Original: Fish Division
cc: Education-Game
J. W. Leonard
Inst. for Fish. Res.
M. G. Galbraith, Jr.
Marquette Fisheries
Research Station

INSTITUTE FOR FISHERIES RESEARCH
DIVISION OF FISHERIES
MICHIGAN DEPARTMENT OF CONSERVATION
COOPERATING WITH THE
UNIVERSITY OF MICHIGAN

ALBERT S. HAZZARD, PH.D.
DIRECTOR

ADDRESS
UNIVERSITY MUSEUMS ANNEX
ANN ARBOR, MICHIGAN

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# A REPORT ON UNDERWATER PROCEDURES USED IN CONJUNCTION WITH SUMMER LAKE SURVEYS, 1954, AND A DISCUSSION OF THEIR PRACTICABILITY IN FISHERIES RESEARCH AND MANAGEMENT



By

Merle G. Galbraith, Jr.

## Abstract

This report is designed to encourage the use of underwater swimming equipment as a tool in fisheries research and management. Observations and experiences with the use of such equipment by the writer, along with a report on the activities undertaken by two other states in this field, are mentioned.

Some of the ways in which this equipment should prove valuable to fisheries research and management are: (1) observations for life history studies, e.g., spawning, habitat selectivity of young fish; (2) ascertain levels in lakes where trout and other species lay during warm summer months; (3) check on the survival of newly introduced species; (4) verification and identification of schools of fish located by new sonar-type depth finder; (5) collection of hard-to-net fish (e.g., smallmouth and largemouth bass, trout) and observations on size range and general abundance of various age-classes of these fish; (6) estimating the size of fish populations in lakes; (7) underwater photography such as for life histories or any other studies where pictures would further clarify the investigator's results; and (8), last but not least, recovery of valuable equipment lost in deep water.

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This report is designed to encourage the use of underwater swimming equipment as a tool in fisheries research and management. During the summer of 1954, the Upper Peninsula lake survey party, under the leadership of the author, initiated the use of such equipment to augment the data obtained by present lake survey methods.

The equipment used by members of the survey party consisted of fins, snorkel tube, and face masks. Plate glass, rather than a plastic lens, was used because the latter scratched easily and thus impaired the observer's vision. A homemade air tank and spring-propelled spear were also used on one occasion.

Of the seventeen lakes surveyed by this party during 1954, fourteen lakes had waters transparent enough to make underwater observations practical. However, low water temperatures during the beginning of the season, and again at the end, discouraged underwater swimming to the extent that observations were made on only five lakes. Observations on these five lakes showed that centrarchids, yellow perch, suckers and minnows were unwary of swimmers when

submerged. In fact, most fish exhibited a great amount of curiosity and swam to within a few feet of the observer. Minnows often encircled the swimmer, making identification easy for those species identifiable by conspicuous external characteristics. During the time that a spring-propelled spear was used, the author easily collected four bass; generally, bass are hard to collect by methods now used by lake survey parties in Michigan. At some lakes, underwater observations were the only means of obtaining information on the bass population, and this was accomplished in much less time than it would ordinarily take to obtain the information by netting. The author was able to make spot checks to depths of 30 feet, but observations at depths greater than 15 feet were restricted to short-time intervals caused by the lack of air.

Observations were made not only on fish, but on bottom types, extent of vegetation, and amount of cover available to fish at various depths.

Sometimes, in using seines, the author experienced difficulty in obtaining samples of minnows which were known to exist in lakes. Underwater swimming was used in this situation as follows: Two men would swim around the lake shore and locate schools of minnows, herding them into a shoal area. The third person would then distribute rotenone poison completely around the area. This method worked efficiently, especially in lakes having shoal areas covered with deadheads and/or mucky bottoms.

Underwater swimming with, and without, the aid of compressed air has been used by some workers in marine fisheries as a method of collecting fish and recently as a method of estimating reef-fish populations (Brock, 1954). The use of underwater swimming gear by fresh-water fisheries biologists is relatively new.

In New Jersey, the fisheries research branch of the Fish Division hired members of an underwater swimmers' organization to make observations on the alewife in one of New Jersey's larger lakes (Sports Illustrated, 1954). The purpose was to locate the vast schools of alewives which seemingly disappeared during the hot summer months. The "skin divers" were able to locate the alewives in drowsing schools in thick bottom grass at a depth of 30 feet. At last reports, this group of underwater swimmers was making observations on fish around selected ocean jetties and recording on waterproof pads the numbers, species and feeding habits of fish. Atop the jetties, the State biologists were recording creel census data on anglers.

Dr. A. D. Hasler of the University of Wisconsin, working on Lake Mendota, has employed underwater swimming gear with compressed air, in conjunction with a sonic sounder. A swimmer verified the presence of schools of fish located by the sounder, and made observations of the movement of these schools. Hasler is also using underwater gear to check on the accuracy of the Peterson, Schnabel and DeLury methods of estimating fish populations. After estimates are made in enclosed bays of a lake, the areas are poisoned and the fish which sink to the bottom are collected by a swimmer using compressed air. Other uses of this equipment by Wisconsin people have included the observation of fish movements into trap nets and actions of fish within the trap itself.

As applied to Michigan, underwater swimming with adequate equipment could be used in a number of ways such as: (1) observations for life history studies, e.g., spawning, habitat selectivity of young fish; (2) ascertain levels in lakes where trout and other species lay during warm summer months; (3) check on the survival of newly introduced species; (4) verification and identification of schools of fish located by new sonar-type depth finder; (5) collection of hard-to-net fish (e.g., smallmouth and largemouth bass, trout) and make

observations on size range and general abundance of various age-classes of these fish; (6) estimating the size of fish populations in lakes in a manner similar to that reported by Brock (1954); (7) underwater photography such as for life histories or any other studies where pictures would further clarify the investigator's results; and (8) last, but not least, the use of such equipment to recover valuable equipment lost in deep water.

There are important factors which limit underwater swimming, such as dark or murky waters and low water temperatures. Although the former may never be overcome, the factor of cold water can be overcome by the use of a rubber suit (sometimes referred to as a "frogman's suit"). A suit of this type would make it possible to operate in all Michigan waters including Lake Superior. At depths greater than 10 to 15 feet, a swimmer should have equipment employing compressed air. Otherwise, such observations are restricted to only a few seconds under the surface. Much energy and time is lost from repeated surfacing in order to replenish one's supply of air. The "aqua lung," or similar equipment, ensures both freedom of movement and enough air for one-half hour submersion time, or more, depending on the size of tanks used.

Literature cited

Brock, Vernon E.

1954. A Method of Estimating Reef Fish Populations. Journal of Wildlife Management, pp. 297-308.

Anonymous

1954. Sports Illustrated. August 16 and August 30, 1954.

INSTITUTE FOR FISHERIES RESEARCH

Merle G. Galbraith, Jr.

Approved by: G. P. Cooper

Typed by: P. R. Darling