Manual of Fisheries Survey Methods II: with periodic updates

Chapter 1: Introduction to Survey Manual

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1.1 Perspective

Surveys are important. They:

- Document the characteristics of the state's aquatic resources at a point in history;
- Provide a factual basis for fisheries evaluation, planning, management, and re-evaluation;
- Supply data for other aquatic scientists and managers.

Good survey information becomes increasingly valuable as time passes and conditions change. Data collected by fisheries personnel over many years are essential for defining and understanding historical trends in fisheries and water quality. However, survey data become almost useless if their precision is in doubt, or if they are not recorded accurately or in sufficient detail. Quality control must be maintained for both present and future needs.

1.2 Survey planning

Problems of modern fisheries management are complex and diverse, and so are the types of information and surveys needed to solve them. Consequently, it is essential that survey objectives be carefully defined before field work begins so that the right data can be collected efficiently. In formulating survey objectives, consider the types of information needed, how precise it must be, limitations of sampling gear, and financial and time constraints. The **Survey Planning Report** in the computerized **Fish Collection System** has been developed to aid the planning process.

1.3 Objectives and description of survey modules

The goal of lake and stream surveys is to develop a description of a body of water, its watershed, and its inhabiting biota that will be useful for fisheries management. This description will be developed by summing information from several survey modules. Each module describes one facet of the water body, watershed, or biota. Biota includes primarily fish populations, but also supporting organisms. Specific objectives and sampling techniques may vary between lotic and lentic environments, and according to the need to address specific management questions.

It is recognized that seldom will there be occasion to complete a comprehensive study of a water body in any one survey. However, it is advantageous to accumulate data in an orderly fashion by completing entire survey modules at every opportunity. In time, the summation of modules will furnish a complete description of all major waters of the state.

The following five types of survey modules will serve as a guide for the orderly accumulation of data.

1.3.1 Drainage and basin descriptions

The objective of this module is to provide appropriate uniform methods for describing relevant characteristics of the setting of a lake or stream. The description should include the immediate

drainage area and the basin itself. Observations about drainage area should focus on characteristics that may directly or indirectly affect the subject body of water.

Lake basin descriptions should include shoreline features, bottom types, morphometry, and critical habitats vulnerable to human degradation. Critical habitats might involve marshes, spawning areas, or shoreline areas vulnerable to dredging, filling, or erosion.

Stream descriptions should include bottom types, stream profiles, flows, depths, and critical areas subject to abuse and damage.

1.3.2 Limnology

The objective of this module is to provide appropriate uniform methods for describing physical and chemical parameters that delineate fish habitat and reflect the biological productivity of the water body. Properties to be measured include pH, alkalinity, nutrient concentrations, clarity, and temperature-oxygen depth profiles.

1.3.3 Plants and Invertebrates

The objective of this module is to provide appropriate uniform methods for describing biota (other than fish) that are indicators of productivity and habitat. Organisms of interest include phytoplankton, macrophytes, zooplankton, and benthos. Seldom do we have the luxury of sufficient time to enumerate abundance of individual species, or even to make reliable estimates of community biomass. However, qualitative estimates of abundance often serve as indicators of productivity. Since phytoplankton is usually the most significant constituent of the primary producers, measures of chlorophyll and Secchi disk transparency serve as the most practical indicators of primary production and are predictably linked to fish production (see Chapter 21). Estimates of both density and coverage of macrophytes are important not only as indicators of productivity, but also because of their role in sheltering fish, providing spawning substrate, protecting shorelines from erosion, absorbing nutrients, and indicating general lake quality.

Surveys of zooplankton and benthos are highly desirable when conducted with a specific goal in mind, such as evaluating survival and production of trout in lakes (see Chapter 18).

1.3.4 Fish Surveys

The objective of this module is to provide appropriate uniform methods for collecting key statistics needed to describe and analyze fish communities and populations. Fish surveys are usually conducted to:

- Describe the status of the fish community and its component populations, or
- Evaluate specific problems or management programs.

Descriptions of fish communities should be as precise and as complete as possible to facilitate comparisons with past and future data. It is imperative that sampling effort be standardized and accurately described. Data collected by various types of fishing gear should be analyzed separately since each has its own built-in bias.

A basic description of a fish community should include a list of species present; plus relative abundance, size frequency, and (usually) growth of important species.

More detailed analyses of fish populations should contain measures of rates of recruitment, growth, production, and mortality. Additional data might include standing crop population measurements or observations on endangered and threatened species (see Chapter 16).

1.3.5 Fishery Assessment

The objective of this module is to provide appropriate uniform methods for describing fisheries. Local reports of fishing quality and complaints are worth recording if they are carefully screened. However, an accurate analysis of a fishery requires a well planned and managed creel census to estimate fishing pressure, fish catch, and fishery value. Creel census methods can be found in Chapter 14, and assistance is available at the Institute for Fisheries Research (IFR).

1.4 Forms and Information Systems

The objective of this module is to provide appropriate and uniform methods for completing survey forms. Many of the survey forms were revised or replaced in 1981, and additional changes will occur as components are added to the computerized Fish Collection System. The main objectives in 1981were to require greater precision (e.g., more size intervals in the length-frequency records), simplify the recording of field data and its transfer to final forms, provide reminders and space for field notes, encourage and aid the analysis of survey results, and get data into formats adaptable to computerization. Paper files for forms not yet computerized should continue to be maintained at four locations (Local Office, Watershed Management Unit, Lansing, and Institute for Fisheries Research). It is strongly recommended that paper copies of both computerized and non-computerized forms be kept at local offices and IFR, even after computerization is completed. Certain types of computations (length-weight regressions, mark-and-recapture estimates, back-calculated growth) can be performed on spreadsheets which are available at IFR and elsewhere.

Forms are described in Chapter 4.

The computerized Fish Collection System began operation in the mid1990s. It is based on the contents of The Manual of Fisheries Survey Methods. By the year 2000, some important paper forms (especially the FISH COLLECTION form) had been replaced by electronic versions featuring the same elements of information. These versions may be printed out or retrieved on-screen. Basic tables used in Status of the Fishery Resource Reports may also be automatically generated, formatted, and printed. Survey components of lesser importance are still to be added to the System. Refer to "Users Guide to the Fish Collection System" (1987 or updated version) for the current capabilities of the System and instructions on how to use it. It is available as a MS-Word document on file servers at most MDNR offices under the file name: FISCOL.DOC. The latest innovation is hand-held field computers into which survey data can be recorded while at lakes and streams, then easily downloaded into the master database back at the office. This eliminates the need to record data on paper, and eliminates potential errors when data is transcribed from paper to computer.

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