Chesapeake Executive Council

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Strategy for Removing Impediments to Migratory Fishes in the Chesapeake Bay Watershed

U.S. Environmental Protection Agency
Region III Information Resource
Center (3PM52)
841 Chestnut Street
Philadelphia, PA 19107

Chesapeake Bay Program

Agreement Commitment Report

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December 1988

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An Agreement Commitment Report from
the Chesapeake Executive Council

U.S. Environmental Protection Agency
Region III Information Resource
Center (3PM52)
841 Chestnut Street
Philadelphia, PA 19107

Annapolis, Maryland
December, 1988

ADOPTION STATEMENT

We, the undersigned, adopt the **Strategy for Removing Impediments to Migratory Fishes in the Chesapeake Bay Watershed,** in fulfillment of the Living Resources Commitment Number 6 of the 1987 Chesapeake Bay Agreement:

> *"...provide for fish passage at dams, and remove stream blockages whenever necessary to restore natural passage for migratory fish."*

We agree to work together to implement the major recommendations of the Strategy:

1) To constitute the Fish Passage Workgroup as the permanent interjurisdictional body coordinating Baywide fish passage efforts, including the development of priorities, timetables, and funding recommendations;

2) To continue to work together to update the comprehensive inventory of obstructions to fish migration in the Bay watershed, and to use this inventory to establish priorities for removal;

3) To adopt a multi-faceted approach to assure the removal of the diverse impediments to fish migration located in the watershed; and,

4) To supplement the technical resources currently dedicated to the removal of impediments.

We recognize the need to commit long-term, stable financial support and human resources to the task of removing impediments to fish migration. In addition, we direct the Living Resources Subcommittee to prepare an annual report addressing the progress attained in implementing the Strategy's recommendations.

Date January 5, 1989

For the Commonwealth of Virginia Gerald L. Baliles

For the State of Maryland William Donald Schaefer

For the Commonwealth of Pennsylvania Robert P. Casey

For the United States of America [illegible]

For the District of Columbia [illegible]

For the Chesapeake Bay Commission W. Taylor Murphy

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EXECUTIVE SUMMARY

The 1987 Chesapeake Bay Agreement includes a commitment that the signatories will "provide for fish passage at dams, and remove stream blockages wherever necessary to restore passage for migratory fish." This commitment was made in response to precipitous declines in the Bay's migratory fisheries and because of the recognition that these declines may be attributable, in part, to the loss of historic spawning and nursery habitat as a consequence of dams and other impediments. In January of 1988, the Living Resources Subcommittee appointed a Fish Passage Workgroup to develop a strategy for implementing the Bay Agreement commitment regarding fish passage. This workgroup includes representatives from each of the Bay states, the District of Columbia, appropriate federal resource agencies, and the environmental community. This report contains the Workgroup's findings and recommendations.

During the past two centuries, a major portion of the historic migratory fish spawning and nursery habitat has been lost as a consequence of dams and other obstructions. The removal of these obstructions is an essential element in our efforts to reestablish healthy migratory fisheries in the Bay watershed. Because the structures which act as impediments to fish migration are diverse, ranging from small road culverts to major hydroelectric facilities, it is important that all responsible parties work together to assure the provision of fish passage. Remedying this problem will require a new level of commitment from our state highway departments, local government, state and federal resource agencies, utilities operating hydroelectric dams, and public and private owners of other dams.

To initiate a comprehensive program for removing impediments to migratory fishes in the Bay watershed, the Workgroup makes the following recommendations:

* The Fish Passage Workgroup of the Living Resources Subcommittee be designated the permanent interjurisdictional body to coordinate Baywide fish passage efforts;

* The signatories work together to update the comprehensive inventory of dams and other obstructions to fish migration;

* The signatories annually reassess their priorities based upon updated inventories and other relevent information;

* All future road and highway culverts should be designed and constructed to assure the passage of migratory fish species present or potentially present in the affected stream;

* Within each Bay state, the highway department should continue to inventory existing road crossings which act as impediments to migratory fishes and to prepare, in cooperation with the resource agencies, a strategy for remedying specific problems;

* The signatories establish a priority list for future fishway projects at these smaller obstructions utilizing the inventory of impediments to fish passage;

* The signatories obtain the technical expertise necessary to provide for fish passage at these obstructions;

* The signatories solicit input and assistance from local governments to provide fish passage at small dams;

* The signatories explore ways to assure the provision of adequate funding for these projects;

* The signatories take steps to assure that they possess adequate legal authority to carry out an effective fish passage program;

* The signatories provide adequate resources to operate and maintain fishways once they are constructed;

* The licenses for all hydroelectric facilities regulated by the Federal Energy Regulatory Commission be examined, and reopened where necessary, to assure that adequate provisions are made for fish passage within a reasonable time frame;

* New licenses for hydroelectric projects not be issued in the watershed without the assurance of migratory fish passage;

* The signatories identify specific spawning reaches suitable for reintroduction;

* The signatories initiate reintroduction programs for migratory fishes, when necessary and appropriate, above impediments that have been targeted for fish passage projects;

* The signatories develop programs to trap adult fishes below the targeted blockage and transport them upstream to spawn, or stock young hatchery-produced fishes above the impediment;

* The signatories identify potential sources of migratory fishes for trap and transport efforts;

* The signatories acquire the necessary equipment for the transport of these fishes;

* The signatories implement management plans, regulatory measures and monitoring programs that will protect newly-introduced fishes until a self-sustaining population has been established;

* The signatories take steps to assure that water quality in targeted streams is maintained at levels necessary for the reestablishment of migratory species;

* The signatories develop a plan for public involvement and sponsorship of activities related to fish passage, and coordinate proposed activities with the Bay Program's Information Network Group;

* The signatories prepare annual reports, for submission to the Chesapeake Bay Program through the Living Resources Subcommittee, detailing the previous year's progress as well as plans for the upcoming year;

* The Fish and Wildlife Service consider enhancing their anadromous coordinator initiative to provide additional assistance in the Bay region;

* A technical workshop be held in the Bay area to apprise interested parties of recent developments relating to fishway design and construction;

* Steps be taken to encourage regional educational institutions to focus resources on this important problem; and

* The Fish and Wildlife Service consider encouraging "cooperative units" in the watershed to focus on issues concerning migratory fish and the engineering and design of fishways.

INTRODUCTION

Of the 260 fish species that occur in the Chesapeake Bay, the most sought after by both sport and commercial fishermen are the migratory species. These include "anadromous" fishes, such as striped bass, river herring, sturgeon and American and hickory shad, that spend most of their adult lives in saltier coastal waters but return each year to spawn in freshwater, as well as semi-anadromous species such as white and yellow perch. The term anadromous is taken from the Greek words "ana", meaning upward, and "dromos", meaning running. Another class of migratory fish are the "catadromous" species, represented in the Bay watershed by the American eel. Catadromous fish spend most of their lives in freshwater, returning to ocean waters to spawn. Together, anadromous and catadromous species are described as diadromous, or migratory between saltwater and freshwater.

At one time, the Chesapeake Bay abounded with migratory fishes. Today, however, these once thriving fisheries are in a depressed state. No longer do sturgeon, striped bass, shad and river herring support extensive recreational and commercial fisheries. In Maryland, the catch of American shad declined from over 7 million pounds a century ago to approximately 20,000 pounds in 1980, prompting the state to ban fishing for this species. Populations of shad in Virginia waters have experienced a similar decline, with current annual harvests averaging 900,000 pounds, compared to over 11 million pounds a hundred years ago. The total annual commercial landings of river herring in Maryland has dropped from over 8 million pounds 50 years ago to approximately 200,000 pounds in 1985. The striped bass commercial catch Bay-wide has declined from 14.7 million pounds in the early 1970's to 1.7 million pounds in the early 1980's. Table 1 illustrates the precipitous decline of the Bay's migratory fisheries. The economic impact of this decline is significant. In the early twentieth century the shad and river herring fisheries were the two most economically important commercial finfisheries in the Bay watershed. Today Maryland's commercial shad fishery is closed as a result of a moratorium imposed in 1980 and the river herring fishery has declined by over 90%. The economic importance of the Bay's migratory species to the sportfishing industry is equally apparent.

This decline cannot be attributed to a single cause. Rather, an intricate complex of factors -- some natural, most man-made -- can be identified. Among those most often cited are pollution and siltation of spawning areas, overharvesting, and construction of dams and other obstructions across the Bay's tributary streams and rivers, preventing access to historic spawning areas. Through the multi-agency Bay restoration program, progress has been made in addressing the degradation of Bay water quality. The 1987 Bay Agreement has bolstered these efforts by establishing specific commitments to reduce nutrient input and sedimentation into Bay waters.

RECENT COMMERCIAL HARVESTS OF MIGRATORY FISHES IN CHESAPEAKE BAY

(Average annual tons for each 10-year period)

		1966-1975	1976-1985	% Decline
American Eel	VA	427.1	257.0	40%
	MD	117.8	106.7	9%
American Shad	VA	1,114.0	454.0	59%
	MD	409.7	37.4 *	91%
Hickory Shad	VA	18.8	0.5	97%
	MD	8.7	0.6 *	93%
River Herring (Blueback herring and alewife)	VA	9,486.0	725.0	92%
	MD	1,094.7	71.0	94%
Striped Bass	VA	1,059.0	226.0	79%
	MD	1,803.3	642.4 *	64%
White Perch	VA	173.8	65.0	63%
	MD	650.8	341.9	47%
Yellow Perch	VA	1.9	0.2	90%
	MD	51.8	14.9	71%
Total	VA	12,280.6	1,727.7	86%
	MD	4,136.8	1,214.6	71%
TOTAL	Bay	16,417.4	2,942.6	82%

* *Pre-moratorium*

Harvest restrictions have been placed on the taking of some migratory species in an attempt to arrest further decline. Until recently, however, little had been done to address the blockage of historic diadromous fish spawning habitat by dams, culverts and other physical obstructions.

BARRIERS TO MIGRATION: AN HISTORICAL PERSPECTIVE

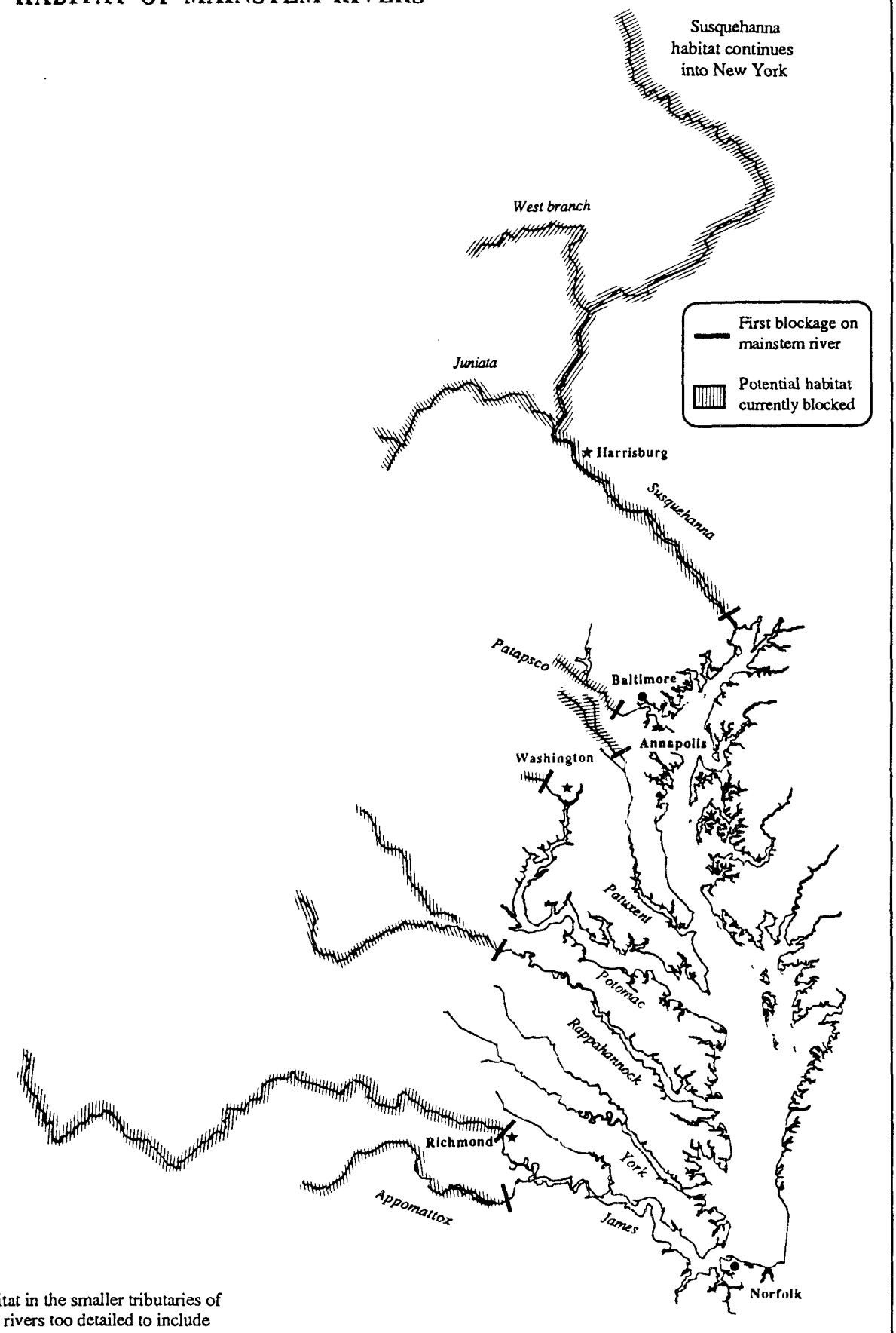
Altering and impounding streams and rivers to meet the needs of a growing populace is a practice as old as the Nation itself. Beginning in colonial times, the number of mill dams was increased to meet the growing needs of commerce. As early as 1774, a navigation canal was proposed for the James River. Many of our founding fathers were actively involved in improving navigation on the James and other Virginia Rivers by constructing systems of canals and dams. These provided better transportation but created impediments to migrating fishes and obstructed once productive spawning and nursery areas.

With the advent of the Industrial Revolution, the potential energy of the rivers was harnessed as dams were built to provide a source of impounded water to drive the mills. Mill dams gave way to huge concrete structures built to provide a source of electricity for growing metropolitan areas. Overland transportation expanded as the horse and buggy gave way to the automobile and dirt trails were paved and expanded into roads and highways. Culverts and other structures placed in or across streams and rivers to support these roads were added to the growing inventory of blockages. Thus, the foundation was laid for a conflict between commercial interests and the environment that would plague natural resource managers into the 20th century.

During the past two centuries, a major portion of migratory fish spawning and nursery habitat throughout the Bay has been lost due to obstructions. The Susquehanna River is perhaps the most dramatic example of the impacts of blockages on migratory fishes. Construction of four dams in the lower river early in this century blocks nearly 300 miles of habitat historically used by shad and herring. The annual harvest of American and hickory shad in the upper Bay, which reached 7.1 million pounds in 1890, plunged to a meager 34,000 pounds in 1979, causing resource managers in Maryland to impose a full moratorium on the harvest of this fish.

Further south, a similar fate has befallen the migratory fishery resources of the James River. At one time anadromous fishes migrated nearly 300 miles upstream, to the river's origin at the confluence of the Jackson and Cowpasture Rivers. Today, however, 5 concrete dams located in the vicinity of Richmond block fish access to nearly two-thirds of that historic habitat. While the Susquehanna and James Rivers may be two of the more dramatic illustrations of the problem, blockages plague virtually every major tributary of the Bay. Figure 1 depicts historical spawning and nursery areas currently precluded by impediments to fish migration. Nearly a thousand such blockages are documented in both Virginia and Maryland.

POTENTIAL AMERICAN SHAD SPAWNING AND NURSERY HABITAT OF MAINSTEM RIVERS *



* Potential habitat in the smaller tributaries of the mainstem rivers too detailed to include

BARRIERS TO MIGRATION: THE CURRENT SITUATION

In Virginia several surveys have been conducted which collectively provide an inventory of the larger impediments to fish passage in the tidewater area. Information on smaller impediments is currently lacking. The "Virginia Hydro Dam Inventory" was prepared in 1981 to provide information about the hydroelectric potential at existing dams. The inventory includes descriptions of the physical condition of the state's larger dams as well as information on ownership. Two regional surveys by the Virginia Polytechnic Institute and State University document stream blockages and water quality on the mainstems of the Rappahannock, James and York Rivers and tributaries of the lower James. "An Analysis of the Impediments to Spawning Migrations of Anadromous Fish in Virginia Rivers" was prepared in 1985 and describes physical impediments to migration on the mainstems of the James, York and Rappahannock Rivers. "Use of Tributaries of the Lower James River by Anadromous Fishes" identifies the first downstream impediment encountered on 96 tributaries to the lower James. The studies include a description of the historic and present ranges of anadromous migrations. Detailed information about the use and ownership of the obstructions and the quality of upstream habitat is not included. In addition, field biologists with the Virginia Department of Game and Inland Fisheries have compiled a "Statewide Inventory of Dams". This inventory is the most inclusive list of dams that impede fish passage, but does not contain information on non-dam impediments. In summary, while much information has already been compiled on stream blockages in Virginia, it needs to be consolidated, and gaps in the data must be filled. Virginia representatives on the workgroup suggested that additional resources may be necessary to collect and organize needed information. See Appendix 1 for a more detailed description of the aforementioned surveys, along with a summary of current fishway projects in Virginia.

In Maryland a similar but more centralized body of information on impediments to fish passage exists. Between 1968 and 1988 the Maryland Department of Natural Resources compiled a "Survey of Anadromous Fish Spawning Areas". The survey identifies all natural and manmade stream blockages impeding the passage of migratory fishes in 15 of 17 tidewater counties. Another, similar survey provides a description of impediments in the two remaining counties. Although the surveys are fairly comprehensive, some of the information is dated, and there are gaps in the available data. Specifically, the current ownership and use of impediments needs to be documented, and information on the presence and abundance of migratory species below blockages needs to be updated.

Detailed physical information about larger dams in the state is compiled in the "Inventory of Maryland Dams and Assessment of Hydropower Resources", also published by the Department of Natural Resources. The inventory does not describe habitat conditions or whether migratory

species are present below the listed dams. See Appendix 2 for a more comprehensive discussion of the status of fish passage efforts underway in Maryland.

Information on stream blockages in Pennsylvania also has to be augmented. However, migratory fish access to the main stem of the Susquehanna River will be possible once passage has been achieved around the four hydroelectric dams in the lower river. Emphasis has been placed on negotiations with the utilities that operate these hydroelectric facilities, and on upstream stocking of juvenile and adult American shad. A survey of habitat quality in the river has been completed. Many impediments in the river are identified in the Water Resources Bulletin for Dams, Reservoirs, and Natural Lakes, published by the state in 1970. The historical importance of the Susquehanna's anadromous fisheries is documented in a review authored by Richard St. Pierre of the U.S. Fish and Wildlife Service. See Appendix 3 for a more detailed discussion of diadromous fish restoration efforts in Pennsylvania.

Key blockages to fish passage within the District of Columbia are located in the Rock Creek system. These are documented in several publications. The D. C. Fisheries Program is working with the National Park Service to prioritize restoration efforts. Other blockages outside of the District have been identified as priorities by District fisheries managers. These include the Little Falls dam on the Potomac River and several smaller blockages on the Anacostia system in Maryland. See Appendix 4 for further information on fish passage status in the District of Columbia. See the map in Appendix 2 for key blockages to fish migration in D.C. area waters.

In recent years resource managers have begun to assess the passage problem more closely and identify remedial measures which included management and passage plans. These concerns culminated in 1987 when the authors of the new Chesapeake Bay Agreement included a specific commitment "to provide for fish passage at dams, and remove stream blockages wherever necessary to restore passage for migratory fish."

STRATEGY FOR REMOVING IMPEDIMENTS

In January, 1988 the Living Resources Subcommittee appointed a workgroup to develop a strategy for implementing the 1987 Bay Agreement commitment to restore passage for migratory fishes. The workgroup is composed of representatives from each of the Bay states, the District of Columbia, appropriate federal resource agencies, and the environmental community. The workgroup identified a number of issues that need to be addressed to accomplish the stated objectives. These key issues are summarized as follows:

Establishing An Ongoing Baywide Fish Passage Workgroup

The Baywide workgroup would coordinate future activities relating to the provision of fish passage. The workgroup would also serve as a forum for the evaluation of past remedial efforts and the development of future fish passage initiatives, including priorities, timetables, and funding recommendations. The workgroup would assure that the responsible authorities work cooperatively in the removal of blockages to fish passage. In addition it would serve as a forum for the exchange and dissemination of information to interested members of the public. The workgroup recommends that:

* The Fish Passage Workgroup of the Living Resources Subcommittee be designated the permanent interjurisdictional body to coordinate Baywide fish passage efforts.

Updating a Comprehensive Inventory of Obstructions

Accurate information on the nature and location of impediments in the Bay watershed is essential to the success of any fishway program. The workgroup recommends that:

* The signatories work together to update the comprehensive inventory of dams and other obstructions to fish migration.

One function of the previously recommended Baywide workgroup would be the coordination of this effort. The inventory must utilize a uniform definition of blockages and include information on the current ownership and use of each impediment, the species and numbers of migratory fishes present below the obstruction, and the quality and quantity of upstream habitat. The inventory should also identify the location of each blockage by river section and stream order and provide a physical description of the obstruction. Where relevant, information concerning the status of any license issued by the Federal Energy Regulatory Commission should be provided. Ideally, this information should be compiled in a central Geographic Information System computer data base accessible to all interested agencies.

Although data gaps exist, existing information supports the need to take immediate steps to remove known impediments to fish passage. The location of major impediments to fish passage in the Bay watershed have already been inventoried. Those impediments should be the initial focus of our remedial efforts. The workgroup recommends that:

* The signatories annually reassess their priorities based upon updated inventories and other relevent information.

Establishing a Multi-Faceted Approach to Migratory Fish Impediments

The structures that act as impediments to fish migration are diverse, ranging from major hydroelectric facilities to road culverts. No one solution or instrumentality can effectively assure fish passage at all obstructions. Instead, it is essential that several initiatives are taken concurrently to remove stream blockages that impede the spawning runs of migratory species. The workgroup thus recommends a multi-faceted approach to this problem:

A. Culverts and Highway Impediments

Many of the smaller impediments to migratory fishes are highway-related structures. The workgroup recommends that:

* All future road and highway culverts should be designed and constructed to assure the passage of migratory fish species present or potentially present in the affected stream; and

* Within each Bay state, the highway department should continue to inventory existing road crossings which act as impediments to migratory fishes and to prepare, in cooperation with the resource agencies, a strategy for remedying specific problems.

B. Small Dams

Many of the dams that impede fish passage are small structures. Designing fishways for these structures is often a relatively straightforward process. The workgroup recommends that:

* The signatories establish a priority list for future fishway projects at these smaller obstructions utilizing the inventory of impediments to fish passage;

* The signatories obtain the technical expertise necessary to provide for fish passage at these obstructions; and

* The signatories solicit input and assistance from local governments to provide fish passage at small dams.

The current fishway program in Massachusetts demonstrates the value of intergovernmental cooperative efforts. The Massachusetts Division of Marine Fisheries designs and assists in the construction of small fishways. Local townships contribute through the provision of heavy equipment and the purchase of concrete and other building materials. Because of these cooperative efforts, the cost of constructing fish passage facilities is in many cases significantly reduced. The

excellent record of the Massachusetts program has generated an extraordinary level of public support.

The Massachusetts program is one possible model for the Bay states to consider. The workgroup recommends that:

* The signatories explore ways to assure the provision of adequate funding for these projects;

* The signatories take steps to assure that they possess adequate legal authority to carry out an effective fish passage program. [A brief summary of the current law in the Bay watershed as it relates to fish passage is attached to this report as Appendix 4]; and

* The signatories provide adequate resources to operate and maintain fishways once they are constructed.

C. Hydroelectric Facilities

Although the number of major hydroelectric facilities in the Bay region is not large, these large dams currently prevent migratory fishes from utilizing hundreds of miles of potential spawning and nursery habitat. Efforts to provide fish passage at these facilities have accelerated in recent years, partly resulting from voluntary agreements between state and federal resource agencies and utilities; much work, however, remains to be done. It should be recognized that efforts at smaller, upstream blockages will not be completely successful without a similar commitment at the hydroelectric facilities and other blockages that obstruct the downstream areas of many of the Bay's tributaries. The workgroup recommends that:

* The licenses for all hydroelectric facilities regulated by the Federal Energy Regulatory Commission be examined, and reopened where necessary, to assure that adequate provisions are made for fish passage within a reasonable time frame; and

* New licenses for hydroelectric projects not be issued in the watershed without the assurance of migratory fish passage.

D. Reintroduction

The upstream introduction of fishes prior to the construction of fish passage facilities "imprints" young fishes and increases their disposition to return, in future years, to the targeted stream. This practice can expedite the recovery of migratory species in waters currently having low populations. The workgroup recommends that:

* The signatories identify specific spawning reaches suitable for reintroduction;

* The signatories initiate reintroduction programs for migratory fishes, when necessary and appropriate, above impediments that have been targeted for fish passage projects;

* The signatories develop programs to trap adult fishes below the targeted blockage and transport them upstream to spawn, or stock young hatchery-produced fishes above the impediment;

* The signatories identify potential sources of migratory fishes for trap and transport efforts;

* The signatories acquire the necessary equipment for the transport of these fishes;

* The signatories implement management plans, regulatory measures and monitoring programs that will protect newly-introduced fishes until a self-sustaining population has been established; and

* The signatories take measures to assure that water quality in targeted streams is maintained at levels necessary for the reestablishment of migratory species.

E. Education

Public education is essential to the long term success of this initiative, just as it is the cornerstone of all our efforts to restore the Chesapeake Bay. The workgroup recommends:

* The signatories develop a plan for public involvement and sponsorship of activities related to fish passage, and coordinate proposed activities with the Bay Program's Information Network Group.

F. Monitoring

It is important that the fisheries agencies monitor the results of their efforts. Such monitoring is essential in gauging the impact of fish passage projects on populations of migratory species, and in assuring the cost effectiveness of future efforts. The workgroup recommends:

* The signatories prepare annual reports, for submission to the Chesapeake Bay Program through the Living Resources Subcommittee, detailing the previous year's progress in removing impediments, as well as plans for the upcoming year.

Supplementing Technical Resources in the Bay Watershed

Technical expertise in the Bay watershed needs to be supplemented in order to implement an effective fish passage restoration program. In particular, there is a strong need to establish expertise in the area of fishway engineering and design. These resource needs could best be met through a cooperative effort by the responsible state and federal agencies. A need exists at the state level for personnel familiar with the principles of fishway design and capable of designing and supervising the construction of small fish passage projects. The capabilities of state fish passage programs could be greatly enhanced by establishing in the Bay region a technical advisory office within the U.S. Fish and Wildlife Service which would act as a resource to state and local government agencies. This office would supplement the existing support currently provided by the regional engineering staff and act as clearinghouse for information relating to fish passage facility construction. The workgroup recommends that:

* The Fish and Wildlife Service consider enhancing their anadromous coordinator initiative to provide additional assistance in the Bay region.

In addition, the workgroup recommends that the following additional steps be taken to address existing gaps in technical knowledge:

* A technical workshop be held in the Bay area to apprise interested parties of recent developments relating to fishway design and construction. This workshop could be sponsored jointly with the Fish and Wildlife Service through their short course program on fish passage;

* Steps be taken to encourage regional educational institutions to focus resources on this important problem; and

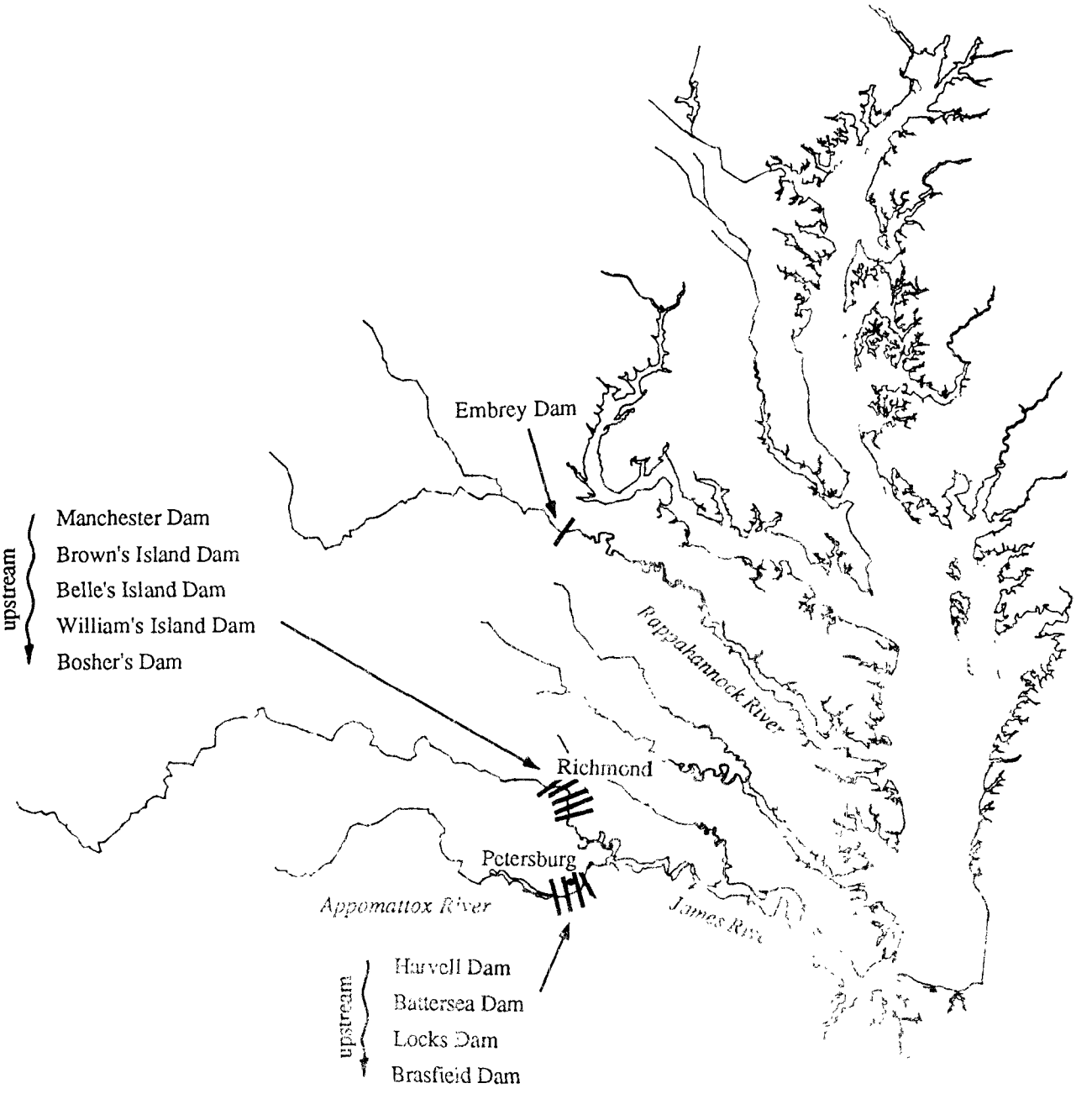
* The Fish and Wildlife Service consider encouraging "cooperative units" in the watershed to focus on issues concerning migratory fishes and the engineering and design of fishways.

STRATEGY FOR REMOVING IMPEDIMENTS TO MIGRATORY FISHES IN THE CHESAPEAKE BAY WATERSHED

APPENDICES

Appendix 1	Virginia Fish Passage Status
Appendix 2	Maryland Fish Passage Status
Appendix 3	Pennsylvania Fish Passage Status
Appendix 4	District of Columbia Fish Passage Status
Appendix 5	Statutory Provisions of the Bay States

Virginia Priority Sites for Fish Passage



Appendix 1

Virginia Fish Passage Status

Identification of Obstructions

1. "The Virginia Hydro Dam Inventory" was prepared for the U.S. Department of Energy, Region III and the Virginia State Office of Emergency & Energy Services in 1981 by the Rockfish Corp., Afton, Virginia. This statewide inventory of dams was prepared to provide information on the hydroelectric potential at existing dams. With five pages of information dedicated to each dam, this three-volume inventory provides hydrologic information, topo maps, photographs, and specific information on ownership, past, current and potential for use, and information on each dam's physical condition. The inventory is arranged in alphabetical order by dam name and may not include all the dams impeding anadromous migrations, specifically the very low head dams.

2. "An Analysis of the Impediments to Spawning Migrations of Anadromous Fish in Virginia Rivers" was prepared by the Department of Fisheries at the Virginia Polytechnic Institute and State University for the Virginia Highway Research Council and the Virginia Department of Highways and Transportation in 1985. This study examined the water quality and physical impediments on the mainstems of the Rappahannock, James and York rivers. No tributaries to these rivers were included in the study. Historic and present ranges of anadromous migrations are indicated in this report.

3. "Use of Tributaries of the Lower James River by Anadromous Fishes" way also prepared by the Department of Fisheries at the Virginia Polytechnic Institute and State University for the Highway Research Council and the Department of Highways and Transportation in 1986. Not only were 96 lower James tributaries examined for use by anadromous species, but the study also identified the first impediments encountered on these tributaries. However, the study did not identify obstructions upstream of these first impediments nor did it examine tributaries below river mile 40 (on the James) because it is unlikely that herring spawn in them. This inventory does identify the stream order of the tributary, the type of impediment obstructing migration, the mileage from the impediment to the mouth of the James and the mileage currently open to spawning on that tributary. Potential mileages above the obstructions were not determined in this study.

4. Another VPI report entitled "Potential Use of Tributaries of the Middle James River by Anadromous Fishes" is the result of a study sponsored by the Virginia Department of Transportation's Research Council. The study identified 463 tributaries of the James River between Richmond and Lynchburg for their potential to be utilized by anadromous fish (alosids) and catagorized these streams accordingly as "probable," "questionable" or "unlikely." These designations were based on examinations of USGS topographic maps and confirmed or modified in the field. The study also identified and evaluated 222 highway crossings for their potential to impede or permit fish passage. Multiple crossings on the same stream were all evaluated, information which will be useful if and when streams are prioritized or targeted for restorative action. The results showed that 208 of the 222 crossings were deemed passable for the species that would encounter them. Of the 14 crossings designated as either impassable or questionably passable for river herring that would ascend to them, 5 of them were on stream reaches designated as "probable" spawning habitat, 3 were on "questionable" stream reaches, and 6 were on stream reaches "unlikely" to have spawning migrations.

5. The Department of Game and Inland Fisheries Statewide Dam Inventory was prepared by the field fisheries biologists. While this inventory of literally hundreds of dams may be the most inclusive list of impediments (dams), there are a number of gaps in the specific information provided. The list includes the stream name, dam name, approximate dam height, the general, and in some cases specific, location of the impediment, the type of fish (fresh or salt water) likely being blocked if known, and a notation as to whether there are known downstream dams. The list does not include any other impediments such as culverts or fall line, nor does it include potential upstream habitat or the number of downstream blockages.

6. The Department of Game and Inland Fisheries' automated database, Biota of Virginia (BOVA), includes the dam locations of dams under the Dam Safety Program and those impediments indentified in the Virginia Polytechnic Institute and State University study (number 3 above). Under the Dam Safety Program, the Department of Conservation and Historic Resources regulates dams greater than 25 feet in height and those which inpound 50 acre feet or more. While BOVA has the capability of displaying these on a map, the database is an incomplete listing of the impediments.

Current & Prospective Projects

1. James River - Biennial budget (1988-90) approved by the legislature includes $900,000 for cost-sharing the breaching and construction of gates at the Manchester and Brown's Island Dams, the first two impediments on the James River. The City of Richmond has $300,000 in its budget for the same project. These amounts which total $1.2 million are $300,000 shy of the current project estimates. The Council and the City have unofficially committed to seeking this same cost-share approach at the next two impediments on the James, William's Island Dam and Bosher's Dam. Scott's Mill Dam, the first dam in the next series of seven dams around Lynchburg (140 miles upstream of Richmond) was recently granted a license for hydropower generation by the Federal Energy Regulatory Commission (FERC). That license contains requirements for fish passage if and when fish reach that dam and fishery agencies deem that passage is warranted.

2. Chickahominy River - Walkers Dam on the Chickahominy River, a tributary to the James River below Richmond was recently the subject of a fishway project proposed by the City of Newport News, the owner of Walkers Dam. The City supported construction of two denil-type fishways at Walkers Dam during the spring and summer of 1988.

3. Appomattox River - The Harvell and Battersea Dams, which are the first of four dams on the Appomatox River near Petersburg, were recently issued hydropower licenses by the FERC. The licenses contain provisions for fish passage. However, some believe there may be financial problems that could delay the construction of these projects. The Appomattox is a major tributary of the James River downstream of Richmond.

4. Meherrin River - While not in the Chesapeake Bay watershed, the first dam on the Meherrin River at Emporia will soon have a fish elevator in place as a result of a condition in the FERC hydropower license issued to Emporia Hydro Power Inc. The elevator, which is expected to be operational for the 1989 spring runs, will benefit the Chowan Basin fisheries in North Carolina.

5. Rappahannock River - The only obstruction to anadromous migrations on the Rappahannock, the Embrey Dam located just above the fall line in Fredericksburg, was recently licensed by the FERC. The license includes requirements for fish passage. The City of Fredericksburg has contested this license and may seek to have the license amended

or revoked. The City has concerns about the developer's intentions to protect the environmental and historical aspects of the project area.

Identified Needs to Fulfill Commitment of Restoring Access to Anadromous Spawning Habitat

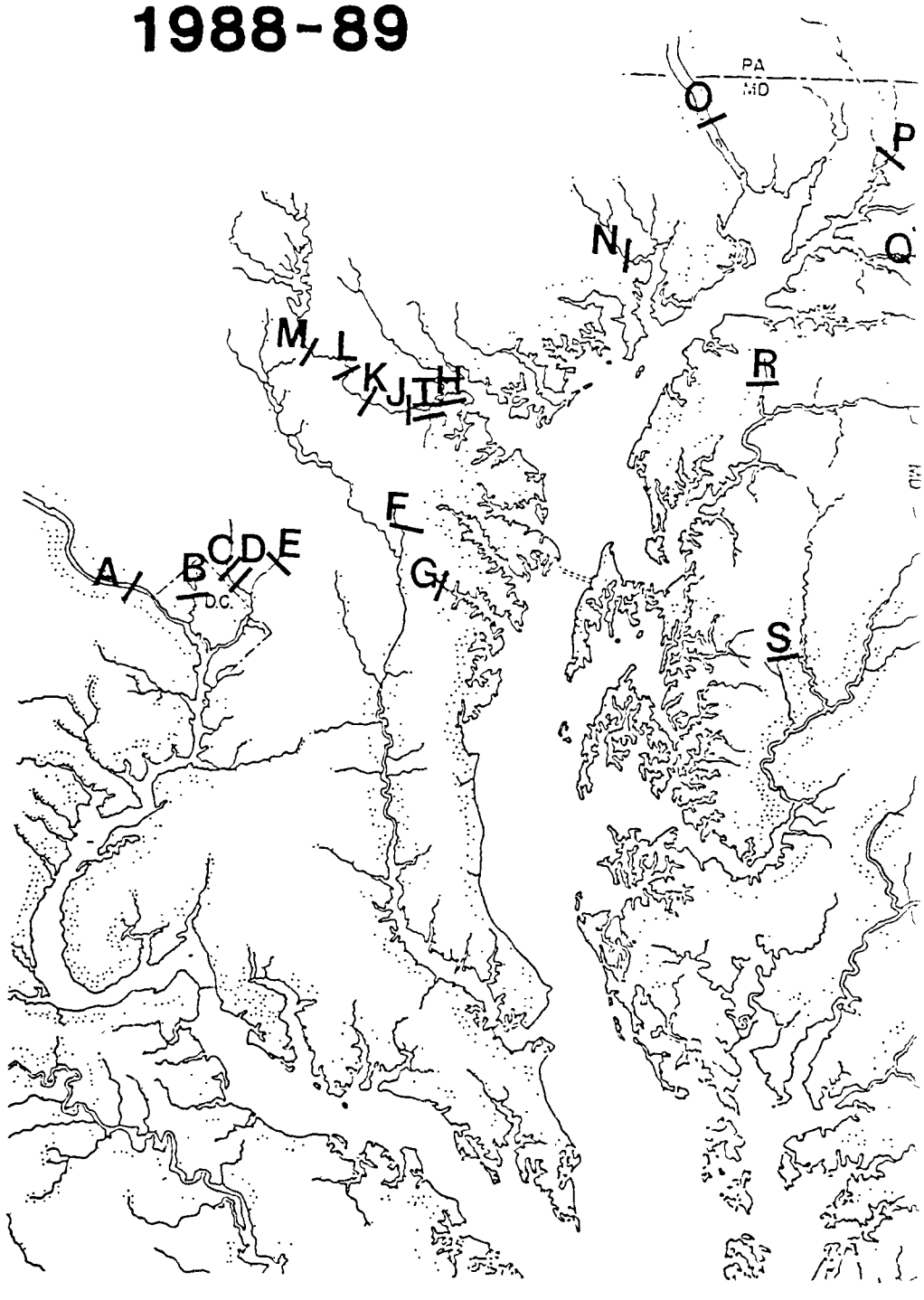
1. Fishway Expertise - In Virginia, there is no expertise in fishway design and construction. The projects underway mentioned above and the anticipated FERC projects have and will rely on the expertise of Ben Rizzo and Dick Quinn, U.S. Fish and Wildlife Service engineers in the Boston Regional Office. Unfortunately, their expertise is deferred to by several states on the east coast. A similar position with the Fish and Wildlife Service should be established in the Bay region to support the expansion of the fish passage effort.

2. Comprehensive Inventory - Less pertinent to the start up of a program, but very significant in its long-range planning, is a comprehensive inventory of the dams and other impediments, including highway culverts. The inventory should be prioritized based on the cost/benefit, the disposition of the ownership/use, the fishery resources at the base of the impediment, and other factors such as water quality. While much of the dam location information is available and much of this has been entered into the Department of Game and Inland Fisheries computer data bank, BOVA, the listing of impediments is not complete and the task of correlating this information to other relevant factors has not been attempted.

3. Commonwealth's Policy - While there have been fish passage laws on the books since the mid-1700s, the contradictory exemptions and weaknesses in these laws have contributed to, rather than halted, the declining trend of the anadromous fisheries. The Commonwealth's policy has taken a new direction with the establishment of the Council on the Environment's policy that fish passage provisions are integral in the Bay restoration effort and that the state should share the responsibility of remediating the problem. The 1988 General Assembly's approval of the Governor's budget initiative to cost-share the James River fishways is recognized as the first step in this new role. This approach to seeking cost-share appropriations will be continued and a mechanism for recovery of state or federal fishway expenditures through the FERC process should be explored. A Congressional delegation from the Bay states in concert with the Department of Interior is the appropriate channel to initiate the required legislative changes.

MARYLAND CHESAPEAKE BAY PRIORITY SITES FOR MIGRATORY FISH PASSAGE 1988-89

CODE	SITE KEY RIVER SYSTEM/ STRUCTURE	RIVER MILE
A	POTOMAC RIVER/ LITTLE FALLS DAM	117.4
B	POTOMAC RIVER/ PIERCE MILL DAM ON ROCK CREEK	4.4
C	POTOMAC RIVER/ DAM ON NORTHWEST BRANCH	1.2
D	POTOMAC RIVER/ DAM ON NORTHWEST BRANCH	1.0
E	POTOMAC RIVER/ DAM ON NORTHEAST BRANCH	2.3
F	PATUXENT RIVER/ FT. MEADE DAM ON LITTLE PATUXENT	11.6
G	SOUTH RIVER/ USGS FLOW WEIR ON BACON RIDGE BRANCH	1.4
H	PATAPSCO RIVER/ DAM ON STONY RUN	0.1
I	PATAPSCO RIVER/ DAM ON DEEP CREEK	0.1
J	PATAPSCO RIVER/ BLOEDE DAM	21.1
K	PATAPSCO RIVER/ SIMPKINS DAM	22.6
L	PATAPSCO RIVER/ UNION DAM	26.4
M	PATAPSCO RIVER/ DANIELS DAM	30.0
N	BUSH RIVER/ DAM ON WINTER'S RUN	2.5
O	SUSQUEHANNA RIVER/ CONOWINGO DAM	9.9
P	ELK RIVER/ DAM ON BIG ELK CREEK	4.5
Q	SASSAFRAS RIVER/ DAM ON HERRING RUN	0.6
R	CHESTER RIVER/ USGS FLOW WEIR ON MORGAN CREEK	6.0
S	CHOPTANK RIVER/ USGS FLOW WEIR ON BEAVERDAM BRANCH	1.3



ONLY INITIAL FISH PASSAGE PROJECTS ARE SHOWN.

NEARLY 100 STRUCTURES ARE BARRIERS TO ANADROMOUS FISH SPECIES IN MARYLAND.

Appendix 2

Maryland Fish Passage Status

The Department of Natural Resources is expanding its efforts to provide fish passage at the many obstructions on Maryland Bay tributaries. An inventory of stream blockages has been compiled with priority major structures in the Susquehanna, Patapsco, Patuxent, Potomac and Elk rivers identified for implementing fish passage. Smaller dams in the Choptank, South, Chester, Sassafras, and Bush rivers are secondary targets during the first year of fish passage implementation. See attached map.

A budget has been formulated for Fiscal Year 1990 for fish passage, which is to include the personnel, equipment, and operational funds necessary to remove blockages, re-stock migratory species, and to construct fish ladders at sites of barriers on priority streams and rivers. A pilot program has been established with US Fish and Wildlife Service (FWS), Chesapeake Bay Foundation (CBF), and National Marine Fisheries Service (NMFS) to transport anadromous fish for restoring spawning runs to migratory spawning populations, and to obtain technical assistance in designing fish ladders.

A fish ladder project has been developed with CBF and the Town of Elkton as a demonstration/educational model for the public. Cooperative assistance and technical liaison have been established with representatives of state and federal agencies for a coordinated Bay-wide implementation of fish passage in Maryland, Virginia, Pennsylvania, and the District of Columbia.

Summary of fish passage work at specific priority sites:

1. <u>Patapsco River Drainage</u>.

The Patapsco historically provided spawning habitat for shad, river herring, and white and yellow perch. The river is presently blocked by four dams: Bloede, Simpkins, Union, and Daniels, listed sequentially downriver. All dams are state owned and located in Patapsco State Park except the second structure, which is owned by Simpkins Industries and serves as an industrial water supply dam for the manufacture of processed paper.

DNR, cooperative federal agencies and the Chesapeake Bay Foundation have completed technical surveys and developed the fish ladder engineering plan for Bloede Dam and have done preliminary design work for Daniels Dam. A plan developed in conjunction with Howard County will remove a portion of Union Dam to create fish passage. It is anticipated that Simkins Industries will fund a fish ladder on their water supply dam as a mitigation measure. Current actions are proceding to remove three blockages on two tributaries of the river, Stoney Run and Deep Creek.

A total of 1.6 million dollars has been requested in the FY 1990 Capital Budget to stabilize Bloede Dam and to begin construction of a fish ladder there. A total of $ 250,000 (perhaps $ 350,000) is available in the current FY 1989 budget through Chesapeake Bay Foundation and the Fish and Wildlife Foundation for final engineering design work on the ladder and to supplement funds for construction as they become available through the state.

Two Patapsco River tributaries downriver of Bloede Dam, Stoney Run and Deep Creek, have been targeted for fish passage. Negotiations are in progress with Calvert Whiskey Distillery to remove two small former water supply dams on the tributaries. Removal of these barriers would be mitigation measures for the State Highway Administration and create passage for herring and white and yellow perch.

2. Elk River Drainage:

A town water supply dam in Elkton on Big Elk Creek has been targeted as a demonstration fish passage facility for the public in a cooperative project among DNR Fisheries, Chesapeake Bay Foundation, and the Town of Elkton. A combination of DNR and CBF funds and equipment provided by the town will be used to construct the fish ladder and public access parking area adjacent to Route 281. The conceptual design of the fishway has been completed; the final engineering plan and construction of the ladder are targeted for late 1988.

Fish monitoring at the site was conducted throughout the spring of 1988, cooperatively done by DNR Fisheries, CBF and FWS. A stocking program was also intiated by DNR Fisheries through an arrangement with RMC Associates, Philadelphia Electric Company, CBF, FWS, and NMFS. As a result, several thousand river herring were transferred above the Elkton Dam from the Susquehanna River at Conowingo Dam and from Unicorn Branch off the Chester River. The fish ladder in Elkton would restore 10-15 miles of spawning habitat into Pennsylvania for migratory species.

3. Potomac River Drainage:

The water supply for the District of Columbia at Little Falls is owned by the Washington Aqueduct Company and operated by the Army Corps of Engineers. The dam has been a major barrier to the passage of migratory fish species since the early 1950s. Recent meetings have been held with D.C. Fisheries, Virginia authorities, and interested federal agencies for the purpose of constructing a fishway on the Virginia side of the Potomac River, and also for the Corps of Engineers to operate/maintain the non-functional Snake Island fishway located in the center of Little Falls Dam. Plans are underway for the Corps of Engineers to design and construct a second fishway with funds provided by the mitigation agreement with the Port America development. This fishway would open the Potomac River spawning habitat another 11 miles to Great Falls, the historical limit for shad and river herring.

Cooperative work with D.C. Fisheries, CBF, and federal agencies was initiated to provide fish passage at Pierce Mill Dam on Rock Creek in the District of Columbia. The plan intends to create a fish ladder with public access to the site in Rock Creek Park.

4. Bush River Drainage:

Preliminary meetings were held in October 1988 with the Department of the Army officials concerning mitigation of two dams on Winters Run for anadromous fish passage. The two structures are water supply dams for Edgewood Arsenal and Aberdeen Proving Ground.

5. Patuxent River Drainage:

The Patuxent drainage has historically supported spawning populations of migratory species upriver to Laurel on the mainstem, and to Savage on the Little Patuxent River. Fish passage is blocked on the Little Patuxent River by a dam on federal property located at Fort Meade. A newer fish ladder design has been developed to replace the deteriorated, non-functional ladder currently on the structure. The Department of the Army has also been requested by DNR to provide, in cooperation with state/federal agencies, for fish passage at the water supply structure. A conceptual design plan for the fishway is being completed by FWS. Mitigation of the Fort Meade Dam would increase spawning habitat 8 miles upriver to Savage, the former historical limit.

6. Susquehanna River Drainage:

The Conowingo Dam, constructed in 1928, has presented a longstanding barrier to the passage of migratory fishes. RNC Associates, in conjunction with Philadelphia Electric Company, have operated a fish lift at the site since 1972, for restocking shad into the Susquehanna River above the

Dam. Under a recent agreement, a second fish passage facility is to be constructed at the site, with additional measures to improve downriver spawning habitat.

Under an agreement developed by the Fish Passage Project, Philadelphia Electric and RMC Associates provided river herring and trucks/personnel for the stocking of Big Elk Creek above the dam at Elkton during the spring of 1988. It is anticipated that this cooperative agreement for stocking at sites of targeted fish passage facilities will continue on a limited basis until DNR has a budget established for equipment, personnel, and operations to conduct the Fish Passage Project work.

Passage at U.S.G.S. Stream Flow Structures

An inventory and assessment of fish passage needs at sites of U.S. Geological Survey stream flow weirs was made in cooperation with the U.S.G.S. personnel in conjunction with technical assistance from DNR and federal agencies. The fish passage structures are to be constructed during 1988, following design criteria provided by FWS.

Passage at Highway Culvert Sites

An inventory of migratory fish blockages at sites of state and county highway culverts has been compiled. A representative listing of state highway culvert blockages for all geographic regions of Maryland was assembled and presented to DNR Water Resources Administration and the State Highway Administration. A contractual study is to be conducted for mitigation measures to be used in removing existing culvert barriers.

Current policy provides for a minimum of one foot placement of culverts below the stream bed level. Future cooperative efforts between DNR/SHA will be utilized to mitigate existing, older barriers to fish passage, including the construction of small weir deflectors to raise water levels to the height of the culvert floor to effect fish passage. Future effort needs to be directed at county highway culverts, following development of a strategy and passage facilities at state-owned culverts to serve as models.

Passage at Privately Owned Structures

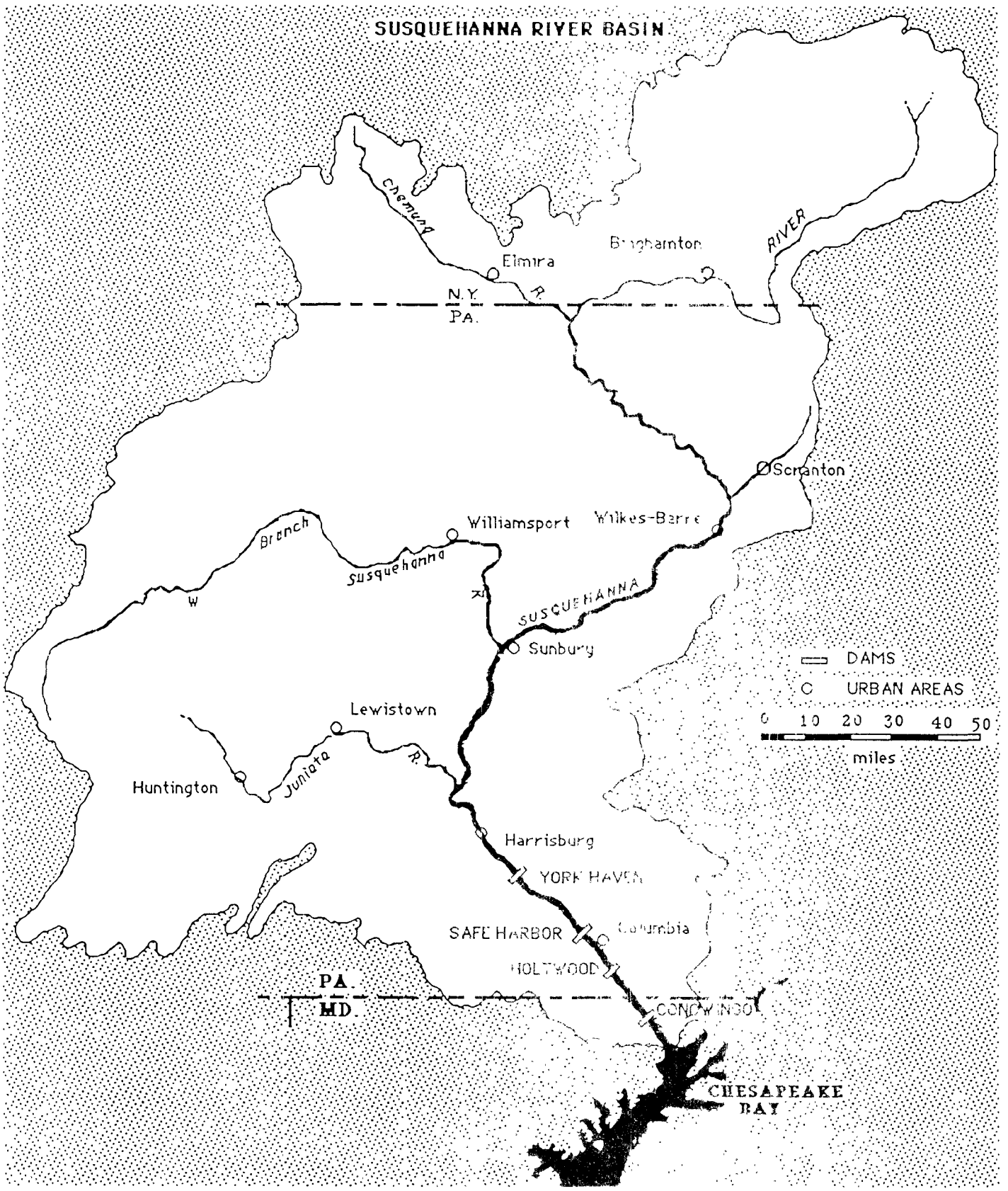
Initial DNR Fisheries/CBF discussions for funding and technical assistance to provide fish passage at privately owned sites have been conducted. Initial fish passage work has been targeted at a privately owned dam on the Sassafras River which blocks fish migration. A future budget is required to assist private landowners in funding fish passage structures beyond the $ 270, 000 requested in the FY 1990 Fish Passage Operational Budget. State, federal, or donated funds might be used to fund fish passage work at private structures, possibly in conjunction with private funds.

Summary

The strategy plan and program developed for fish passage during the first part of 1988 needs to be continued for several years to bring about fish passage at nearly 100 identified stream barriers in the tidewater region of Maryland. A budget for personnel and equipment is necessary for monitoring and stocking fish at barrier sites, constructing passage facilities, and maintaining/repairing passage structures.

At present, the Fish Passage Project Manager is dependent on cooperating state, federal, and institutional personnel to expedite fish passage, stocking and monitoring, and structure maintenance. Personnel and equipment are not currently available to bring about the 1987 commitment for development of fish passage at nearly 100 blockages in Maryland's tidewater counties, or to maintain coordination with the other state and federal agency representatives that are involved in Baywide fish passage efforts.

PENNSYLVANIA PRIORITY SITES FOR MIGRATORY FISH PASSAGE



Appendix 3

Pennsylvania Fish Passage Status

The fish species of recreational, commercial and ecological significance to the Susquehanna Basin in Pennsylvania and the Chesapeake Bay are diadromous species which would spend at least part of their life cycle in Pennsylvania's portion of the Susquehanna River Basin, if their migrations were not blocked by existing dams. These species are as follows: American shad, hickory shad, striped bass, American eel, blueback herring and alewife.

The Susquehanna River once supported large populations of all of these fishes. Each year anadromous adults returned from the sea through Chesapeake Bay to ascend the river, some going as far as Binghamton, New York, to reproduce. Catadromous juvenile American eels also returned annually to mature. The development of hydropower and the associated construction of mainstem dams prevented all of these species from reaching their historic spawning and nursery areas. As a result, their populations declined drastically and with the exception of American eels, these species now occur only in the lower river below Conowingo Dam. American eels currently inhabit the lower Octoraro and Elk Creek basins in Pennsylvania.

A strategic plan for restoration of these species to the Susquehanna River Basin was adopted by the following agencies in 1979:

Department of the Interior - Fish and Wildlife Service
Department of Commerce - National Marine Fisheries Service
New York State Department of Environmental Conservation
Pennsylvania Fish Commission
Maryland Department of Natural Resources

In 1981, this strategic plan was adopted by the Susquehanna River Basin Commission and included in their comprehensive plan.

The major restoration emphasis on the mainstem of the Susquehanna and its larger tributaries has been placed on the American shad because of its potential for producing substantial recreational and commercial fisheries wherever it is found. This species has historically used extensive areas of the Susquehanna Basin for reproduction and nursery habitat. Considering that the Susquehanna River is the largest river on the East Coast, and more than 60,000 acres of suitable habitat still remains in the basin, successful restoration of this species would contribute greatly to the limited existing stocks of the Atlantic Coast.

Secondly, restoration efforts for American shad on large rivers, particularly as they relate to the design and implementation of fish passage facilities, usually are beneficial for hickory shad, striped bass, American eel, blueback herring and alewife. Therefore, the anticipated development of American shad passage facilities on the Susquehanna should help restore these five species as well, since their life history requirements are generally similar to that of the American shad. However, specific efforts will be necessary in addressing existing blockages on smaller tributaries which have historical significance as spawning and/or nursery habitat for some of the other target species.

The process of developing, adopting, scheduling and implementing a plan for American shad is already underway on the Susquehanna. Prior to 1970, several biological and engineering studies were conducted to determine the feasibility of American shad restoration and the design of appropriate fishways. Concurrently, fertilized American shad eggs were introduced in basin waters, mostly without measurable population improvement. It was determined, however, that the

Susquehanna Basin, with the exception of the polluted upper West Branch, is generally suitable for American shad, and restoration is feasible.

In 1970, the Susquehanna Shad Advisory Committee was formed to address restoration efforts. The committee was comprised of representatives of the various hydropower project owners and the resource agencies. The Pennsylvania Fish Commission's Fish and Boat Code permits the Commission to order the owner of a dam on any Commonwealth water to erect fish passage facilities, or where such facilities are not presently practicable or advisable, to enter into agreement with the owner or operator of any dam and require an annual sum of money in lieu of requiring fishways. Such an agreement exists with each owner of the three project dams on the lower mainstem of the Susquehanna in Pennsylvania. These funds eventually served to support restoration activities which effectively began in 1971 with a 5-year project under the direction of the Susquehanna Shad Advisory Committee. In 1976, this committee was restructured and titled the Susquehanna River Anadromous Fish Restoration Committee (SRAFRC). Studies begun under the original 5-year plan continued, with an annual renewal of utility funding between 1976 and 1980.

In August 1980, the Federal Energy Regulatory Commission (FERC) issued licenses for the continued operation of the Conowingo, Holtwood, Safe Harbor and York Haven hydroelectric projects. Several resource agencies and other groups filed petitions of intervention with FERC requesting that various issues, including passage of American shad and other target species, be resolved as part of the license process.

The project owner at Conowingo Dam in Maryland decided to seek a separate resolution, while the three project owners in Pennsylvania agreed to continue their cooperative and joint efforts to reach settlement. Shad restoration programs were maintained through this period under terms of a second 5-year program agreement, using project owner funds. In the interim, discussions occured between the three upstream licensees and the intervenors. Talks came to fruition with a December 1984 agreement between these two parties, establishing a 10-year, 3.7 million dollar restoration project funded by the utilities and under the direction of SRAFRC. This program was approved by FERC in 1985.

Intervenor's settlement with the Conowingo project owner on several matters, including fish passage facilities, has not been completed. Negotiations continue and some progress has been made.

The 10-year American shad restoration program, referred to earlier, is fully active and the third year of this program was completed in 1987. An annual plan is derived and progress report is published each year.

Specific aspects of the restoration program involve the collection and hatching of American shad eggs from several Virginia rivers as well as the Delaware and Columbia rivers. Releases of fry and fingerling American shad are then made into the Juniata River and the Susquehanna River downstream from Conowingo.

Until 1988, releases of out-of-basin prespawned adult shad from the Connecticut and Hudson rivers were made upstream from all dams in an effort to permit natural reproduction in the free-flowing parts of the basin. This effort was discontinued because of its limited success and high cost.

Returning adult American shad are annually trapped at a fish collection facility built by the project owner at Conowingo Dam. These fish are transported upstream by the project owner to free-flowing areas of the river where they find suitable spawning habitat.

Fry and fingerling American shad from the Pennsylvania Fish Commission's Fish Culture Facility at Van Dyke, Juniata County, are chemically marked to differentiate them from the naturally-reproduced young found in the river. Outmigrating juveniles from all sources are monitored at several points downriver to determine such things as percentage of marked versus unmarked fish, growth, relative abundance and rate of migration. Efforts are also being made to determine effects on juveniles passing through project turbines.

In addition to the ongoing program, intervenor-project owner negotiations on fish passage facilities at the four major hydropower projects continues on the lower Susquehanna and a current inventory of dams on selected tributaries of the basin deemed suitable for diadromous fish restoration is being compiled.

Appendix 4

District of Columbia Fish Passage Status

Information on blockages to fish passage within the District of Columbia is primarily restricted to the Rock Creek system and summarized in several publications and studies. The Rock Creek Watershed Conservation Study compiled by the National Park Service provides a detailed account of water quality, hydrology, land usage, spawning conditions and barriers to fish migration. A subsequent study (Houghton, 1983) specifically evaluates stream barriers and proposes recommendations for mitigation. The D. C. Fisheries Program is currently collaborating with the National Park Service to monitor resident and migratory fish populations in this system in order to make additional recommendations and prioritize restoration efforts.

The fish populations of the Anacostia River drainage are described with reference to earlier studies in a report entitled Resource Identification Study for the Anacostia River (Dietemann and Giraldi, 1973). While the report does not specifically describe the effect of barriers to fish migration, the distribution of fish populations are compared to historical ranges, providing insight into the extent of habitat degradation and current usage. The D. C. Fisheries program is in support of a current study by the Interstate Commission on the Potomac River Basin designed to update this work. It is expected that detailed information on the Anacostia system, particularly with respect to blockages and their effect on anadromous fisheries resources, will be available within a year.

Other blockages, located outside the jurisdiction of the District of Columbia, directly impinge on local anadromous fishery resources and are of concern to District fisheries managers; notably, the municipal water supply dam at Little Falls situated on the Potomac River and several smaller blockages in the Anacostia drainage streams that terminate in the District require fish passage. The District has substantial interest in identifying and mitigating these blockages and is prepared to lend support to future fish passage restoration.

Appendix 5

Fish Passage Provisions of the Bay States

MARYLAND

Relevant Statutory Provisions: NR §§ 4-501 and 502.

Prohibition of Obstruction: NR § 4-501 prohibits any obstruction to the passage of fish. A dam, however, may be constructed and maintained in accordance with NR § 4-502.

Affirmation Requirements: § 4-502(a) requires that every owner of a dam construct on the dam and keep repaired at least one fish ladder if the Department deems it necessary for the passage of fish. § 4-502(b) requires that any person intending to construct a dam file an application with the Department, setting forth sufficient information to enable the Department to determine the necessity for constructing a fish ladder. (The Department is to advise each applicant of its determination.)

Maintenance and Repair Requirements: § 4-502 requires that the fish ladder be kept in repair.

Administration: § 4-502(a) puts the initial burden upon the Department to notify a dam owner that it deems a fish ladder necessary for the passage of fish. § 4-502(b) puts the initial burden on the person seeking to construct a dam to file an application with the Department, who then determines, based upon that application, whether a fish ladder is necessary. The statute sets forth no guidelines for the Department to use in making its determination of whether a fish ladder is "necessary," thus it appears to be a highly discretionary determination as to both existing dams and new dams.

Alternatives Available to Dam Owner: § 4-502(d) provides that if the owner, operator, or lessee of a dam entered into an agreement prior to July 1, 1955 to pay the state an annual sum of money instead of being required to erect a fish ladder or other fish passage devices, the provisions of that agreement remain in effect. However, the amount of money paid to the State each year cannot be less than four and one half percent of the estimated cost of constructing a fish ladder and cannot be more than $4000 annually. These monies must be used to manage, rear, and distribute the fish actually placed in the water and to acquire any necessary facility for these purposes.

Penalty Provisions: § 4-502(f) provides that the Department must investigate every violation of this section. It also provides that any person who violates the notice from the Department requiring him to install or repair a fish ladder is quilty of a misdemeanor and upon conviction, is subject to a fine not exceeding $300, or imprisonment not exceeding three years, or both, costs being imposed in the discretion of the court. A separate offense exists on each day the person violates the notice.

Exceptions: §§ 4-501 and 502 apply to all waters of the State, however, under § 4-502(f), these provisions do not change any term, condition, or obligation imposed by a contract in force prior to July 1, 1955 between the owner of any dam and the State.

VIRGINIA

Relevant Statutory Provisions: § 29.1-532. (relating to dams and other objects); § 33.1-256. (relating to toll bridges.)

Prohibition of Obstruction: § 29.1-532. deems any dam or object which obstructs the passage of fish a nuisance unless it is used to work a mill, factory, or other machine useful to the public and is allowed by law or by order of a court. § 33.1-256. prohibits a toll bridge from obstructing the passage of fish.

Affirmative Requirements: § 29.1-532. requires any person owning or having control of a dam or other obstruction which may interfere with the passage of anadromous and other migratory fish to provide every such dam or other obstruction with a suitable fishway unless the Board considers it unnecessary. ("Suitable fishway" means one which passes significant numbers of the target fishes, as determined by the Board.) Owners of dams or other obstructions which are not authorized by law must have the obstacles removed at their expense when the Board determines that the obstacles interfere with the free passage of fish.

Maintenance and Repair Requirements: § 29.1-532 requires that owners of such dams or other authorized obstructions shall maintain and keep fishways operational, in good repair, and restore them in case of destruction.

Administration: § 29.1-532 puts the initial burden upon the owner of the dam or other obstruction to provide a suitable fishway unless the Board deems it unnecessary. The only "guideline" contained in the statute for the Board's decision is that the purpose of a fishway is for anadromous and other migratory fish to have free passage up and down the streams from March to June and down the streams throughout the remaining months. However, because the provision assumes a fishway to be necessary unless the Board deems it unnecessary, the lack of guidelines is less troublesome.

Alternatives Available to Dam Owner: § 29.1-532. contains no provision for an agreement with the state to pay money in lieu of constructing a fishway.

Penalty Provisions: § 29.1-532. provides that a court, after reasonable notice to the parties and upon satisfactory proof of the failure to comply, may order any necessary construction or destruction to be initiated or put in good repair at the expense of the owner of the dam o other obstruction. All construction or destruction must be initiated within one year of the court order and completed within three years of the court order. Any person failing to comply with this section must pay as a penalty a percentage of the estimated cost of construction or destruction equal to the percentage specified on the judgement rate of interest pursuant to § 6.1-330.10.

Exceptions: § 29.1-532 does not apply to portions of certain rivers and streams listed in the statute. Also, no fish ladders may be required on dams twenty feet or more in height

PENNSYLVANIA

Relevant Statutory Provisions: 30 P.A.C.S.A. §§ 3501-3506

Prohibition of Obstruction: The relevant statutory provisions contain no general prohibition of obstructing the passage of fish by a dam or other object in the water.

Affirmative Requirements: § 3501 requires that, upon written order from the commission, any person now or hereafter erecting or maintaining a dam must erect such chutes, slopes, fishways, gates or other devices as the commission deems necessary to enable fish to pass at all seasons of the year.

Maintenance and Repair Requirements: § 3502 requires that all devices be operated in a manner prescribed by the commission and must remain open and be maintained in good order and repair by the person owning or maintaining the dam in which the device is located. § 3503 provides that the device may be closed for repairs or when not needed with written approval of the commission.

Administration: These provisions put the initial burden upon the administering agency to give notice to the dam owner that a device is necessary to enable fish to have free passage during all seasons of the year. Furthermore, these provisions contain no guidelines for the commission's determination that a device is "necessary."

Alternatives Available to Dam Owner: § 3501(b) provides that in lieu of requiring the erection of devices for fish passage at any dam where they are not deemed by the commission to be practicable or advisable for the passage of fish, the commission may enter into an agreement with the owner or person in control of the dam to pay to the commission a sum of money periodically, which is not less than two and one half percent of the estimated cost of the erection of fish passage devices plus the estimated cost of reasonable depreciation and maintenance of the same, except in cases where the sum of the interest, depreciation and maintenance so calculated would be equal to or exceed $25,000, in which case the annual payment shall be $25,000 per year. § 3501(c) provides that these monies are to be expended by the commission for the stocking with fish of the waters of the stream dammed, the propagating, rearing and distribution of fish placed in the waters and the acquisition of the necessary facilities therefor, and carrying out such other fish managing practices in the waters as are deemed proper by the commission for the improvement of public fishing opportunities therein.

Penalty Provisions: § 3504 provides that any person failing to comply with these provisions within three months of the date of notice provided in § 3510(a) must forfeit and pay to the commission a civil penalty of $100 for each day of non-compliance. § 3505 provides that if the person fails to erect the devices required by the commission within three months of the date of notice or fails to maintain the required devices, the commission may erect the necessary devices or make necessary repairs and recover the costs from the person owning or maintaining the dam.

Exceptions: These provisions apply to all waters of the state.

(The District of Columbia makes no provision for the obstruction of fish passage.)

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