

Great Lakes Coastal Wetlands Consortium

Study Indicators and Metrics

The Consortium has pre-selected a set of indicators that need to be validated for implementation within a long-term monitoring strategy. These indicators have been clustered into three major groups: Flora and Fauna, Physical Characteristics, and Landscape Measures. The goal of projects funded in Year One research is to collect information to assess all indicators using specifications listed under each group heading.

Flora and Fauna

The bulk of the field work in Year One is being conducted on Flora and Fauna indicators. The Consortium has specified general metrics to be measured and general research methods to be employed. Research teams have coordinated specific field methods with one another. The following table presents the Flora and Fauna indicators along with the metrics to be measured and the general methods to be employed. Some methods present the range of options being tested. Detailed discussion papers can be found for some of these indicators at:

<http://www.glc.org/monitoring/wetlands/subcommittees/flora-fauna.html>.

(See next page for Indicator Specifics Table.)

Table 1. Flora and Fauna Indicator Specifics

Indicator (with SOLEC ref. number)	Metrics	Methods
4501 – invertebrate community health	Diversity indices, adult caddisfly presence/absence and diversity.	Sweep nets, activity traps, blacklighting caddisflies. Hester-Dendy. Need standardized processing. Need standardized habitat sampling. Repeat visits.
4502, 4503 – fish community health and DELTs	Several diversity and abundance (fish per meter) measures, incidence rate of DELTs.	Electroshocking along transects, fyke nets
4504 – amphibian diversity	Many possible population, diversity, and abundance measures. Compare with extensive measures – Species presence, abundance, and diversity.	From most intensive to most extensive – complete counts, capture-recapture, larvae sampling, drift fences or pitfall traps, funnel trapping, visual encounter surveys, Marsh Monitoring Program (www.bsc-eoc.org/mmpmain.html), audio surveys.
4507 – bird diversity and abundance	Intensive – many population, diversity, and abundance measures. Compare with extensive measures – Species presence, abundance, and diversity.	Intensive – territory mapping, strip censuses, nest counts, site inventories. Extensive – MMP survey
4513 – plant community health	<i>From air photos:</i> % dominant vegetation types, % invasive types; <i>from floristic survey:</i> % wetland obligate species, % native taxa, FQI; <i>from quantitative sampling:</i> % cover of invasives in dominant emergent, % floating/submersed cover of turbidity tolerant taxa, rate of change in invasive taxa.	Air photo compilation and interpretation, floristic survey, and quantitative sampling
4506 – contaminants	Contaminant levels or physical anomalies. <i>Further work is needed to develop this indicator.</i>	External survey of bullheads, DELTs (deformities, eroded fins, lesions, and tumors), or other methods that provide useful biological contamination metrics.

Physical Characteristics

Information about a number of indicators relating to physical characteristics of the wetlands and their surrounding environment is also part of Year One research. Data for metrics within these indicators is being collected to primarily provide context for flora and fauna measurements, rather than to be used as separate indicators of coastal wetland condition. This includes collection of historical data from existing monitoring stations. These data are being used in analyses to help explain wetland conditions and standardize conditional measurements across sites. Detailed discussion papers on some of these indicators can be found at <http://www.glc.org/monitoring/wetlands/subcommittees/physical.html>.

Table 2. Physical Characteristic Indicator Specifics

Indicator (with SOLEC ref. number)	Metrics	Methods
<i>4861 - water levels</i>	Lake levels, wetland water levels, in/out-flows	Data should be obtained from lake gauges.
<i>4516 - sediment flow</i>	Suspended sediment unit area yield (tonnes/km ² of upstream watershed)	Metric should be estimated from gauging stations upstream of wetland. Alternatives – sediment core, turbidity measures.
<i>8142 - sediment available for coastal nourishment</i>	Sediment budget, net accumulation/loss	Metrics measured from streamflow and sediment gauging stations at mouths of major tributaries. Alternatives – geomorphic surveys of barrier bars/islands, airphoto interpretation.
<i>Storms and Ice</i>	Possible metrics include wetland form factor, succession lag times, storm erosion of shore buffers; ice cover duration, ice thickness, ice jams	Methods vary by metric.
<i>4860 - Phosphorus and total Nitrates</i>	Total phosphorus and nitrates concentrations from May to July for correlation with other metrics. <i>Further work is needed to develop this indicator.</i>	Metric calculated from concentration and flow measures from gauging stations.

Landscape Measures

The long-term monitoring plan that the Consortium is developing will also include several landscape-scale indicators. These indicators may include some or all of the following:

- Areal extent of wetlands by type
- Habitat adjacent to wetlands
- Gain in restored wetland area by type
- Land use classes adjacent to wetlands
- Land use classes in watershed
- Extent of upstream channelization
- Proximity to navigable channels
- Proximity to recreational boating activity