REVIEW OF PROGRESS

UNDER THE

STRATEGIC VISION

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GREAT LAKES FISHERY COMMISSION
2100 Commonwealth Blvd., Suite 209
Ann Arbor, Michigan 48105

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EXECUTIVE SUMMARY

In 1991 the Commission adopted a strategic vision encompassing three areas: healthy ecosystems, integrated management of sea lamprey, and improved institutional/stakeholder partnerships. A review of progress slated for 1995 shows that, although much has been accomplished, achievement of some milestones is behind schedule and achievement of others is difficult to assess because they are either too far reaching or too qualitative.

Achievement of the milestones in the vision statement on healthy ecosystems will require a concerted effort by all natural resource agencies with responsibilities for the Great Lakes. Potentially, the most important effort of the Commission relevant to this vision is sponsorship of the review of the Joint Strategic Plan for Management of Great Lakes Fisheries. An objective of this review is the establishment of a procedural framework for linking water quality and fisheries management on the lakes. Without an effective framework, the healthy ecosystem milestones on eliminating population and species losses, preventing unintentional introductions, and increasing the quality of aquatic habitats, all far-reaching goals, will not be met. Achievement of the milestone on reduction of toxics will, because of inputs from a contaminated earth, require a much longer period, perhaps centuries rather than a decade, unless current fish-consumption advisories are found to be too conservative. Recent reports of successful lake trout reproduction in Lakes Huron and Ontario and of extensive wild populations in Lake Superior indicate that encouraging progress is being made on the lake trout restoration milestone.

Substantial progress is being made on maintaining lampricide registrations, reducing use of lampricides, developing quantitative assessment and improved control technologies, and improving program coordination--all milestones in the sea lamprey vision statement--but suppression targets based on economic injury levels have not been established. Concurrent analysis of other tasks accounts for the delay in establishing suppression targets.

Considerable progress has been made in achieving the objectives of the partnership vision statement milestones but accomplishments typically fell short of the target dates. Fish community objectives have been developed for four of the five lakes and research priorities have been identified. Only two lakes have produced state of the lake reports, however, and incorporation of environmental objectives into the fish community objectives developed by the lake committees will require a new approach, which will be addressed in the review of the strategic plan. The milestones involving an improvement in advisor participation and a communications strategy are being addressed, albeit later than called for. Canadian advisors were designated in 1992 as envisioned.

PURPOSE

In 1991, the Commission adopted a strategic vision to provide an explicit statement of the focus, intent, and direction of its program for the next ten years, the decade of the 1990s. Formally published in the next year (GLFC 1992), the vision consisted of a fundamental concept embracing the ecosystem approach and of vision statements on achieving healthy ecosystems, integrated management of sea lamprey, and improved institutional/stakeholder partnerships. Each vision statement contained a number of milestones for accomplishment. Milestones have various target dates, some occurring as early as 1992 and some as late as the end of the decade. The Commission is strongly committed to achieving all milestones by their target dates, and, accordingly, the vision calls for a review of progress in 1995 and at the end of the decade in 2001. This report provides a brief accounting of progress in achieving the milestones through 1995. Each of three sections begins with one of the three vision statements and the associated milestones. Readers can consult the actual publication for an explanation of why these statements and milestones are important to the Commission.

STATEMENT ON HEALTHY ECOSYSTEMS

The Commission shall encourage the rehabilitation and protection of healthy aquatic ecosystems in the Great Lakes: that are based on foundations of naturally reproducing fish populations and self-regulating fish communities; that provide sustainable benefits to society; and that support fisheries having increased contributions of wild fish. The conservation of biological diversity through rehabilitation of native fish populations, species, communities, and their habitats has a high priority.

Milestone 1) No further loss of native aquatic populations or species.

A needed inventory of the known diversity of fish in the Great Lakes and in lower tributaries is a key element of the biodiversity research proposed by the Commission's Board of Technical Experts (BOTE). This inventory should provide a benchmark for measurement of potential losses. Although this vision statement specifically mentions fish, it could be interpreted, under an ecosystem approach, to apply to all biota. A broadly interpreted Milestone covering all species will not, however, be achieved because native mussels are threatened by the zebra mussel invasion (Williams et al.1993).

Milestone 2) Establishment of policies, legislation, and programs by 1995 that Prevent the unintentional introduction of non-native organisms that have potential for naturalization in the Great Lakes.

The shipping, private aquaculture, bait fish, and aquarium industries are important sources for unintended introductions. The Commission, which organized the early effort to prevent ballast-water discharges into the lakes from ocean-going vessels, has continued to address this problem. For instance, the Commission

- paid the publication and reprint costs (also funded the research) of a source paper on introductions in the Great Lakes (Mills et al. 1993),
- participated in drafting the Water Resources Development Act of 1992 (which requires mandatory ballast control in the Hudson River),
- published a protocol that limits salmonid introductions into the Great Lakes (Homer and Eshenroder 1993),
- sponsored the report to governments on ruffe,
- advocated to the Canadian Coast Guard the inclusion of the St. Lawrence estuary in their ballast guidelines and
- participated on the [U.S.] Great Lakes Panel.

Notwithstanding these efforts, two exotic species that have not reproduced in the Great Lakes (European flounder and Chinese mitten crab) have reappeared, despite a mandatory ballast-water-exchange program in the U.S. and a voluntary-exchange program in Canada. The ballast-control regulations and guidelines only reduce risks. Better enforcement, conversion of the Canadian guidelines to statutes, and extension of the management zones to include more coastal area are needed until new ship designs incorporating control technologies can be researched and deployed.

Little progress has been made to reduce the potential for introductions from the aquaculture, bait fish, and aquarium industries. The appearance of whirling disease in Lake Ontario tributaries and the lessening of restrictions on importation of grass carp show that the potential is still high. The Commission participated in an interagency review of OMNR's draft position on aquaculture and plans are being developed to focus attention on these issues during the 1995 meeting of the IJC and in a chapter of a book about fishery policy for the Great Lakes.

Milestone 3) Achievement of lake trout restoration objectives in Lake Superior, and detection of increasing levels of naturally reproduced yearlings in each of the other Great Lakes.

The most encouraging evidence of increased reproduction of lake trout outside of Lake Superior is in Lake Ontario, where naturally reproduced yearlings were consistently captured in 1994 for the first tone. Also, in Lake Huron advanced wild fry were taken in 1994 at three locations on a major spawning shoal located in the middle of the main basin. Wild yearling L*e trout remain scarce in all lakes except in Superior where current yield, which includes catches of stocked fish, amounts to 33% of the rehabilitation goal (Hansen et al. 1994). Sea lamprey predation, over-fishing, management set-asides of some of the best spawning areas for other uses (Eshenroder et al. accepted for publication), and information gaps about lake trout reproductive biology continue to thwart the rehabilitation program. The sea lamprey problem is especially severe in Lake Huron, but a new problem--obtaining permission from tribal authorities to treat the Bad River--threatens lake trout in western Lake Superior. Consistent with tradition, the Commission remains the leading advocate for take trout rehabilitation. This support during the first half of the decade of the 1990s involved supporting lake trout research including the RESTORE conference held in 1994, supporting the lake committee/technical committee structure, and publication of the vision itself. To fully capitalize on the RESTORE initiative, a new lake trout task should be started in BOTE to undertake important research into factors that limit successful reproduction and to coordinate existing research.

Milestone 4) Achievement of net gains in the quality of aquatic habitats.

Loss of physical habitat in the Great Lakes continues to exceed gains such as those resulting from RAPs (Dodge and Kavetsky 1994). Achievement of this Milestone remains a major challenge for all natural resource agencies concerned with the Great Lakes. Integration of fishery and environmental objectives and indicators and development of a uniform system of classification and inventory of habitat and of reporting changes are priority needs. Relevant efforts of the Commission include

- sponsorship in 1993 of a workshop on integration of RAPs and fishery management planning (also published the proceedings and the results of a survey:. Hartig 1993a, 1993b),
- sponsorship in 1994 of an environmental objectives workshop involving environmental managers,
- production of a joint report with the International Joint Commission and the U.S. EPA on ecosystem partnership coordination (Koonce 1994),

- support for the HabCares symposium (including the production of a practical guide for habitat rehabilitation),
- sponsorship of a workshop on design of incidental habitat,
  support for review of RAPs, and
- collaboration between the Lake Superior Committee and the B inational Initiative on development of indicators of aquatic ecosystem health.

Improved institutional arrangements that allow for an ecosystem approach are a precursor to achievement of the aquatic-habitat milestone (Koonce 1994). Recognizing this problem, the Commission is facilitating a review of institutional arrangements within the context of A Joint Strategic Plan for Management of Great Lakes Fisheries (Dochoda and Koonce 1994). A goal of the exercise is to establish a procedural framework for linking RAPs, LAMPs, and the Joint Strategic Plan so that habitats important to fish are recognized for protection or remediation by regulatory agencies.

Milestone 5) Reduction of toxic substances to levels that do not impair the health of aquatic organisms nor the wholesomeness of food for consumption by humans and wildlife.

Concentrations of contaminants (toxics) in fish flesh generally declined from the mid-1970s to the early 1990s, but these declines have ceased or reversed in recent years (DeVault et al. 1994). Loadings of contaminants to the Great Lakes have not increased, and consequently recent changes in concentrations in fish may reflect changes in how contaminants are cycled through the food web (Stow et al. 1994). Therefore, although much has been achieved in reducing contaminants, the Commission's milestone of reaching no-effect levels in biota and of complete wholesomeness of Great Lakes fish for human consumption is probably not attainable in the near term because of small but significant inputs of contaminants from the land mass. The Commission has had little direct involvement in contaminant issues except for limited efforts at clarifying the effects of contaminants on lake trout reproduction and at drafting a position statement adopted in June 1995.

STATEMENT ON INTEGRATED MANAGEMENT OF SEA LAMPREY

The Commission will provide an integrated sea lamprey management program that supports the Fish Community Objectives for each of the Great Lakes and that is ecologically and economically sound and socially acceptable.

Milestone 1) Establish target levels of sea lamprey abundance by 1994 that maximize net benefits of sea lamprey and fisheries management.

Suppression targets based on economic injury levels have not been established but the software and analytical procedures (Koonce et al. 1993) needed to quantify them have been developed. The delay in establishing targets results from an addition of other tasks (which, has enlarged the undertaking) to optimize selection of stream treatments, allocate treatments among takes, and make trade offs between lampricide applications and alternative controls. This expanded process requires more time and has delayed the establishment of targets until law "in 1996. Targets identified by the lake committees using a non-injury level approach have, been used to develop the FY 1997 cost estimates, the first use of targets in the Commission's budget process.

Milestone 2) Suppress sea lamprey populations to target levels through an optimal program of control, assessment, and research. This program will be characterized by

a) maintenance of lampricide registrations with environmental agencies,

Reregistration of lampricides continues to be a top budget priority-$4.7 million has been allocated by the Commission for this process, which is currently in Phase IV and proceeding well. Technical support from NBS staff at Lacrosse has been good.

b) development and use of alternate control techniques to reduce reliance on lampricides to 50% of current levels,

The average. amount of lampricide (TFM) applied each year was 20% lower in 1991-94 than in the preceeding decade (1981-1990). Thirty percent of this reduction is attributable to lower application rates in the 1990s, made practible with new knowledge from efficacy research (Bills and Johnson 1992), and the remaining 70% is related to a smaller average volume of river water being treated each year. Less water is treated because of construction of barrier dams and better data on ammocoete populations which allows for less-frequent treatments of some streams.

Although the target reduction in lampricide use by 50% at the end of the decade is optimistic, substantial progress with alternative controls is, scientifically well advanced compared to 1991, the year the strategic vision was developed. Research on new, alternative methods of sea lamprey

control was accelerated with implementation in 1992 of a grants program. Important findings from this research with potential applications are designs for velocity barriers that block sea lampreys and allow passage of largesized, non-jumping fish; discovery of chemicals that induce partial metamorphosis in sea lampreys; and evidence that components of sea lamprey bile acids serve as pheromones for adult sea lampreys. The grants program also supported research on efficacy of the sterile-male-release program in Lake Superior and the St. Marys River. Also, the control agents have begun testing inflatable barriers that can be configured to allow fish passage when sea lampreys are not spawning.

Budgets in the 1990s reflect the Commission's increased emphasis on alternative methods of control. The percent of the sea lamprey management budget spent on alternative controls increased fourfold from FY 1991 to 1995 (from 4% to 16%).

c) development of quantitative assessment and improved control technologies for lentic areas and connecting channels,

Quantitative assessments, including a major effort on the St. Marys River, have recently been emphasized in the Commissions field program. In particular, deep-water samplers have been engineered and geographical-positioning and informational systems (GIS) have been adapted for use in surveying ammocoetes in the St. Marys River where they will also be important in developing and assessing treatment strategies. In addition, a new application of the lampricide Bayer for lentic areas was recently developed and awaits a use permit. These efforts represent major progress for this milestone.

d) improvement of information gathering and research through program coordination among sea lamprey control agents, fish management agencies, other agencies and private groups, and researchers.

Task groups that provide strategic planning and a coordination function have been established for the barrier, sterile-male-release, and St. Marys River programs. Research coordination has been advanced through Commission sponsorship of workshops 'in 1992-94 on integrated pest control, lamprey pheromones, endocrine control of sex differentiation 'in lampreys, lamprey metamorphosis, and application of barriers. A workshop on population compensation is planned for the fall of 1995. The task groups and

workshops provide opportunities for collaboration between control experts and researchers. Collaboration between the control agents and fish managers was improved in the early 1990s, when control experts were appointed to each lake's technical committee. Altogether, these efforts comprise a substantial increase in coordination activities since the late 1980s.

STATEMENT ON INSTITUTIONAL/STAKEHOLDER PARTNERSHIPS

The Commission will encourage the delivery of complementary programs focussed upon achievement of Fish Community objectives as adopted by the Lake Committees for each Great Lake:

- **leadership from the Lake Committees,**
- **coordination of fish management programs,**
- **integration of sea lamprey and fish management programs,**
- **development of coordinated programs of research,**
- **recognition of Fish Community Objectives by environmental agencies as they implement their programs, and**
- **strengthened and broadened partnerships among fish management agencies and non-agency stakeholders.**

Milestone 1) The Commission will achieve and foster partnerships necessary to effectively accomplish the following.

a) Fish Community Objectives for each Great Lake and connecting water will be available for distribution by the Commission in 1992,

Fish Community Objectives for individual lakes are at various stages of completion with

- Superior published in 1990,
- Michigan accepted for publication in 1995
- Huron published in 1995, and
- Erie agencies reviewing a draft.

Lake Ontario remains the major holdout, but in 1995 the Lake Ontario Committee charged a working group in the Province to begin developing the technical basis for revising lake objectives. Community models and the results of other research developed by the Commission will be an asset to the working group. The Commission should continue to encourage the Lake Ontario Committee to complete this task.

b) State of the Lake Reports for each Great Lake and connecting water will be published by the Commission in 1993, 1996, and 1999,

A first round of State of the Lake Reports was completed for Lake Superior (Hansen 1990) and Ontario (Kerr and LaTendre 199 1) before the strategic vision was adopted. A second-round State of the Lake Report was published for Lake Superior (Hansen 1994) and a report for Huron was accepted in 1994 for publication; reports due in 1993 for the other lakes are lacking. Achievement of this milestone is well off schedule, and an analysis of what these documents should contain and how they can be produced is needed.

c) quantifiable environmental objectives will be included by 1993 within the Fish Community Objectives established by the Lake Committees, and

The Commission sponsored a workshop in 1993 that focused on collaborative objectives among fishery and environmental agencies concerned with Lakes Erie and Superior, but a consensus was not achieved. The Lake Superior Committee has, however, made progress in cooperating with the Binational Program in establishing common indicators of ecosystem health. Also, the Lakes Michigan and Erie Committees have taken initial steps toward their involvement *in RAPs. This activity and other actions discussed earlier under the milestone about aquatic habitat also apply to this milestone. The partnership vision is essentially the means for achieving the visions on healthy ecosystems and partnerships. The intention to revisit the Joint Strategic Plan is equally relevant to this milestone.

d) priorities for fishery research will be established and disseminated by 1993.

A statement on research priorities was drafted by the Board of Technical Experts in 1993, modified in 1994, and will be distributed in 1995.

2) Stakeholder participation in Commission activities will be enhanced and characterized by the following:

a) Canadian advisors representing key stakeholder groups will be established by 1992,

Three Canadian advisors were designated in 1992, and two were active through 1995. One replacement advisor is needed.

b) the role of United States and Canadian advisors will be reviewed to identify ways to broaden representation and improve opportunities for participation by 1993, and

Replacements for inactive/vacant U. S - Advisor positions are being sought. Five new nominations have resulted, but eight vacancies remain in two states. The U.S. Section tried in 1993 to provide more travel support for U.S. Advisors but the State Department declined this effort to increase advisor participation. Letters requesting advisor nominations from state governors encourage a broader base of representation by now suggesting that the advisor representing the public-at-large not be associated with a fishing organization or business. improved opportunities for advisor participation hinge to a large extent on implementation of a communications strategy, which is discussed in the next milestone.

c) a communications strategy that promotes stronger and broader partnerships with stakeholders will be implemented by 1992.

One year after adoption of a communications strategy in 1992, the Commission released a video on the sea lamprey program but fiscal constraints limited implementation of other initiatives. In 1994, funding was allocated for solicitation of grants in the communications area and for production of a prototype newsletter. None of the grant solicitations was successful, but a newsletter was distributed in early 1995 and was favorably received. With the establishment in 1995 of a communications officer position in the secretariat, increased stakeholder participation is expected.

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