

Natural/Cultural Ecosystems of the Great Lakes Basin: Degradation and Rehabilitation

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We have come to perceive the Great Lakes Basin as comprising a nested holarchy of ecosystems: local degraded areas of concern as well as relatively pristine heritage areas in the coastal zone of the lakes; the five Great Lakes and the four major interconnecting rivers each separately with its own areas of concern and heritage areas; and the entire set of lakes and rivers with their contiguous watersheds. With each of these three scales a broad generic conceptualization appears to be appropriate for the relevant practical and political issues. The sketch of a model in this paper can be attributed, in parts, to Ramon Margalef and to John Caddy.

In a pristine state the waters of these ecosystems were dominated by self-organizing communities of relatively large benthic or demersal biota that thrived at the edges and near the bottoms of the rivers and lakes of the Great Lakes Basin. Most of the cultural stresses that exploitive humans then applied to these lakes had the effect of suppressing, crippling or vitiating the indigenous demersal sub-system but also, directly and indirectly, of fostering an offshore pelagic sub-system of exotic biota with relatively little self-organizing capability. Though similar in general terms, this transformation involved different species complexes in shallower and deeper basins. Waters upstream in the Basin and distant from cities were generally less abused than were downstream waters near cities, and consequently exhibit fewer of the symptoms of this "general distress syndrome" and "ecosystem transformation".

Introduced Pacific salmon that thrived as part of the stress-dependent offshore fish associations came to be highly prized by anglers. With rehabilitation the balance between a reconstituted near-shore association and the stress-dependent offshore association appears to be swinging toward a state with some ecosystemic resemblance to the original pre-stressed nearshore association. Anglers and their service industry involved in the offshore fishery, that has been valued at about \$2 Billion annually, are quite concerned that salmon are no longer as large and abundant as was the case some years ago, while human inhabitants of coastal zone settlements and recreationists and anglers who use the partially rehabilitated near-shore beaches and waters are generally pleased.