

## FISHERY QUESTION

To assess a lake's fish population, several other parameters which constitute the lake's ecological balance need to be considered. The number of fish a lake is able to support depends on several factors. Various chemical levels in the water can be helpful or deleterious to certain species of fish. These same levels may also affect the fish by supporting or limiting the plankton, benthos, and other food resources. The climate, as well as such physical factors as size and depth of the body of water are specific for certain fish species. External pressures such as water and air pollution and human utilization of aquatic resources may increase the selectivity of a fish population.

Because there are so many factors which can affect a fish population, sufficient background information must be obtained before an assessment or comparison of the fish data can be done. A physical survey of the lake should be made which includes the climactic conditions, size, depth profile, shoreline development, inlets and drainage, lake age, and any other significant features about the lake.

An analysis of the water chemistry should also be made to determine the limiting nutrients and the seasonal changes in such factors as water temperature, oxygen levels, and pH ranges. For a more accurate picture of the effects of water chemistry upon the fish population, a year round chemical

analysis would be necessary to determine the maximum and minimum values affecting the population. Some levels which should be measured include pH, oxygen- temperature, alkalinity, copper, calcium and magnesium hardness, phosphate, specific conductance, hydrogen sulfide, and water turbidity.

Water chemistry can also affect a fish population indirectly through its effects upon the benthos and other food resources. A study of the food available to the fish through plankton and benthos would be useful in understanding some of the factors limiting a given population.

In deciding which methods to use in fish sampling, several of the difficulties and inaccuracies inherent in each method need to be considered. Each method is at least somewhat selective for the size and species of fish that can be caught. Sampling methods must also be adapted to physical conditions such as lake depth and contour. Since no one method of sampling could guarantee an accurate approximation of a lake's fish population, combining two or more methods in the same survey might prove to be more successful. for example, gill netting might be coupled with boat shocking, shore seining or spot poisoning. *good!*

Since different areas of a lake may present a wide range of habitats for various fish species, an attempt should be made to examine as many of these types of areas as possible. Sampling should be done in both shallow and deep areas. If gill netting is used, nets should be placed at different

vertical depths, as well as both horizontally and vertically from shore. Bays, inlets, and areas with different bottom or macrophyte growth should be examined.

Collected fish should be weighed and measured and the location where they were caught recorded. The fish should be identified and the number of species present determined. Data on the ages of fish could be collected with the scale aging method. Information about fish growth or other variables such as migratory patterns could also be obtained through a program of fish tagging. Fish could also be examined for such variables as fecundity or parasitism.

In examining the collected data, references from other studies would be very useful for the sake of comparison. With a record of the weight, length, and age of each fish of a given species, several factors could be analyzed. The average weight and length for each age class could be determined and compared with similar data from other lakes. By examining the relative number of fish in each age class, some conclusions might be able to be drawn regarding which years might have been more productive or successful for a certain fish species, or for the entire fish population.

It is also possible to measure the condition factors of various fish in the population using the formula  $W(10^5)/L^3$ .

The condition factor for a fish species can be an indication of the availability of food resources in the environment. *another stress* By comparing condition factors obtained in a lake survey with values from other surveys, it can be determined whether or

not a fish's weight is normal for its length.

Gut analysis can be useful for determining not only which foods are preferred by a fish species, but also which ones are available in its environment. By concurrently examining condition factors and gut analysis, it can be determined whether optimal food conditions exist in the lake.

Many other comparisons are possible with the variety of fish data which can be examined. A study of the fish population can be very useful as an indication of total lake condition. By studying species representation, ages, and weights and lengths of the fish population, information can be collected about such factors as lake age and productivity and the effects of various external pressures upon the lake.