctuations	NA	
Energy consumption	NA	
Artificial coastal structures	NA	
Mass transportation	NA	
Area, quality, and protection of special lakeshore communities	NA	
Extent of hardened shoreline	NA	
Extent and quality of nearshore natural land cover	NA	
Gain in restored wetland area by type	NA	
Land conversion	NA	
Susceptibility (source water assessments)	NA	
Area, quality, and protection of special lakeshore communities	NA	
Sediment flowing into coastal waters and wetlands	NA	
Aesthetics	NA	
Incidents of water-borne disease outbreaks	NA	
Solid waste generation	NA	
Chemical contaminants in human tissue	NA	
Global warming: number of extreme storms	NA	
Global warming: first emergence of water lilies in coastal wetlands	NA	
Contaminants in snapping turtle eggs	NA	
Contaminants affecting the American otter	NA	
Sediment, land, and water habitat	NA	