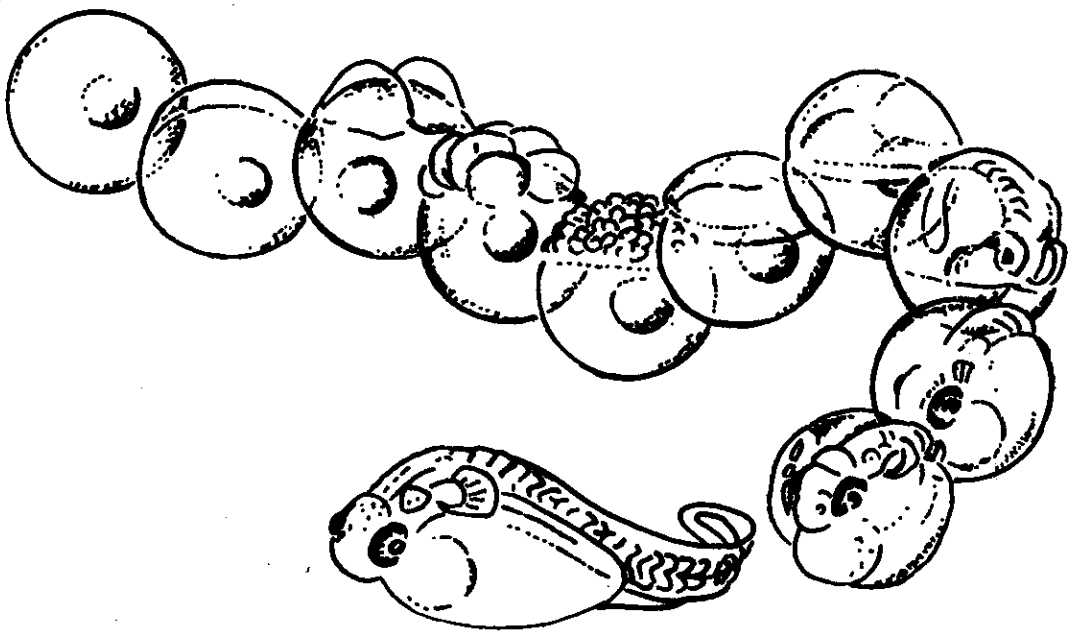
MANUAL FOR IDENTIFICATION OF EARLY DEVELOPMENTAL STAGES OF FISHES OF THE POTOMAC RIVER ESTUARY



Alice J. Lippson and R. Lynn Moran

Prepared for the Power Plant Siting Program of the Maryland Department of Natural Resources

PPSP-MP-13

MANUAL FOR IDENTIFICATION OF EARLY DEVELOPMENTAL STAGES OF FISHES OF THE POTOMAC RIVER ESTUARY

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1450 S. Rolling Road
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With Chapters:

Ophichthidae by John E. Cooper and Michael Fahay . Cyprinid Key by Jules Loos . Atheriniformes (Belonidae, Cyprinidontidae, Poeciliidae) by Neal R. Foster . Atherinidae by Johnson C.S. Wang . Centrarchidae by Charles Anjard . Percidae by Fred C. Rohde.

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Power Plant Siting Program of the
Maryland Department of Natural Resources

FOREWORD

The responsibilities of the Maryland Power Plant Siting Program include assessing the environmental effect of power plants on aquatic biota in the Chesapeake Bay and its tributaries. Over the last few years, the Siting Program has concentrated studies in the Potomac estuary, below Washington, D.C., where power plants are on-line at Possum Point and Morgantown and where a nuclear plant is proposed for Douglas Point (see map p. 2). Site-specific studies were conducted from 1972 to 1973, and, in January 1974, a comprehansive river-wide study, the Potomac River Fisheries Program, was initiated.

Because the Potomac estuary is a major spawning and nursery area for a variety of commercially important species, including striped bass, menhaden, alewife and white perch, a major component of the Fisheries Program was an ichthyoplankton survey. Early developmental stages of fishes are susceptible to entrainment by power plant cooling systems. Data on distribution of life stages, times and places of spawning and species identifications are prerequisite for any assessment of potential effect on the fisheries by entrainment of these stages.

This guidebook has been prepared to facilitate more rapid identification of eggs and larvae of Potomac species. It is the final product of the Potomac River Ichthyoplankton Workshop, organized by Martin Marietta Corporation's Environmental Technology Center and held on February 4-6, 1974 under the auspices of the PPSP. The workshop was held for all participating institutions of the Potomac River Fisheries Program that would be individually identifying large numbers of ichthyoplankton. This workshop, held in advance of the field programs, assured compatibility of identification as well as familiarization of all field scientists and laboratory technicians with Potomac River species and methods of identifying early developmental stages.

In preparation for the workshop, the authors prepared a specimen reference collection for each institution. A master collection including eggs, larvae, and juveniles of 73 species of Potomac River fishes, is currently archived at Martin Marietta's Environmental Technology Center and continues to be available to interested scientists.

This manual has been compiled from information generated in the workshop sessions by speakers and attendees alike, from heretofore undescribed specimens in the reference collection, and from a literature survey of existing descriptive works. Although the selection of species was based solely on Potomac River fish distributions, the final list is comprehensive and representative of ichthyofauna in other mid-Atlantic estuaries as well. The manual will also serve as a compendium of ichthyoplankton references for the practitioner.

In a sense, by stressing methodologies of identification rather than detailed taxonomic descriptions, this manual demonstrates a new approach that we hope will be equally useful to both the experienced and inexperienced worker. It is distributed with the intent that its applicability will be tested, not only by investigators in the Potomac River area, but also by those in other ecologically similar regions. Hopefully, with proper feedback from users and reviewers, and with future workshops to provide expertise and additional background material, a more expanded version of the manual encompassing the early developmental stages of all East Coast estuarine fishes may eventually be developed.

ACKNOWLEDGEMENTS

The authors would like to thank all those who helped us compose and write the preliminary manuscript on ichthyoplankton identification prepared for the Potomac River Ichthyoplankton Workshop. This current manual is based on that first effort. These individuals include: James Edmunds IV, James Burkholder, Michael Schmitt, Mickey Kosierowski, Constance Zeni, and Peter de Fur, of the Department of Geography and Environmental Engineering, the Johns Hopkins University; and Steven Goodbred and Steven Reagan, of Goucher College, Baltimore, Maryland.

We are, furthermore, indebted to all the speakers and attendees at the workshop who have contributed in some part to this present manual. Session leaders, in particular, have added a substantial amount of new information on criteria for species identification. These lead speakers generously shared the fruits of their experience. We thank James Edmunds IV who spoke on typically estuarine species and J.C.S. Wang on freshwater forms, both currently with Ecological Analysts, Baltimore, Maryland; Wallace G. Smith and Peter Berrien of the NOAA, National Marine Fisheries Service, Sandy Hook Laboratory, Highlands, New Jersey who presented the session in marine species; and Ruth Stoddard and Jean St. Onge who described laboratory techniques at the NOAA, National Marine Fisheries Service, Ichthyoplankton Sorting Center, Narragansett, Rhode Island. In the text, wherever we have incorporated new factual information presented by these speakers, we have designated them as the source.

Major contributors to this project are the supplemental authors listed both on the title page and under the appropriate family descriptions. Each is knowledgeable in identification of early developmental stages of species within certain families. We thank them for their willingness to contribute to this manual.

We are grateful to all who gave specimens to the workshop reference collection, invaluable aids to us in verifying existing written descriptions, including: Thomas Tathum, Ron Kernehan, Charles Anjard, and Fred Rohde, Ichthyological Associates, Inc.; John Cooper, Chesapeake Biological Laboratory; J.C.S. Wang and James Edmunds IV, Ecological Analysts, Inc.; Ruth Stoddard and Wallace G. Smith, NMFS; and Jules Loos, Academy of Natural Sciences of Philadelphia. The sources of newly described specimens in the text (designated by the term "original illustration") are as follows: Conger oceanicus, USNM Coll. No. 186259; Dorosoma cepedianum, Hybognathus nuchalis, Carpiodes cyprinus, Lepomus gibbosus, and Pomoxis annularis, Charles Anjard, Ichthyological Associates, Inc.; Anchoa hepsetus, Engraulis eurystole, and Peprilus triacanthus, Wallace G. Smith, NMFS; Anchoa mitchilli, Notemigonus crysoleucas, Membras martinica, Menidia beryllina, Menidia menidia, and Enneacanthus gloriosus, J.C.S. Wang, Ecological Analysts, Inc.; Cyprinidon variegatus, Fundulus diaphanus, Fundulus heteroclitus, Fundulus majalis, and Lucania parva, Neal R. Foster, Academy of Natural Sciences of Philadelphia; Hippocampus erectus, Chesapeake Biological Laboratory, Crab Survey Cruise, Robert Miller and Steven Sulkin; Syngnathus fuscus, John Cooper, Chesapeake Biological Laboratory; and Gobiosoma bosci, Potomac River Ichthyoplankton Cruise, Chesapeake Biological Laboratory and Martin Marietta Laboratories. In addition, original unpublished illustrations have been provided as follows: Anguilla

rostrata, Myrophis punctatus, and Chasmodes bosquianus, by John Cooper; Myrophis punctatus (detail) and Conger oceanicus (detail) by Michael Fahay, NMFS; Strongylura marina, by Neal Foster; Leiostomus xanthurus, and Micropogon undulatus by Peter Berrien, NMFS; Pseudopleuronectes americanus by Ruth Stoddard, NMFS; Jules Loos provided photographs of Notropis hudsonius for redrawing. We are indepted to all these individuals who permitted us to bridge so many gaps by their contributions.

The library facilities of NOAA, National Marine Fisheries Service, Oxford Biological Laboratory, Oxford, Maryland were made available for our use, and we gratefully acknowledge the help and consideration generously given by Helen Lang, librarian at this facility. Special acknowledgement goes to Allart Kok for his many assistances and for rendering a number of the illustrations and to Nadine Johansen for her cheerful typing and retyping of the manuscript. We have had constant personal interest and administrative support for this project by Leonard Bongers and Donald Talbot of Martin Marietta's Environmental Technology Center and Lee Zeni and Myron Miller of the Maryland Power Plant Siting Program. And, finally, we thank Charles Walker and the U.S. Fish and Wildlife Service, Department of the Interior, for their encouragement and assistance in finalizing this report.

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