

Book Development: Standard Sampling Methods for North American Freshwater Fishes

Objective

Standardization of procedures in production and data collection throughout industry, medicine and science has led to many great advances. However, sampling of inland fish populations across North America remains unstandardized, or at most, standardized at a state or local level. Our objective is to edit a text that will provide standard methods for sampling fish populations in various types of freshwater environments across North America. The goal will be to provide standard ways to obtain the most commonly used indices of fish population structure and abundance: presence, length frequency, relative weight, relative growth, and catch per unit effort.

With data sharing on the Internet, large-scale studies such as global warming, and advances in sampling equipment, the reasons for wide-scale standardization are more compelling than ever. Standard measures are necessary if freshwater conservation issues are to be addressed at large watershed or geographical scales involving interjurisdictional or international cooperation and rapid, electronic communication. Standardization is the basic, first step in establishing computerized information networks to disseminate information and data between fisheries managers, researchers, educators, legislators and the general public. Increased communication and data sharing would in turn lead to larger sample sizes and more powerful data sets to test the effects of regulations, habitat improvements or other management techniques, and to a reliable means to check for the presence of rare or endangered species. Having published, standard protocols would also lead to more efficient use of monitoring funds, reducing the amount of time and resources that all fisheries biologists and managers spend on developing sampling techniques and experimental designs.

The effects of wide-scale standardization may also improve the quality of fisheries education across North America. Widespread standardization within agencies and institutions across North America would likely lead to standardization of training courses, facilitating the cooperation and exchange of information and materials among educators and between educators, employers and students. Having a source of standard techniques that was developed by some of the most experienced and knowledgeable fisheries scientists in North America today; that were among the most common and statistically valid of those techniques currently used by government conservation agencies; and that were among the simplest methods possible, would be ideal for educators designing introductory courses in fisheries sampling. Moreover, training would closely mirror what a student would encounter in the work force, and employers would better understand the extent of new employee skills. Retraining of employees who move between states, provinces, agencies and institutions, an occurrence that is much more frequent today than 20 years ago, would be minimized if standards were widespread. Additionally, the averages of comparison data would be most useful to students and new employees, allowing them to identify abnormalities in their data that they may not otherwise have the experience to recognize. The standard methods will also closely reference and complement the fisheries statistics book to be published soon by the American Fisheries Society (Analysis and Interpretation of Freshwater Fisheries Data, M. Brown and C. Guy, eds.)

For all these reasons, standardization of sampling methods is fundamental to advancing freshwater fisheries conservation; therefore, it is critical that we begin this process immediately.

In the 1980s and 1990s, work to move toward standardizing sampling procedures in the United States was conducted by the Fisheries Techniques Standardization Committee, Fisheries Management Section of the American Fisheries Society. This work resulted in a compilation of methods that were being used across North America; however, an actual selection of a subset of methods to standardize lake, pond, river, and stream surveys was never completed. Recently, the Fisheries Management Section of the American Fisheries Society, by a unanimous vote at the 2004 annual meeting in Madison, Wisconsin, has chosen to continue the work of the Fisheries Techniques Standardization Committee by supporting this book project with one of the largest grants ever given by the section. As opposed to simply describing a wide variety of methods, this text will provide a single set of recommended or standard protocols for various coldwater and warmwater environments.

Proposal Details

We propose to edit a text of several chapters, each chapter describing a standard method to sample fish in a particular type of freshwater environment. These environments will include small lakes and ponds, reservoirs, large natural lakes, wadable streams, and large rivers. The goal for the sampling methods will be to provide standard measures to describe fish sampling data including the most commonly used indices of population structure and abundance: presence, length frequency, relative weight, relative growth, and catch per unit effort. The methods will be chosen by a group of expert authors selected for each chapter. Authors of different chapters will communicate to ensure sampling techniques and chapter formats among types of environments are as similar as possible. The standard subset of methods for each environment type will be selected according to the following criteria.

- It will be the most common and statistically valid of those used by government conservation agencies across the United States. If many groups are already using a particular technique, standardization will be much easier, both politically and logistically. The exception to this will be if a particular method is considerably flawed.
- It will be the simplest method possible. Complex methods are much less likely to be standardized.
- It will not be forced on any individual, group, or agency. A book such as this will be available to those who are starting standard monitoring programs and would like to start standardizing, or those who would like to change from a particular program to a more national program. Those who are already happy with local standardized sampling plans already in place will not be influenced to change.
- It will provide national and regional averages of size structure, catch per unit effort, growth, and condition indices for common sport and non-game species (when available) collected using the standard techniques.
- It will provide methods to transfer or compare data collected using another technique to that collected using standard sampling. If that is not possible it will discuss what comparisons are possible.
- It will be updated in future years much like Standard Methods for the Measurement of Water Quality and Wastewater to reflect major advances in Fisheries Science.

- It will not discuss standard habitat measuring techniques, except those used to standardize fisheries gear such as conductivity, secchi depth, and water color.
- Sampling will focus on large juvenile and adult life stages that can be easily sampled with standard gears or begin to be of a size that may be harvested by anglers.
- Sampling will involve methods that minimize mortality of fishes. Techniques such as toxicants and explosives will not be included.
- Sampling will involve methods that allow for the identification of fish species and measurement of lengths and weights.

Potential Chapters

1. Principles of sampling
2. Warmwater fish in small standing waters
3. Warmwater fish in large standing waters
4. Warmwater fish in wadable streams
5. Warmwater fish in rivers
6. Salmonids/coldwater species in small standing waters
7. Salmonids/coldwater species in large standing waters
8. Salmonids/coldwater species in wadable streams
9. Salmonids/coldwater species in rivers
10. Averages and ranges for comparison (average and range of PSD's, RSD's, RLF, CPUE, Wr, Growth)
11. Data management and statistical analysis
12. Methods to convert data collected by other sampling methods

This book is being edited by Drs. Scott Bonar (Arizona Cooperative Fish and Wildlife Research Unit, USGS, University of Arizona), Wayne Hubert (Wyoming Cooperative Fish and Wildlife Research Unit, USGS, University of Wyoming), and David Willis (South Dakota State University). To date, the following authors are confirmed, and additional authors are being contacted.

- Mike Allen, The University of Florida
- Paul Bailey, Wyoming Game and Fish Department
- Dave Beauchamp, Washington Cooperative Fish and Wildlife Research Unit
- Scott Bonar, Arizona Cooperative Fish and Wildlife Research Unit
- Mark Brouder, U.S. Fish and Wildlife Service
- Jeff Boxrucker, Oklahoma Department of Wildlife Conservation
- Scott Bryan, Arizona Game and Fish Department
- R.A. Curry, University of New Brunswick
- Chris Guy, Montana Cooperative Fishery Research Unit
- Wayne Hubert, Wyoming Cooperative Fish and Wildlife Research Unit
- Gordon Haas, University of Alaska, Fairbanks
- Robert Hughes, Oregon State University
- Alison Iles, Arizona Cooperative Fish and Wildlife Research Unit
- Nigel Lester, Ontario Ministry of Natural Resources

- John Lyons, Wisconsin Department of Natural Resources
- Steve Miranda, Mississippi Cooperative Fish and Wildlife Research Unit
- Rob Neumann, Southern Illinois University
- John Ney, Virginia Tech University
- Craig Paukert, Kansas Cooperative Fish and Wildlife Research Unit
- Donna Parrish, Vermont Cooperative Fish and Wildlife Research Unit
- Jim Peterson, Georgia Cooperative Fish and Wildlife Research Unit
- Johannus Pitlo, Iowa Department of Natural Resources
- Kevin Pope, Texas Tech University
- Mike Quist, Wyoming Cooperative Fish and Wildlife Research Unit
- Charles Rabeni, Missouri Cooperative Fish & Wildlife Research Unit
- Scott Rogers, Arizona Game and Fish Department
- Roy Whaley, Wyoming Game and Fish Department
- Dave Zafft, Wyoming Game and Fish Department

The Fisheries Management Section has contributed \$10,000 to this effort, the US Geological Survey has contributed \$17,380 in cash and in-kind services and the leadership of the U.S. Fish and Wildlife Service has pledged \$30,000 to the project. Contact with other federal agencies, foundations, and organizations, such as the Compton Foundation and the Education Section of AFS, is currently underway to obtain additional funds to fully support this project.

If you or your organization would like to help sponsor this project, or for more details, please contact the Senior Editor: Dr. Scott Bonar, E-mail: sbonar@Ag.arizona.edu