Manual of Fisheries Survey Methods II: with periodic updates

Chapter 23: Guidelines for Evaluating Walleye and Muskie Recruitment

William Ziegler and James C. Schneider

TOC
NEXT PAGE
PREVIOUS PAGE
CITATION

Suggested citation:

Ziegler, William and J. C. Schneider. 2000. Guidelines for evaluating walleye and muskie recruitment. Chapter 23 *in* Schneider, James C. (ed.) 2000. Manual of fisheries survey methods II: with periodic updates. Michigan Department of Natural Resources, Fisheries Special Report 25, Ann Arbor.

Chapter 23: Guidelines for Evaluating Walleye and Muskie Recruitment

William Ziegler and James C. Schneider

Biologists in Wisconsin have refined catch-per-effort (CPE) methods for surveying and evaluating the recruitment of juvenile walleye and muskellunge over many years. The methods have been extensively tested in Michigan and Minnesota as well, and found to be very useful.

The method usually gives quite reliable results in one sampling trip. However, an additional trip should be made if initial results may not be representative. Results should be viewed as approximations, tempered with experience and common sense, and verified by adult surveys during spawning periods, if possible.

These methods provide a relative index of walleye or muskie recruitment in a timely fashion. That information allows us to monitor stocking success, track natural reproduction, adjust stocking rates, set and alter stocking priorities, and monitor the effects of environmental fluctuations and habitat degradation on reproduction.

23.1 Walleye

TOC
NEXT PAGE
PREVIOUS PAGE
CITATION

Serns (1982, 1983, and personal communications) developed standardized methods for estimating the recruitment of walleye at three life stages: fall young-of-the-year (yoy), spring yearling, and fall yearling. He provided directions for sampling and for estimating actual population size from CPE. Subsequently, these methods have proven to be very reliable on more than 45 lakes in Wisconsin and northern Michigan and guidelines for ranking CPE have been refined.

23.1.1 Walleye sampling

Collect juvenile walleye with either 220-volt AC or (preferably) DC electrofishing boat at night during fall (yoy and yearling) or spring (yearling), when they are concentrated inshore. Ideal water temperatures (F°) range from mid 70s to high 40s (better, >50). In the fall, such temperatures occur from September to early October in northern Michigan, and somewhat later in southern Michigan. In the spring, such temperatures occur in May and June. Recruitment surveys of smallmouth bass and yellow perch may be conducted concurrently (or sequentially) if they do not hamper collecting a high proportion of stunned walleyes.

Serns recommended that one complete circuit of the shoreline be made for proper use of his population formula. For very large lakes, sampling can be reduced to representative sections, but beware that bias can occur if the best walleye habitats (firm substrates) are not sampled in proportion to their occurrence in the lake. Good habitats can be selected as index stations, where changes in CPE are monitored annually, but it is not appropriate to compute population estimates for the entire lake from good stations alone. These are the minimum standards for sampling effort:

- Lakes with less than two miles of shoreline – shock entire shoreline;
- Lakes with less than 500 acres – shock 2 miles of shoreline;
- Lakes between 500 and 1,200 acres – shock two, 2-mile sections of shoreline;
- Lakes over 1,200 acres – shock three or more 2-mile sections of shoreline.

23.1.2 Walleye evaluation

Serns (1982) provided the following equation for calculating the number of yoy walleye in an entire lake based on sampling the entire shoreline (or a good representative sample) in the fall:

$$\text{fall yoy walleye/acre} = 0.234\ (\text{yoy shocked/mile of shoreline})$$

For example, if the average catch was 20 yoy per mile, the population estimate is 4.7 yoy fingerlings per surface acre (0.234 x 20).

Serns (1983) provided the following equation for calculating the number of yearlings in the entire lake based on sampling the entire shoreline (or a good representative sample) in spring or fall:

$$\text{yearling walleye/acre} = 0.194\ (\text{yearling shocked/mile of shoreline})$$

In the table below are ranks for evaluating the relative strength of yoy year classes in good walleye lakes. These are based on efforts to verify index sampling through subsequent surveys of adult walleye surveys or reliable fishing reports. Ranks are more appropriate for less intensive sampling efforts and index stations than population estimates calculated from equations. Walleye densities calculated from equations have been added to the last column for comparison.

Fall yoy/mile shocked	Year class strength	Calculated number/acre
<45	poor	<11
45 - 130	average	11 - 30
>130	strong	>30

A similar ranking system for evaluating the relative strength of year classes based on either spring or fall yearling indexing is in the table below. It is based on less experience and should be considered tentative.

TOC
NEXT PAGE
PREVIOUS PAGE
CITATION

Yearling/mile shocked	Year class strength	Calculated number/acre
<20	poor	<4
20 - 90	average	4 - 18
>90	strong	>18

23.2 Muskie

This procedure is based on 10 years of musky evaluation in northern Wisconsin and the Upper Peninsula of Michigan and personal communications with several Wisconsin DNR fisheries biologists, particularly Terry Margenau (Spooner, Wisconsin, Fisheries Research).

23.2.1 Muskie sampling

Muskie electrofishing surveys are best conducted when juvenile fish (age 0 or 1) are concentrated in shallow water during late fall (mid to late October and early November in northern Michigan). Sometimes good catches can also be made in early spring. Water temperatures (F°) at these times range from mid 30s to upper 40s. Recruitment of northern pike may be indexed concurrently. Other comments regarding electrofishing procedures and sampling intensity for muskie are the same as for walleye (above).

23.2.2 Muskie evaluation

Based on efforts to verify results through adult surveys and reliable fishing reports, an understanding has been gained of CPEs that constitute strong and weak year classes for muskie lakes. Guidelines are:

yoy/mile shocked	Yearling/mile shocked	Year class strength
<2	<1	weak
2 - 6	1 - 4	average
>6	>4	strong

23.3 References

Serns, S. L. 1982. Relationship of walleye fingerling density and electrofishing catch per effort in northern Wisconsin lakes. North American Journal of Fisheries Management 2:38-44.

Serns, S. L. 1983. Relationship between electrofishing catch per unit of effort and density of walleye yearlings. North American Journal of Fisheries Management 3:451-452.

TOC
NEXT PAGE
PREVIOUS PAGE
CITATION

Prepared October 1998 by W. Ziegler and J. C. Schneider

TOC

NEXT PAGE

PREVIOUS PAGE

CITATION