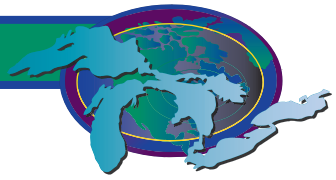

Land Cover Adjacent to Coastal Wetlands

Indicator # 4863

Note: This is a progress report towards implementation of this indicator.

Overall Assessment

Status:	**Not Fully Assessed**
Trend:	**Undetermined**
Rationale:	**The status and trends are currently under investigation and proposed for additional investigation for the full basin. Although other results exist for Canada, "Land Cover Adjacent to Coastal Wetlands" results are currently unavailable for Canada.**

Lake-by-Lake Assessment

Each lake was categorized with a not assessed *status and an* undetermined *trend, indicating that assessments were not made on an individual lake basis. The status and trends are currently under investigation in each lake basin.*

Purpose

- To assess the basin-wide presence, location, and/or spatial extent of land cover in close proximity to coastal wetlands
- To infer the condition of coastal wetlands as a function of adjacent land cover

Ecosystem Objective

Restore and maintain the ecological (i.e., hydrologic and biogeochemical) functions of Great Lakes coastal wetlands. Presence, wetland-proximity, and/or spatial extent of land cover should be such that the hydrologic and biogeochemical functions of wetlands continue.

State of the Ecosystem

Background

The state of the Great Lakes Ecosystem (i.e., the sum of ecological functions for the full Great Lakes basin) is currently under investigation and proposed for additional investigation (Lopez *et al.* 2006). Differences in the regional status of "Habitat Adjacent to Coastal Wetlands" can be determined using the existing data (see Pressures), but the results are preliminary and observations are not conclusive. Nor can the regional trends be extrapolated to determine the state of the ecosystem as a whole.

Relevant coastal areas in the Great Lakes Basin have been mapped to assess the presence and proximity of general land cover in the vicinity of wetlands using satellite remote-sensing data and geographic information systems (GIS), providing a broad scale measure of land cover in the context of habitat suitability and habitat vulnerability for a variety of plant and animal species. For example, upland grassland and/or upland forest areas adjacent to wetlands may be important areas for forage, cover, or reproduction for organisms. Depending upon the particular physiological and sociobiological requirements of the different organisms, the wetland-adjacent land cover extent (e.g., the width or total area of the upland area around the wetland) may be used to describe the potential for suitable habitat or the vulnerability of these areas of habitat to loss or degradation. Although other related Great Lakes indicators are described or proposed to include Canadian data at a broad scale (Lopez *et al.* 2006), basin-wide "Land Cover Adjacent to Coastal Wetlands" results are currently unavailable for Canada.

Status of Land Cover Adjacent to Coastal Wetlands

Percent forest adjacent to wetlands

The amount of forest land cover on the periphery of wetlands may indicate the amount of upland wooded habitat for organisms that may travel relatively short distances to and from nearby forested areas and wetland areas for breeding, water, forage, or shelter. Also, the affects of runoff on wetlands from nearby areas (e.g., nearby agricultural land) may be ameliorated by biogeochemical processes that occur in the forests on the periphery of the wetland. For example, forest vegetation may contribute to the uptake, accumulation, and transformation of chemical constituents in runoff. Broad-scale approaches to assessing percentage of forest directly adjacent to wetlands may be calculated by summing the total area of forest land cover directly adjacent to wetland regions in a reporting unit (e.g., an Ecoregion, a watershed, or a state) and dividing by wetland total area in the reporting unit. This

calculation ignores those upland areas of forest outside of the adjacent "buffer zone" for wetlands within each reporting unit. Other buffer distances may be appropriate for other habitat analyses, depending on the type of organism. For runoff analyses, the chemical constituent(s), flow dynamics, soil conditions, position of wetland in the landscape, and other landscape characteristics should be carefully considered. Coastal wetland areas may be generally assessed by calculating forest wetland-adjacency in specifically targeted coastal wetlands of interest, by targeting narrow coastal areas such as areas within 1 km (0.62 miles) of the lake shoreline (Figure 1), or by targeting all wetlands in a specific inland and coastal region of the historical lake plain (Figure 2).

Percent grassland adjacent to wetlands

The amount of grassland on the periphery of wetlands may indicate the amount of upland herbaceous plant habitat for organisms that might travel relatively short distances to and from nearby upland grassland and wetland areas for breeding, water, forage, or shelter. As with forested areas, the affect of runoff on wetlands from areas nearby (e.g., agricultural) land may be ameliorated by biogeochemical processes that occur in herbaceous areas that are on the periphery of the wetland. For example, herbaceous vegetation stabilizes soils and may reduce erosional soil loss to nearby wetlands and other surface water bodies. As with forest calculations, broad-scale approaches to assessing percentage of grassland directly adjacent to wetlands may be calculated by summing the total area of grassland directly adjacent to wetland regions in a reporting unit. Other buffer distances may be more appropriate for habitat analyses, depending on the type of organism. For runoff analyses, the chemical constituent(s), flow dynamics, soil conditions, position of wetland in the landscape, and other landscape characteristics should be carefully considered. Coastal wetland areas may be generally assessed by calculating grassland wetland-adjacency in specifically targeted coastal wetlands of interest; by targeting narrow coastal areas such as areas within 1 km of the lake shoreline (Figure 3), or by targeting all wetlands in a specific inland and coastal region of the historical lake plain (Figure 4).

Standard Deviation

Classes describe the distribution of percentage of forest or percentage of grassland adjacent to wetlands (among reporting units) relative to the

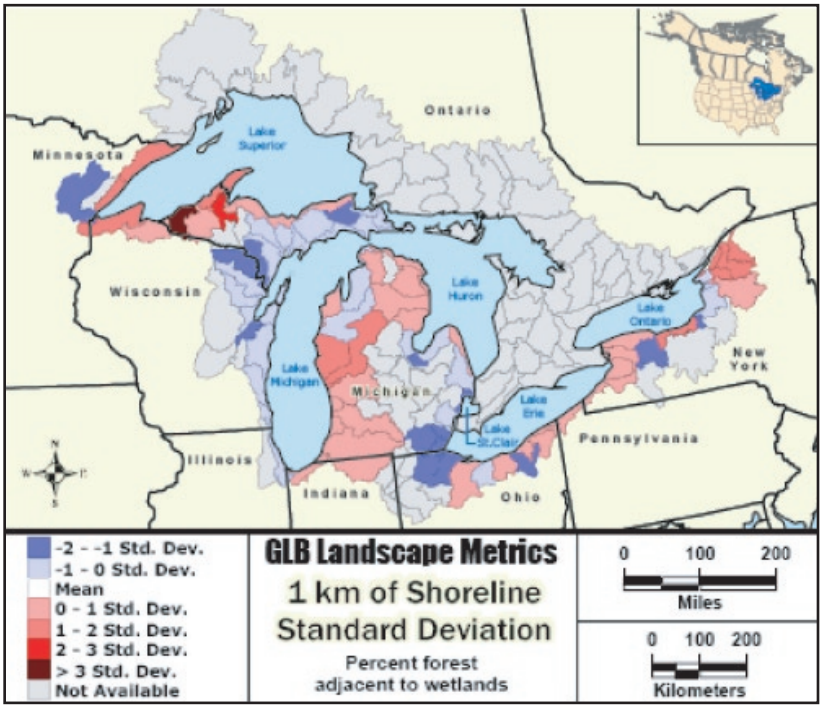

Figure 1. Percent forest adjacent to wetlands, among 8-digit USGS Hydrologic Unit Codes (HUCs), measured within 1 km of shoreline; data are reported as standard deviations from the mean.
Source: Lopez *et al.* 2006

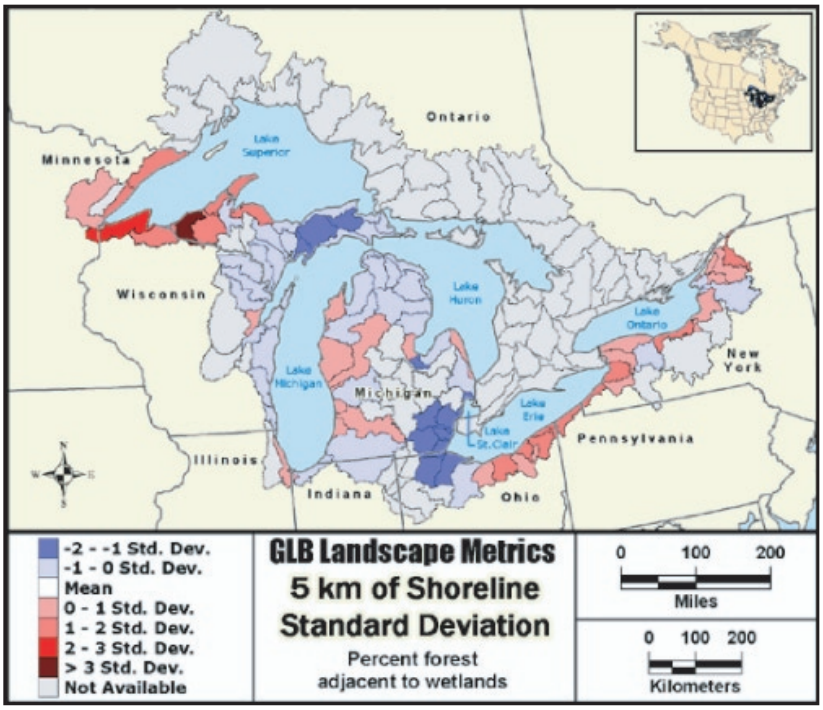

Figure 2. Percent forest adjacent to wetlands, among 8-digit USGS Hydrologic Unit Codes (HUCs), measured within 5 km of shoreline; data are reported as standard deviations from the mean.
Source: Lopez *et al.* 2006

mean value for the metric distribution. Class breaks are generated by successively described by standard deviations from the mean value for the metric. A two-color ramp (red to blue) emphasizes values (above to below) the mean value for a metric, and is a useful method for visualizing spatial variability of a metric.

Pressures

Although several causal relationships have been postulated for changes in "Land Cover Adjacent to Coastal Wetlands" for the Great Lakes basin (Lopez *et al*. 2006), it is undetermined as to the relative contribution of the various factors. However, some preliminary regional trends exist. For example, in the 1 km coastal region of southern Lake Superior there is a relatively high percent of forest adjacent to coastal wetlands, and in the 1 km coastal region of western Lake Michigan there is a relatively low percent of forest adjacent to coastal wetlands. Differences in percent forest between these two coastal zones generally track with respect to percent of agricultural land cover or urban land cover, as measured with similar techniques. These results are preliminary and observations are not conclusive. Similar phenomena are currently under investigation and proposed for additional regional and full-basin investigation.

Management Implications

Because critical forest and grassland habitat areas on the periphery of coastal wetlands may influence the presence and fitness of localized and migratory organisms in the Great Lakes, natural resource managers may use these data to determine the ranking of their areas of interest, such as areas where they are responsible for coastal wetland resources, among other areas in the Great Lakes. It is important for managers to understand that results for their areas of interest are reported among a distribution for the entire Great Lakes basin and that caution should be used when interpreting the results at finer scales.

Comments from the author(s)

To conduct such measures at a broad scale, the relationships between wetland-adjacent land cover and the functions of coastal wetlands need to be verified. This measure will need to be validated fully with thorough field sampling data and sufficient *a priori* knowledge of such endpoints and the mechanisms of impact. The development of indicators (e.g., a regression model using adjacent vegetation characteristics and wetland

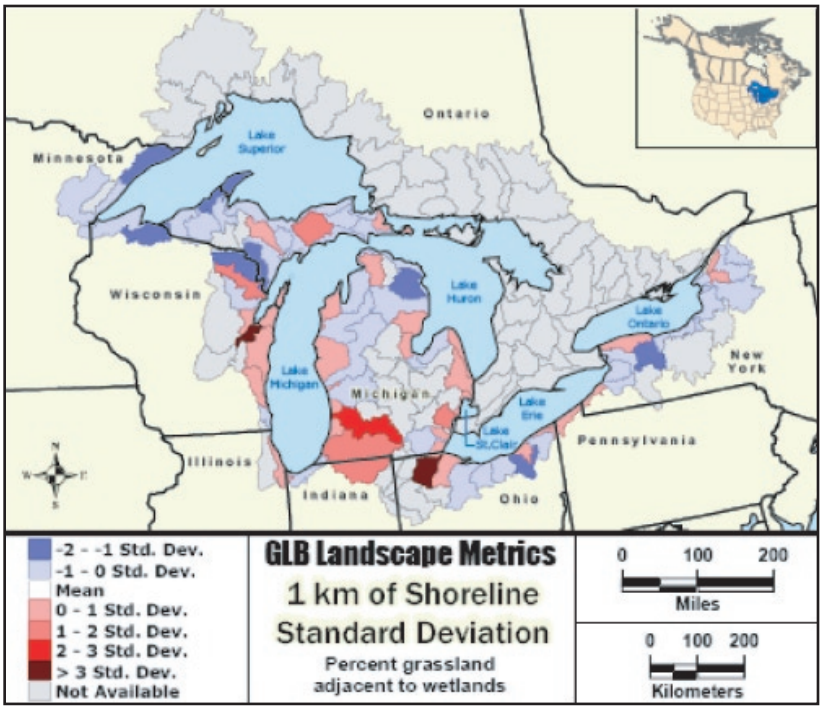

Figure 3. Percent grassland adjacent to wetlands, among 8-digit USGS Hydrologic Unit Codes (HUCs), measured within 1 km of shoreline; data are reported as standard deviations from the mean.

Source: Lopez *et al*. 2006

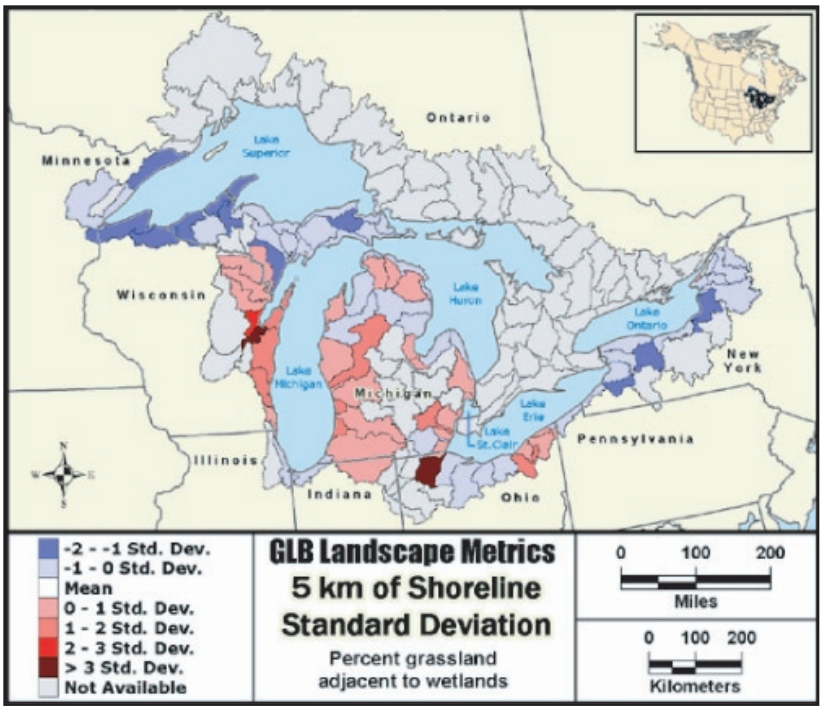

Figure 4. Percent grassland adjacent to wetlands, among 8-digit USGS Hydrologic Unit Codes (HUCs), measured within 5 km of shoreline; data are reported as standard deviations from the mean.

Source: Lopez *et al*. 2006

hydroperiod) is an important goal, and requires uniform measurement of field parameters across a vast geographic region to determine accurate information to calibrate such models.

Acknowledgments
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Sources
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