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HOW FISH POPULATION SURVEYS SHOULD BE REPORTED

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ABSTRACT

To facilitate the evaluation and use of population studies, reports should include:

1. A description of the area sampled, including the chemical classification and physical type of water, the type of bottom, depth of water, speed of movement and other information necessary to describe the environment from which the population came.
2. A description of the method of sampling employed in sufficient detail to enable the results to be evaluated and compared with results of other surveys.
3. Methods of measuring the results should be stated. The report should state if an attempt was made to recover fishes of all sizes, and if all fish were weighed or partly weighed and partly estimated. Such information is necessary for evaluation of the reliability of the results.
4. The population composition should be listed by species, with the numbers and weights of fish in each inch-group. A summary of the population should state the pounds per acre where possible, the A_t value, the F/C ratio, and the E values of the component species to facilitate comparisons with other populations containing the same or different species of fishes.
5. The author should summarize and interpret the results in so far as possible.

Many population surveys are of local interest only, and should never find their way into fisheries literature. If, however, the surveys have been carefully conducted and are extensive enough, their publication may add much to our knowledge of fish populations and dynamics.

At the present time the results of thousands of surveys repose in filing cabinets waiting for that moment when the biologists responsible have nothing better to do than to buckle down to the hard task of determining whether they really mean anything. However, each is so busy making new surveys that this spare time seldom materializes.

There is lacking in fisheries literature adequate reports of the compositions of fish populations in rivers, streams, lakes and impoundments. This has handicapped the development of theories of population dynamics and of ecological successions. It has also prevented detection of possible cyclic changes in population composition affecting the standing crop and the catch. For effective theorization, there must be available a great mass of definite information upon population compositions over a long period of years in the same environments, and upon those in different environments.

To be of use for this and other purposes, the surveys should be reported in such a manner that the information is intelligible to and useable by others. The published information should include a description of the area sampled, the method of sampling, the methods used in measuring the results, the population composition and a summary of what it all means to the author.

Description of the Area Sampled: Since the environment determines in large measure the composition of a fish population, the area sampled should be ade-

quately described. The type of water (river, stream, pond, lake, etc.) should be clearly stated, but this is not enough. For example, if a stream is sampled, the width and depth of the stream, the temperature, season, speed of the current (in feet/min. or miles/hour), type of bottom and other pertinent information should be included. This is necessary if the information is to be of more than local interest.

The actual size (not the estimated size) of the sample area should be given. Estimated areas are usually unreliable, even where estimated by experienced biologists.

Method of Sampling: A complete description of the method of sampling should also be given so that others may know what degree of reliance to place upon the results. For example, for rotenone sampling, the record should include the formulation used and the percent of rotenone it contained, the concentration applied (in p.p.m.), the method of application (surface, pumped, stirred, etc.), and other information pertinent to evaluation of the results. Over a period of years most organizations have changed their methods of sampling and thus have records of populations taken by a variety of methods.

Methods of Measuring the Results: Needless to say, all fish should be recovered and weighed; however, complete recovery is not possible with most sampling methods and in many cases no attempt is made to recover and record the small fishes. Often a large proportion of the fish killed by rotenone sampling is estimated, not recovered and weighed.

The published report should state whether fishes of all sizes were collected as completely as possible and especially if all fish reported in the population were weighed or partially weighed and the rest estimated. It is suggested that such estimated fishes not be included in the reported population composition. In rotenone sampling, it is also important to know if the population reported included a second-day pickup and a third-day pickup.

Reporting the Population Composition: Preferably, the results should be reported as the numbers and weights of fish in each inch-group and the totals for each species. This presents the information in such a manner that it can be compared and used by others for various purposes. Unfortunately this requires more space than is generally available in technical journals and makes necessary publication in department bulletins if the results of many surveys are to be reported.

Since listing of the results by inch-groups presents to the reader a mass of undigested information, it is very desirable to summarize the information into fewer items. When possible, the pounds per acre should be reported. In addition it is helpful in comparing populations and estimating the state of balance to report, at least the A_t value and F/C ratio of the complete population, and the E values of the component species.*

The A_t value is the percent of the total weight of the population that is in the form of harvestable fish. It thus furnishes a measure of the efficiency of the population and enables it to be compared with other populations containing the same or different species.

The F/C ratio is the ratio by weight of forage fishes to piscivorous species. By grouping all species into two classes, it enables comparisons to be made with other similar and dissimilar populations.

The E value is the percent of the total weight of a population due to a particular species, and measures the efficiency of that species in conversion of available food into fish flesh in that particular environment. It is for this reason that the environment should be adequately described. Such information concerning a particular species under a wide variety of conditions can then be combined into an understanding of its environmental requirements and capabilities.

Summary and Conclusions from the Survey: The results of each population survey should be summarized and interpreted in so far as possible by the person conducting the survey. Usually he is in the best position to explain the results. At least he can add additional information useable to others who may try to coordinate such data and extract from them the generalizations upon which a science of fisheries may be based.

* Swingle, H. S. 1950. Relationships and dynamics of balanced and unbalanced fish populations. Ala. Poly. Inst., Agr. Expt. Sta., Bul. 274, 74 pp.