Manual for Otolith Removal and Preparation for Microstructural Examination

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Published by
the Electric Power Research Institute and
the Belle W. Baruch Institute for Marine Biology and Coastal Research

The recent improvements in the estimation of the age and growth of fishes are an exciting technological breakthrough. Accurate age-specific growth rates, variability in growth rates, and mortality rates for larvae and juveniles in field samples can now be obtained by analyzing the daily increments in the otoliths from individuals. These rates are needed to estimate cohort-specific growth rates and survival rates, which in turn are needed to determine the history of the survivors and year-class strength and recruitment.

EPRI's long-term goal for the Compensatory Mechanisms in Fish Populations (COMPMECH) program is to improve prediction of fish population response to environmental change. Although the emphasis is on predicting responses associated with power generation, we have been careful not to limit our focus to contemporary regulatory concerns. One fundamental assumption in the design of COMPMECH, and the basis for our enthusiasm about supporting the publication of this manual, is the premise that to better understand the dynamics of a population, we need to place a greater emphasis on understanding what is happening at the level of the individual fish.

Given the major role the Electric Power Research Institute (EPRI) perceives for otolith analyses in quantifying and predicting the dynamics of fish populations, it is critical that the techniques for removal, preparation, and analysis of otoliths be developed, compared, and refined as quickly as possible and with appropriate attention to quality control. This manual is an important step in this direction. We compliment the authors on this effort to share the details of their extensive experience.

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Otolith microstructural studies exist for over 50 families and 135 species of fish and squid. A review of more than 200 investigations showed that a wide variety of techniques have been used in otolith microstructure studies. We foresaw the need of a manual on otolith preparation as microstructure studies become routine in life history investigations. The purpose of our manual is to 1) Permit and encourage fish biologists and fishery scientists to include otolith microstructural analysis in their investigations, 2) List all techniques, materials, and equipment necessary for large-scale aging studies on young fishes, and 3) Provide a basis for standardization of protocols and techniques. To accomplish these aims, detailed methods are provided on otolith removal, cleaning, storage, sectioning, polishing, and etching. We emphasize that there are many alternative methods to those described in the manual. To facilitate review of other laboratories' techniques, tables are provided which sort out published methods by author and species.

Our laboratory's protocols have resulted from our interactions with colleagues, especially those in Japan, and a legacy of graduate students supervised by Dr. John Mark Dean. We acknowledge previous students: Dr. Richard L. Radtke, P.W. Haake, Dr. Charles W. Wilson, Dr. Daniel W. Beckman, Dr. Rudolfo Baldevarona, Mark Foy, and Dr. Edward Cyr, for contributing their expertise to our laboratory. Colleagues who have exchanged technical information through reciprocal visits include Dr. Yasuo Mugiya, Dr. Juro Yamada, Dr. Toru Takita, and Dr. Yutaka Natsukari. We would like to acknowledge the support of the National Science Foundation and the Japanese Ministry of Education who made these exchange visits possible. Dr. Norimitsu Watabe and Dana Dunkelberger who direct and manage the Electron Microscopy Center at the University of South Carolina have collaborated, advised, and assisted in several otolith investigations.

We would like to thank Dr. Nancy Butterworth, Jayne Brim, Dr. James Cowan, Dr. Edward Cyr, Dr. Lisa Kline, Anne B. Miller, and Dr. Susan Sogard for helpful comments on early drafts of this manual, and Kitty Johnson for graphics. We would especially like to thank Anne B. Miller of the Belle W. Baruch Institute for Marine Biology and Coastal Research for her skill, knowledge, assistance, and patience in the technical details involved in the printing of this manual. It would not have been possible for us to have completed this manual without her.

 This manual is technical publication number 1991-01 of the Belle W. Baruch Institute for Marine Biology and Coastal Research.

Appendices