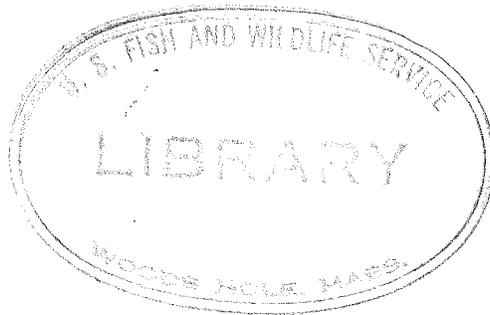


Development and Operation of a Tagging Unit
in a Marine Biological Laboratory

by

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65-18

Bureau of Commercial Fisheries
Biological Laboratory
Woods Hole, Massachusetts 02543
Laboratory Reference No. 65-18
25 October 1965

NOV 19 1965

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Part I.

Introduction

In 1957, several research programs were being conducted at the Woods Hole, Massachusetts, Laboratory of the U. S. Bureau of Commercial Fisheries to study important commercial groundfish and the sea scallop. The tagging of fish and shellfish was a basic part of this research, and each program was conducting an independent tagging operation. As a result there was considerable duplication of effort in routine procedures such as the study of types of tags and tagging techniques, procurement of tags and tagging equipment, inventory, record keeping, publicity and acknowledgment procedure.

A Tagging Unit was established at this time, employing one man on a half-time basis to consolidate the separate tagging operations of these research programs, and to standardize the operating procedures. Within a year the duties became a full-time operation.

The following services were provided for the biologists and their tagging projects: single purchasing order for tags, arrangements with manufacturers for tag design, development and production, maintenance of inventory and issuance of tags, tagging tools and related equipment, acknowledgment of tag returns and payment of cash rewards, publicity for tagging programs, maintenance of tagging and tag return records, and design of forms; and sea duty on tagging cruises, time permitting.

Since 1957 the tagging project has continued to adapt to the needs of an expanding laboratory, and increasing obligations beyond the laboratory.

Most of the services have been changed in procedure and enlarged in scope, and new functions have been added to the project. Among these are the following: cooperative tagging programs with state conservation departments, a broader application of the public relations function, a consulting service for outside organizations, providing information for the International Commission for the Northwest Atlantic Fisheries (ICNAF) on tagging programs conducted by non-member organizations, providing displays of tags and tag developments for biological meetings, schools, and colleges; writing reports and papers for publication on procedures and techniques developed by the tagging project.

The operation of the tagging project may now be described as internal (services provided for the biologists and investigators of the Laboratory) and external (outside functions necessary for the above services, and for ICNAF, and consulting services requested).

This paper describes the need for a tagging service unit, how it developed and adapted its procedure for handling all the administrative and technical functions of the several projects at this Laboratory, where species of commercial groundfish are studied, and how these services became useful beyond this Laboratory.

Part II.

Internal Relations

The major purpose of the tagging project is to relieve the biologists and investigators of all the routine details of conducting a tagging program. Once a tagging program is decided upon as to species, areas, and time of tagging, the project handles all details for the biologists except (with certain exceptions) the actual physical tagging of the fish, and the working up of the data from the tag returns.

The service of the project begins (in cooperation with the biologists) with the selection of the tag or tags suited for the species. The original procedure as shown in Part I has been followed with some change in emphasis, especially in the development of tags, and with public relations.

Because of the large number of species tagged, their varied characteristics and reactions to tags, adaptation of existing tags and experimentation and design of new types of tags and tagging tools have been a responsibility of the project. This has involved a close contact with tag manufacturers and with the development of new materials adapted to the design of tags, as well as contacts with material and design consultants of related industries.

Unforeseen complications occur, calling for a very special effort on the part of the project in the field of public relations. Certain species tagged in quantity are shipped under refrigeration as a fresh fish in the round (not frozen or processed) to retain distribution centers as far away as 1,800 miles from the ports of landing. Undiscovered tags, eventually found and returned from such distances, called for a

two-phase approach to the problem of securing adequate information with the returned tags; involving cooperation by our own service organizations and the industry. Demand for certain flounders and scup (porgie) as a fresh or pan fish over a broad area of the Eastern United States, coupled with the development of high speed, over-land, refrigerated transportation, have contributed to this problem.* Due to the absence of individual handling from the time they are caught, it was necessary to develop a system to trace from the remote retailer back to the original receiver and shipper of the fish at the port, and so to the vessel to obtain the vital recapture information necessary for research.

The design of forms for the operating procedure of the project has been expanded in the acknowledgment of the returned tag. Stationery (with text suited to the individual program) has been designed. The stationery form shows over its entire face, in three shades of sea green, a lightly reproduced over-lay chart outline of the coast from the Carolinas to Eastern Nova Scotia, indicating the 100-fathom curve of the continental shelf and major fishing banks. A hand rubber stamp is used to indicate on the chart/letter the place where the fish was tagged (. -Tagged) and recovered (. -Recovered). Other tagging information is shown in a panel on one side of the form, and the text of the form letter contains information pertinent to the program.

Tank experimentation and testing of tags and materials have been available to the project since the opening of the new Laboratory

* See Public Relations - Part III

and Aquarium. Otherwise the services for the biologists have operated, with some expansion, as originally planned, and may be described as follows:

1. Supplying tags of appropriate serial numbers, ready for use, with tools and related equipment.
2. Supplying forms and equipment for wet or dry recording at sea.
3. Setting up and maintaining the records for each tagging program.
4. Acknowledging all returned tags.
5. Paying cash rewards through agents at ports of landing, and with acknowledgments when returned tags arrive at the Woods Hole Laboratory by mail. One dollar is paid for a fish or scallop tag (with scallop shell, if possible) with information. Two dollars is paid for a tagged fin fish submitted to a port agent or Laboratory representative with the tag intact on the fish, for accurate measurement, scale and otolith sampling, and observation of the effect of the tag on the fish.
6. Operation of a \$1,000 imprest cash fund for tag reward payments through port agents at eight ports of landing.
7. Providing preliminary reports on results of tagging programs for the Laboratory biologists and for outside cooperating agencies.
8. Distribution to Laboratory biologists of current literature on other tagging programs and tagging techniques, as well as manufacturers' brochures and tag samples.
9. Complete publicity before and after each program through Service, state, and private publications, press releases, and port agents.

10. Participating in tagging programs at sea when time permits.

Part III.

External Relations

Regional Office

The imprest fund of \$1,000 for tag reward payments is operated under the general control of the Regional Office at Gloucester, Massachusetts, headquarters for Region 3. Application for reimbursement of the fund for rewards paid is made on Reimbursement Voucher Standard Form No. 1129-Rev. through the Regional Office at the end of each month (at shorter intervals when necessary to keep up with payments). Port agents are supplied from the imprest cash fund by the project, and for each reward payment a Receipt for Cash - Subvoucher Standard Form No. 1165 is made out by the port agent and sent, with the tag and information, to the tagging project at the Woods Hole Laboratory for record keeping. All of the record keeping and book-keeping necessary in maintaining the imprest cash fund balance and reimbursement is done by the tagging project.

The Office of Statistical Services of the Regional Office at Gloucester operates a port pool, composed of port agents stationed at principal fishing ports in Region 3, at Rockland and Portland in Maine; Gloucester, Boston, New Bedford and Provincetown in Massachusetts; Point Judith, Rhode Island; and Portsmouth, Virginia. These port agents are an important and far-reaching extension of the services of the tagging project. In direct contact with fishermen and the industry, they not only handle tag return information, reward payments and

publicity for the tagging project (in addition to their regular routine), but collect scale and otolith samples from tagged fish, and provide guidance and advice from the field in policy matters for the tagging project. Due to the necessity for direct and constant contact with the port agents, the Office of Statistical Services at Gloucester permits the project to deal directly with the port agents (within the scope of S. O. P. agreed upon by both agencies) rather than through their Gloucester headquarters.* At the Woods Hole Laboratory all tagging matters relating to the port agents are handled only through the tagging project.

Other Service Agencies

As the number of species tagged and the volume of tagging increased, it became necessary to request assistance with tag returns (and in completing information with returned tags) from representatives of the Bureau of Commercial Fisheries Market News Service and fishery marketing specialists at ports and marketing centers where we do not have port agent representation. Valuable assistance has been rendered by the Market News Regional Supervisor at New Orleans, Louisiana; market news reporters at New York City; Baltimore, Maryland; and Hampton, Virginia; and fishery marketing specialists in New Jersey and Maryland. Also, operating from the Fisheries Research Board of Canada stations at St. Andrews, New Brunswick, and St. Johns, Newfoundland, are many fisheries officers stationed at ports in the three eastern seaboard provinces of Canada. On a reciprocal basis, these fisheries officers perform the same functions for the tagging project as our own port agents.

Relations with ICNAF

Part of the function of ICNAF is to coordinate tagging among the member nations. On the western side of the Atlantic, the ICNAF area extends to the southern border of Rhode Island. The tagging project furnishes general information for that organization, acting also as its agent for non-member organizations tagging fish within U. S. Bureau of Commercial Fisheries Region 3 (state and private laboratories), as certain species tagged in the area to the south are recaptured in the ICNAF area. Periodic requests are made for reports on the accomplishments of the U. S. in the ICNAF tagging, with respect to the development of tagging programs conducted by member nations are forwarded to the ICNAF Office of the Secretariat at Halifax, Nova Scotia, where they are reproduced on cards, and all data are sent to each member. Each member nation then has a current file of all ICNAF tagging, and of certain tagging on the U. S. Atlantic Coast south of Rhode Island. This system is extended by the tagging project to the non-member laboratories of this area.

Cooperative Programs with States

This Laboratory has conducted cooperative tagging programs with the Conservation Departments of Massachusetts, Rhode Island, New York, and New Jersey. These programs involve species in which the U. S. Bureau of Commercial Fisheries and the states have a common interest, and which are important in both the commercial and sport fisheries. In the combined tagging program, the specialized resources and equipment of each agency are utilized to the advantage of the entire program.

When a state requests Bureau of Commercial Fisheries participation, state biologists meet at this Laboratory with our biologists and the tagging project for discussions. If the program is warranted, details are agreed upon and the program is planned. Although the procedures vary somewhat, the operation is essentially the same with each state.

The participation by the Woods Hole Bureau of Commercial Fisheries Laboratory is as follows:

1. Supplying the tags selected with BCF Woods Hole return message.
2. Paying the rewards.
3. Services of the port agent system.
4. Service of the tagging project public relations system.
5. Service of the tag return acknowledgment procedure.
6. Service of ICNAF program registration.
7. Participation by R/V Albatross IV and biologists of this Laboratory in offshore phase of tagging of species when necessary.

The participation by the State Conservation Departments is as follows:

1. Providing biologists, supporting personnel, and vessels suitable for inshore tagging operations.
2. Conducting, with few exceptions, all tagging operations (20,000 fish tagged in these programs to date by the states).
3. Participation by the states with their own publicity and public relations system.
4. Working up the data from the returned tags.

Generally, the U.S. Bureau of Commercial Fisheries has existing facilities enumerated earlier, including a specific budget, the port agent system, and the tagging project, while the State Conservation Departments have biologists, vessels, and manpower in quantity available in the area. In this way the states may conduct tagging programs not otherwise possible, and the Bureau can more easily obtain needed tagging data and accumulate data which may be needed in the future.

Cooperation with the Woods Hole Oceanographic Institution

This organization conducts a continuing and extensive program involving the release of surface drift bottles and bottom drifters, as well as a widespread tagging program for tuna and other large game fishes. The drifters especially, and to some extent the drift bottles and fish tags, are recovered by commercial fishing vessels and brought to port. As an assistance to these programs, the port pool - port agent facility of the Bureau processes these returns, pays the rewards, and sends the information to the tagging project. A separate reward fund for these programs is supplied to the project by the Woods Hole Oceanographic Institution for distribution by the tagging project to the port agents.

Public Relations

In order to overcome difficulties in obtaining information from tags discovered at distant inland points (Part II, Public Relations), a two-week study was made of the landing, handling, shipping, and record keeping procedures of 50 leading receiving wholesalers at ports

from Long Island, New York, to Norfolk, Virginia, as well as the distribution markets at Philadelphia, Pennsylvania, and Baltimore, Maryland.

It was learned that dealers (receiving wholesalers) kept records of trips landed, dates and areas fished, and that many of them were vessel owners. It was further learned that code numbers on shipping boxes and/or serial numbers on invoices, when obtained from the distant retailer, and checked out with the dealer at the port of landing who shipped the fish, could produce the necessary tag return information.

As an experiment to obtain tag return information in reverse to the usual procedure, the following plan was put in operation. A special information/instruction card was designed for mailing to retail outlets. Wholesale dealers contacted at the ports accepted 7,500 of these instruction cards and mailed them to their retail trade with the monthly billing. In this way it was not necessary for the wholesalers to disclose to anyone their confidential customer listings.

Due to good response from retailers, and excellent cooperation by dealers at ports of landing, and assistance from service personnel where available, the "card" system was effective, producing a majority of returns with complete information where no information was obtained with returns before. Return information has been completed for tags discovered as far away as Florida, Mississippi, Texas, Ohio, Tennessee, and South Dakota. These fish were shipped from Gloucester, Boston, and New Bedford, Massachusetts.

A broad listing of media for news release has been assembled. Included here are commercial and sportfish editors, newspapers of

coastal towns and cities, magazines of the commercial and sport fishing industries, sport fishing clubs, shore sport fishing stations, party boat associations, bait shops, state conservation news outlets, etc. Also, in small, remote fishing villages the assistance of a leading captain or vessel owner is obtained. In this way we have an extension of ordinary publicity and announcements, and the cooperator often takes care of forwarding the tags and information to this Laboratory.

Through the St. Andrews, New Brunswick, station of the Fisheries Research Board of Canada, publicity and announcements are distributed by Canadian fisheries officers (port agents).

Relations with Manufacturers

In order to obtain the services and assistance from manufacturers as outlined in Part II, contact, both personal and by mail, is frequently made with manufacturers' technical consultants and with producers of materials useful in the design and production of tags.

Smaller manufacturers in this field have been more cooperative in these services. Large corporations require more volume and market potential, and are not as patient and flexible in their attitude toward design and experimentation. One tag was developed from three components: a semi-rigid nylon double barb, extruded polyethylene tubing, and a message of 115 words on a very thin sheet vinyl; each element produced by a different specialist.

Consulting Service

As a result of the assistance given by manufacturing specialists to the tagging project, knowledge and experience of value to other organizations has been gained. This applies especially in the field of newly developed materials and techniques in marking tags.

In this connection, a testing service has been established with a private laboratory equipped for determining the possible toxic effects of tag materials on the flesh of live fish and other animals.

Information most frequently requested is for manufacturing references, and for manufacturers' design and consulting services. Requests for information on tags suitable for a certain species of fish, and for information on the chemical and physical properties of materials are frequently received, especially with regard to extruded vinyl plastics and nylon molding. Occasionally information requests are received from fields other than fishery research for the design of marking devices.

Biologists from many organizations here and abroad have visited the tagging project for consultation on tagging problems (which is a valuable exchange of knowledge for the project) and many information requests are answered by mail.

Sponsored by the International Commission for the Northwest Atlantic Fisheries, a tagging symposium was held at Woods Hole in 1961. All countries engaged in the tagging of fish were invited to send representatives. An exhibit by manufacturers of tags, tagging tools, and materials was arranged for the symposium, as well as a display of tags and equipment used by this Laboratory. From these contacts many inquiries have been processed. Also, guidance has been given to manufacturers in producing special purpose tags ordered by laboratories outside the United States.

Represented among the inquiries processed by the project are laboratories of the Service, state, private and university laboratories,

and individuals throughout the United States. Similarly, inquiries have been received from laboratories in Canada, Puerto Rico, Central and South America, and European sources from Norway to Italy (including the Food and Agriculture Organization), as well as South Africa and India.

Reports and Material for Publication

In addition to publicity releases, news releases on a popular basis are occasionally prepared. Reports are requested by fishery biology organizations for meetings and by ICNAF. The International Council for the Exploration of the Sea's publication "A Guide to Fish Marks," 1935, was brought up to date on the section for the United States by the tagging project, for re-publication by that organization. Laboratory Report (Woods Hole) No. 62-2 has been useful in processing requests for information, and a paper on the public relations experiment (Public Relations, Part III) for inland tag returns is being completed.

Exhibits and Displays

Portable exhibits of tags, tools, and equipment are prepared for meetings of fishery biology organizations and for the use of biologists of the Laboratory when addressing the public, and the Laboratory Aquarium staff is assisted in planning permanent exhibits related to tagging.

Portable displays are prepared and sent on tour of the ports, where they are placed in fish exchanges and public places, showing the movements of tagged fish, information gained from the tagging

and a current listing of fishermen of the port who have found and returned tags from the program to the Woods Hole Laboratory.

Conclusion

In the period from 1957 through April, 1965, 80,576 fish and shellfish were tagged by six projects operating at the Laboratory, involving 12 species: cod, haddock, winter flounder, fluke, yellowtail, whiting, redfish, dogfish, halibut, scup, alewife, and the sea scallop. Of this total 20,000 were tagged by the Conservation Departments of four states: Massachusetts, Rhode Island, New York, and New Jersey, in cooperative programs with this Laboratory, involving four species: alewife, winter flounder, fluke and scup.

During this period the amount paid in cash rewards through the port agents and by the tagging unit at Woods Hole (for tag returns mailed directly to the Laboratory) totaled \$14,479 exclusive of rewards paid by Canada for U. S. tagged fish landed in Canadian ports by Canadian fishermen. The largest amount of reward payment in a single year (1964) was \$3,223, and in a single month (May, 1964) \$549.

The greatest number of fish tagged in any one year was 21,342 in 1957. The largest total tagged on one cruise (sea scallops) was 7,539.

One man operating this system, allowing time for sea duty, travel in the field for manufacturing contacts, port agent surveillance, and public relations, aided by the port agents and a typist, has been able to successfully carry out the objectives and accomplishments described in this paper.

Further, due to the fact that this is the only unit of its kind, the knowledge and experience gained with regard to the techniques involved in tagging, design of tags, manufacture, and the new public relations system devised, have been made available through consultation to many organizations tagging fish here and abroad.