

Final Report for
Chesapeake Bay Program Grant No. X-003396-02
Fiscal Year 1990

PROGRESS TOWARDS IMPLEMENTATION OF
THE POTOMAC LIVING RESOURCES
MONITORING PLAN

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INTERSTATE COMMISSION ON THE POTOMAC RIVER BASIN

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This is the second progress report on implementation the Potomac River Living Resources Monitoring Plan (PRLRMP). The plan was drafted in 1988 - 1989 in order to coordinate existing programs of county, state, federal, and other agencies into an integrated living resources monitoring program for the tidal Potomac River, and to propose additional programs where needed. It was also intended to serve as a model for integrating living resources monitoring programs in the Chesapeake Bay area. A task force composed of scientists and managers working on the Potomac River was established in late 1988 for the purpose of evaluating and improving the draft PRLRMP and discussing how the plan would be implemented. After six months of meetings and draft reviews by the task force, the final PRLRMP was submitted to the Joint Living Resources/Monitoring Subcommittee Work Group and the Living Resources Subcommittee of the Chesapeake Bay Program in June 1989. See the acknowledgements for a list of the task force members.

Some of the plan's recommendations were initiated at once in 1989; others required action on the part of the Chesapeake Bay Program or state and federal agencies before they could be implemented. The plan identifies several tasks for the Interstate Commission on the Potomac River Basin (ICPRB). Furthermore, ICPRB is tracking implementation of PRLRMP recommendations by other agencies. In the following discussion, each of the 15 PRLRMP recommendations is restated with a description of current status. ICPRB has been primarily involved in implementing recommendations 12 through 15.

This progress report will be circulated to members of the PRLRMP workgroup, the Potomac Regional Monitoring Committee (PRMC) coordinated by the Metropolitan Washington Council of Governments, and interested representatives of the Chesapeake Bay Program, NOAA, Fish and Wildlife Service and state and local governmental agencies.

PROGRESS TOWARDS IMPLEMENTATION OF RECOMMENDATIONS

RECOMMENDATION 1. "It is critical at this stage in the Potomac River Living Resources Monitoring Program (and in the Bay community as a whole) that fish biologists and estuarine ecologists working on other parts of the food chain clearly state their views on the factors controlling fish populations in the Potomac River, in order to identify those trophic components or water quality parameters needing monitoring. In particular, differing perspectives on the relative roles of climatic variation, overfishing, and water quality (nutrients, contaminants, impediments) need to be clearly articulated and, to the extent possible, resolved."

This difficult yet critical task for the Bay community is ongoing in many groups although formal discussion - and resolution - of the problems are rare. Local forums where the problems have been discussed in the last year include 1) sessions of the Estuarine Research Federation annual meeting in Baltimore, October 9-12, 1989, 2) a workshop entitled "Ichthyoplankton Monitoring and Research on the Chesapeake Bay", December 5, 1989 (see recommendations 3 and 4 below) and 3) the Tidal Freshwater Ecosystems Symposium of the Virginia Academy of Sciences meetings at George Mason University on May 25, 1990.

RECOMMENDATION 2. "New or expanded stock assessment programs for juvenile and adult finfish in the Potomac mainstem are needed to comprehensively monitor largemouth bass and bay anchovy (resident species), and river herring (anadromous species), all of which have been designated PRLRMP species of interest. These studies would complement four ongoing projects monitoring finfish in several tidal freshwater tributaries and just below the fall-line. Expanding the large-mouth bass project would also allow objective evaluations of different SAV communities as fish habitats."

Juvenile herring are regularly surveyed by Maryland Department of Natural Resources (DNR) in several locations around the bay but still not in the Potomac River. Bay anchovy are not being surveyed by DNR.

CONTACT: Mr. Leon Fewlass (Maryland DNR, Freshwater Fisheries)

The Maryland DNR Largemouth Bass Study continues to track 10 - 15 radio tagged bass, monitor bass tournaments, and electrofish and seine for population data in the freshwater tidal Potomac River. A general observation from the last several seasons is that largemouth bass are moving

with the SAV beds as the beds have expanded downstream from the Washington, D.C. area. Sampling sites in the D.C. area that have recently experienced a drop in SAV densities have also shown decreases in bass numbers. Cooperative efforts on the part of the Maryland Department of Natural Resources, District of Columbia Regulatory Affairs, Virginia Department of Game and Inland Fish, Virginia Marine Fisheries Division, and the Potomac River Fisheries Commission will soon produce uniform fishing limits for largemouth bass and liscensing procedures for the three jurisdictions.

RECOMMENDATION 3. "An intensive monitoring program for egg and larval stages of anadromous fish is tentatively proposed; actual recommendations for such a program should wait until after an ichthyoplankton workshop which has been proposed for mid 1989."

Dr. Edward Houde (University of Maryland) convened a workshop with the support of Maryland DNR to discuss "Ichthyoplankton Monitoring and Research in the Chesapeake Bay" with a relatively small group of fish biologists and managers on 5 December, 1989, and he edited the proceedings which were published in April 1990. Workshop participants discussed the uses of ichthyoplankton monitoring and research in 1) assessing fish resources, 2) detecting trends in abundance, 3) linking trends to water quality or habitat criteria, and 4) gaining understanding of early life dynamics that can be related to recruitment variability. The workshop concluded that ". . . it is not certain that the benefits to fishery management of [monitoring anadromous ichthyoplankton] would be greater than those derived from abundance monitoring of later life stages . . . the present monitoring schedule and efforts in the Bay are not adequate to survey the spawning areas and times of anadromous fish . . . intensive monitoring of anadromous ichthyoplankton in selected spawning areas might define the environmental conditions that led to the eventual juvenile year-class abundances".

The ichthyoplankton component of the ongoing Gunston Cove Ecosystem Monitoring Program, George Mason University, intensely monitors one spawning area of striped bass, white perch, and herring in the Potomac Estuary. Up to eight years of data from the physical/chemical, zooplankton, SAV and juvenile/adult fish components of this ecosystem program permit good assessments of the relationships between water quality

and habitat and ichthyoplankton survival. (See also recommendation 4.)

CONTACT: Mr. Jim Uphoff (Maryland Department of Natural Resources)

The Small Tributary Monitoring Project (DNR) in Mattawoman Creek was expanded from two to seven stations in the 1990 field season and anadromous species ichthyoplankton were monitored at four stations twice a week from March through June. A full 1991 field season is planned. A final report of the '90 data is in progress.

RECOMMENDATION 4. "We recommend that archived samples of the Maryland Chesapeake Bay Plankton Monitoring Program (MDE) from 1984 to the present be analyzed for ichthyoplankton. These samples will provide the basis of an ichthyoplankton monitoring program for resident species (primarily bay anchovy, a PRLRMP species of interest) in the mainstem Potomac River and will complement two existing ichthyoplankton monitoring programs in Potomac tributaries. We further recommend that a monitoring program specifically targeted at resident ichthyoplankton be added to the Plankton Monitoring Program."

The ichthyoplankton workshop (see above) noted that ". . . monitoring of fish eggs and larvae for species that are abundant, widely distributed, and have a protracted spawning season may provide useful information in the context of present Chesapeake Bay monitoring efforts." The workshop participants then recommended that ". . . selected, archived plankton samples from the Bay [Plankton] Monitoring Program be examined and analyzed for ichthyoplankton to determine if the sampling design is adequate to evaluate abundances and spatio-temporal distributions of selected species", namely bay anchovy, naked goby, hogchoker and perhaps a few other species. "Results of this proposed evaluation should be incorporated into any decision on whether to include ichthyoplankton in future monitoring activities."

CONTACT: Mr. Willy Burton (Versar, Inc.)

As of October 15, 1990, Versar had not received funds to analyze their archived zooplankton samples for ichthyoplankton.

CONTACT: Dr. Don Kelso (George Mason University)

The Gunston Cove Ecosystem Monitoring Program intends to continue monitoring ichthyoplankton in Gunston Cove. In 1991, weekly sampling for anadromous ichthyoplankton will be done at several stations beginning in March. Sampling will continue throughout the summer in order to monitor resident species ichthyoplankton.

RECOMMENDATION 5. "The Maryland DNR annual oyster bar survey and Virginia's shellstring spatfall survey need to be expanded upriver. Emphasis needs to be put on introducing more quantitative sampling methods for oyster bars."

A Shellfish Monitoring Workshop will be held at Horn Point Laboratory on November 6 and 7, 1990 to discuss Maryland and Virginia sampling methods, existing spatfall and bar monitoring programs in the Bay, and implementation of the 1989 Fisheries Management Plan for Chesapeake Bay Oysters. As of now, the state programs are essentially unchanged from last year.

RECOMMENDATION 6. "A new, intensive water quality monitoring program on cross-channel transects that intersect three oyster bars is recommended in order to document differences in offshore and nearshore, or bar, environments."

It is not feasible at this time for MDE to implement this recommendation. Continuous samplers would need to be deployed since these instruments measure at intervals frequent enough to record the relatively short-term anoxic/hypoxic events in shallow waters.

RECOMMENDATION 7. "A fisheries-independent monitoring program for blue crab should be started. We endorse the efforts of CBSAC and the Chesapeake Bay Program to continue the development of a Bay-wide crab survey and urge that such a survey be incorporated into the Bay-wide monitoring activities."

Summer trawl surveys for blue crabs included 21 stations in small creeks in the lower Potomac River estuary from 1977 to 1986, but were stopped in 1986 because of 1) time and effort limitations and 2) low (mostly zero) counts at most of the stations being sampled. Recreational crabbing, however, indicates a significant crab population inhabits the Potomac estuary. In the present DNR/University of Maryland Cooperative Blue Crab Management Plan Study, several

Potomac sites are sampled as part of the tagging program and the winter dredge survey of juveniles and males. The University of Maryland is responsible for sampling the Potomac sites. The Fisheries Management Plan for Blue Crab (Living Resources Subcommittee, 1989) calls for a summer survey (Action 3.1) and designated crab sanctuaries (Action 5.2). It is still uncertain if Potomac sites will be included in future summer surveys, or if Potomac crab sanctuaries will be established.

RECOMMENDATION 8. "We endorse the CBLRMP plans to continue documenting SAV distributions with annual aerial surveys and suggest that an aerial survey of tidal wetlands be done in conjunction with the SAV survey. Ground-truthing of aerial surveys of SAVs should receive high priority. We recommend that the SAV workgroup of the Chesapeake Bay Living Resources Subcommittee designate an institution(s) to consistently manage the SAV survey."

The U.S. Geological Survey (Virginia Carter and Nancy Rybicki) have intensely monitored the abundance and distribution of SAV in the tidal Potomac River from 1978-89. In 1989 and 1990, the Metropolitan Washington Council of Governments (MWCOG), in conjunction with the U.S.G.S., aerially photographed and mapped SAV distribution in the metropolitan area as part of its Hydrilla control program, and MWCOG intends to do annual surveys of the area in the future. The annual Bay SAV Survey photographs, ground-truths and maps SAV in the entire Potomac estuary, and incorporates ground-truthing done by the U.S.G.S., MWCOG, and others. The 1989 Chesapeake Bay SAV survey results were published in June 1990 ("Distribution of Submerged Aquatic Vegetation in the Chesapeake Bay and Tributaries and Chincoteague Bay - 1989", by R. J. Orth and J. F. Nowak) and are available through the Chesapeake Bay Liaison Office (301-266-6873).

The SAV workgroup of the Living Resources Committee has requested funding from EPA and others for the 1991 SAV survey. The Submerged Aquatic Vegetation Policy (1989) recommends annual surveys of the Bay area at least through 1995.

An indepth technical synthesis of water quality factors controlling SAV distribution and abundance is almost finished and will be available through the Chesapeake Bay Liaison Office (301-266-6873). Near-shore and mid-channel sites were compared for four major areas including the tidal, freshwater Potomac.

CONTACT: Linda Hurley (Chair, SAV Workgroup, Living Resources Subcommittee)

A regularly funded monitoring program for SAV beds will hopefully be continued. The indepth technical synthesis (above) should greatly enhance the ability of the program to attract regular funding sources. Designating an institution(s) to manage the SAV survey and ensure rapid data analyses and synthesis in the future would also help the program. A biennial aerial survey of tidal wetlands could easily be instituted in conjunction with the SAV survey in the future if mapping scales are 1:24000 and funding is available for the extra flight time. The Wetlands Inventory and Mapping Workgroup is presently evaluating survey approaches for tidal wetlands.

RECOMMENDATION 9. "A water quality monitoring program for nearshore sites, with and without SAVs, is highly recommended for the entire tidal Potomac and important tributaries. The possibility of initiating a volunteer program to accomplish this is being explored by a number of groups and should be encouraged."

CONTACT: Ms. Nancy Rybicki (U.S.G.S., Reston, VA)

The U.S. Geological Survey has no immediate plans to continue its previous research on water quality at nearshore sites with and without SAV. This past field season, their research focused on comparisons of water velocities in SAV beds and midchannel.

CONTACT: Ms. Linda Hurley (Chair, Submerged Aquatic Vegetation Workgroup, Living Resources Subcommittee)

The SAV technical synthesis (see recommendation 8) establishes regional ambient habitat requirements for SAV in the Bay. These criteria will be used to determine restoration goals for water quality parameters and SAV acreage in the Bay, including the tidal Potomac. Some monitoring of nearshore sites with and without SAV will be necessary in order to track success of the restoration program. The details of this monitoring effort are not worked out as of yet.

RECOMMENDATION 10. "Slight differences in methodologies between the various plankton monitoring programs in the Potomac River can easily be corrected. Monitoring of plankton and benthos (other than oyster) in the lower estuary near the recurring anoxic region is relatively sparse, and projects focusing on this region of the river should be encouraged."

Zooplankton samples were collected July 26, 1990, at two of the District of Columbia Environmental Control Division (DCECD) monthly sampling sites in order to compare the surface horizontal tow method used by DCECD and depth-integrated sampling methods used by other groups. The data are presently being analyzed by Claire Buchanan.

The Chesapeake Bay Plankton Monitoring Program intends to drop its zooplankton component beginning in 1991 because of funding problems. Maryland Department of the Environment will write a final report for the zooplankton component based on 8 years of data and will publish it by April or May of 1991. The Living Resources Subcommittee, however, has submitted a budget request to EPA to provide funds to continue the project for FY 1991. If funds are forthcoming, zooplankton will be sampled in 1991 by MDE at their three Potomac stations.

RECOMMENDATION 11. "We tentatively endorse efforts presently being made to initiate water column respiration studies (i.e. short-term oxygen consumption over time) by the Maryland Chesapeake Bay Water Quality Monitoring Program and others in mesohaline regions typified by hypoxia or anoxia. This should provide a good index for tracking improvements in the bay's pelagic habitats as nutrients are reduced. A workshop to review the proposed study methods and to ensure that they are adequate for monitoring purposes is presently needed."

There has been no action as of yet on the part of the Bay community to organize a workshop to discuss this proposal. Considering the funding shortages that are forecast for 1991, this project will probably be shelved for the time being.

RECOMMENDATION 12. "The feasibility of maintaining one, or more, repositories for hard copies of historical and contemporary living resources data from the Potomac River should be explored very soon. The Metropolitan Washington Council of Governments (MWCOCG) and the proposed Potomac Research Center at George Mason University are two possible repositories. Accessibility to the public, both in terms of

geographic location and ease in obtaining or viewing the data, is an important requirement. We recommend bolstering efforts to assemble hard copy collections of Potomac living resources monitoring data and to establishing repositior(ies)."

ACTION BY ICPRB:

REPOSITORIES. ICPRB initiated discussions in 1989 with both George Mason University (GMU) and MWCOG concerning the establishment of repositories of data hardcopies at these locations. In a February 22, 1990 meeting at ICPRB, the details of establishing the repositories and cooperatively updating them were worked out. George Mason University has placed their repository in the campus library system and will integrate the bibliography of Potomac River living resources data (see below) into their computer system. The MWCOG repository has been incorporated into their inhouse library system. ICPRB has passed on more than 100 hard copies of various Potomac biological data sets and reports to GMU and MWCOG.

RECOMMENDATION 13. "We endorse the developing computerized data bank for living resources at the EPA Chesapeake Bay Liaison Office (CBLO) Computer Center in Annapolis, MD., and recommend that efforts be made to enter all of the Potomac's living resources data into computer databases."

ACTION BY ICPRB:

COMPUTER DATA ENTRY PROGRAM. ICPRB has designed and written a DBASE data entry program to facilitate entry and storage of biological data into computer formats compatible with the CBLO biological databases. Much historical data resides on paper; contemporary data are going on paper or on various incompatible computer formats. Comparisons of the data are consequently difficult to make even though disparate data sets are often comparable. The CBLO has recognized the need for a computerized data bank in which the data is entered in a standardized format and made available to researchers and living resources managers, and it is developing such a data bank. Unfortunately, only a few large monitoring programs presently submit data to the CBLO data bank. The biological data entry program designed by ICPRB is intended to allow smaller organizations such as research groups and local

agencies to generate databases in forms directly comparable to each other and to the evolving CBLO databases.

Master lists of fish, benthos, zooplankton, phytoplankton, and SAV species found in the Potomac estuary were compiled by ICPRB from a number of sources and are a feature of the ICPRB data entry program. Researchers can quickly select species from these master lists to create computer files (eg. for individual cruises or sample sets) that are format compatible with the CBLO databases. Sources for the species master lists include the "Environmental Atlas of the Potomac Estuary", the Gunston Cove Ecosystem Monitoring Program, District of Columbia fish surveys, "Index and Field Identification Guide to the Fishes of the District of Columbia", "Field Guide to the Submerged Aquatic Vegetation of Chesapeake Bay", the National Water Quality Network surveys (1958 - 1968), and the Chesapeake Bay Program species lists.

Since the National Oceanographic and Atmospheric Administration's NODC coding system for species is being used by the EPA Chesapeake Bay Program, species in the master lists are tagged with the appropriate NODC codes whenever possible. Approximately 700 species, resident in the Potomac estuary, were found not to have NODC codes. ICPRB is working with the U. S. Geological Survey and NOAA to get codes assigned to these species.

Preliminary versions of the data entry program have been demonstrated to representatives from MWCOG, DCECD, George Mason University, and Computer Services Corporation (CSC), and at the Tidal Freshwater Ecosystems Symposium of the Virginia Academy of Sciences meetings at George Mason University on May 25, 1990. Valuable insights and suggestions were received and incorporated into the program.

DATA ENTRY OF HISTORICAL AND CONTEMPORARY DATA. ICPRB has identified contemporary and historical data sets that are not entered into computer data files and are encouraging the organizations responsible for the data to 1) enter it in computer formats compatible with the SAS format used at the Chesapeake Bay Computer Center, according to the computer center's guidelines, or 2) use the data entry program available from ICPRB. Some historical data sets (eg. monthly phytoplankton counts of samples collected by the

National Water Quality Network between 1958 and 1968) have been entered in abbreviated forms in STORET or other computer databases. Other historical data sets will need to be entered by ICPRB if the data proves to be valuable enough to include in the large databases needed for trend analyses.

RECOMMENDATION 14. "Plans should be made now for analyzing and interpreting the Potomac River living resources monitoring data in order that thoughtful, effective management policies can be formulated soon and predictive models of the system can be updated. ICPRB should continue the task of designing and performing basic, or first-step, status and trend analyses for merged data sets of Potomac living resources. Increasing the availability of these analyses will hopefully stimulate analyses of "relationships between water quality, habitat quality and the abundance, distribution and integrity of living resources populations" (objective III of the Chesapeake Bay Living Resources Monitoring Plan)."

ACTION BY ICPRB:

BIBLIOGRAPHY AND HARD COPY COLLECTION. A critical prerequisite to developing comprehensive, integrated biological databases was assembling a complete bibliography and a hard copy collection of past and present biological data from the tidal Potomac River. Many of the data sets are poorly circulated, not readily available, or still in the form of raw data. This past year, ICPRB has compiled a bibliography of data sheets, reports, summaries and discussion of biological data for the Potomac River. A preliminary bibliography was compiled from the ICPRB library system, the University of Maryland Chesapeake Bay Laboratory library system, the Chesapeake Bay Environmental Data Directory, the Smithsonian Institution Library and miscellaneous bibliographies. On November 16, 1989, MWCOG convened a meeting of the Potomac River Monitoring Committee and ICPRB's efforts were discussed with the group. PRMC members subsequently helped ICPRB obtain some data sets. In early 1990, ICPRB searched the University of Maryland's CDrom literature search system and incorporated references to Potomac biota into the bibliography. Ongoing efforts to obtain hard copies of unpublished data sheets, reports, summaries and journal articles pertaining

to Potomac Estuary biota have resulted in a fairly complete collection of references at ICPRB. Missing are some difficult-to-obtain data sets and reports.

The bibliography is available in printed form or on computer diskette from ICPRB. The EPA Chesapeake Bay Program, and the George Mason University (GMU) and MWCOG repositories, received an early version of the bibliography in February, 1990. ICPRB, GMU and MWCOG intend to jointly update this bibliography regularly.

DEVELOPMENT OF ANALYTICAL TOOLS. ICPRB has assembled a list of historical and contemporary biological data sets into a DBASE matrix, and is evaluating 1) the feasibility of merging them into an integrated database, and 2) their value as a complementary or contrasting study if they cannot be included in the integrated database. Included in the matrix is information concerning sampling methods, computer format (if the data has been computerized), locations and dates. Comparable data from various data sets will be merged into larger databases which will be used to determine status and trends of several key species (identified in the Potomac River Living Resources Monitoring Plan), and to identify possible relationships of these species' populations with water and habitat quality in the Potomac estuary.

ICPRB has indicated its interest in participating in a Bay Program effort to develop an Index of Biological Integrity (IBI) for the Potomac estuary and its tributaries. ICPRB members also attended the EPA Rapid Bioassessment Workshop on June 5, 1990 (EA Engineering and Science, Inc., Hunt Valley, MD). We feel that many of the rapid bioassessment tools that currently exist can easily be tailored to evaluate Potomac estuary communities and we intend to apply these techniques to data from a few select areas in the estuary early in FY 1991. ICPRB will continue to review the literature in order to evaluate other statistical and analytical methods presently used on biological data from estuarine systems, and to select the ones most appropriate for the Potomac River biological data sets.

RECOMMENDATION 15. "The Potomac River Living Resources Monitoring Task Force will be dissolved when this report is complete. We suggest that ICPRB and MWCOG schedule at least an annual, formal meeting to exchange information on new developments and to review living resources monitoring activities of the Potomac River."

MWCOG convened a meeting of the Potomac Regional Monitoring Committee (PRMC) on November 16. The group discussed various living resources monitoring programs in the Potomac and recommendations of the Potomac River Living Resources Monitoring Plan.

ACTION BY ICPRB:

ICPRB is continuing to work with MWCOG to identify items that should be addressed at future meetings and/or should receive high priority. ICPRB will distribute the bibliography of Potomac living resources and the data entry program to interested members of the PRMC at that committee's next meeting.