COLD-STORAGE LIFE OF FRESH-WATER FISH--NO. 1

Very little information is available on the cold-storage life of fresh-water fish. Landings of these fish contribute substantially to the domestic supply of fishery products. Cold-storage life data are of value to the producer in adopting proper packing procedures and in evaluating the marketing problems, and to the sport fisherman for preserving a portion of his catch. Furthermore, studies of the freezing and cold-storage keeping characteristics of species not now being extensively used may ultimately lead to their wider utilization. This project was initiated at the Seattle Technological Laboratory about two years ago. The results to date are presented in this report.

EXPERIMENTAL PROCEDURES

Collecting samples in the Great Lakes and other areas and shipping them in good condition to the Seattle Laboratory limited the scope of the study. The fish

Table 1 - Cold-Storage Life of Certain Fresh-Water Fish Stored as Round (Whole) Fish at 0° F.

Description of Samples					Condition of Samples Stored at 0° F. 2/					
Species		Source	Date Caught	Method of Handling, Shipping, & Packing 1/	Initial Examination Just Prior to Storage	After 3 months' Storage	After 6 months' Storage	After 9 months' Storage	After 12 months' Storage	Estimated Cold-Storage life of the Test Samples
Common Name	Scientific Name									Months
Yellow perch	*Perca flavescens*	Lake Erie	October 1951	A	Good; body meat mild-flavored, firm, and flaky	Good, but belly-flap portions of some fish slightly off-flavored	Good, but somewhat rubbery-textured and belly-flap portions slightly off-flavored	(Same as at six months)	(Same as at six months)	More than 12
Yellow pike	*Stizestedion vitreum*	Lake Erie	October 1951	A	Good; body meat mild-flavored, moist, and tender	Good	Good	Good	Good	More than 12
Blue pike	*Stizostedion glaucum*	Lake Erie	October 1951	A	Good; body meat mild-flavored, moist, and tender	Good, but belly-flap portions slightly off-flavored	(Same as at 3 months)	(Same as at 3 months)	(Same as at 3 months)	More than 12
Whitefish	*Ceregonus clupeaformis*	Lake Erie	November 1951	A	Raw meat extremely soft, but cooked meat firm	(No significant change)	(No significant change)	Fatty portions rancid, dark meat somewhat strong flavored	Poor; fatty portion and dark meat rancid	9
Sheepshead	*Aplodinotus grunniens*	Lake Erie	October 1951	A	Body meat varied greatly in flavor and texture	Varied	Varied	Varied	Varied	Varied from 0 to more than 12
Carp	*Cyprinus carpio*	Mississippi River	June 1952	B	Body meat tasteless, moist, and soft	Dark meat disagreeably off-flavored	(Same as at 3 months)	Meat poor in appearance and firmer than originally	Meat poor in appearance and in flavor	9
Bullhead	*Ameivrus melas*	Lake Benten, Minnesota	August 1952	C	Body meat moist and soft	Dark meat somewhat strong-flavored	Poor, dark meat off-flavored; body meat slightly off-flavored and mushy	-	-	6

1/ Method A. Whole fish were frozen, packed in dry ice, and shipped to Seattle by railway express. At the laboratory they were ice-glazed, wrapped by moisture- and vapor-proof cellophane, and stored at 0° F.
Method B. Whole fish were frozen, packed in dry ice, and shipped to Seattle by air freight. At the laboratory they were ice-glazed, wrapped in moisture- and vapor-proof cellophane, and stored at 0° F.
Method C. Whole fish were iced and shipped to Seattle by railway express. At the laboratory the fish were washed, frozen, ice-glazed, wrapped in moisture- and vapor-proof cellophane, and stored at 0° F.
2/ Factors determining quality were appearance, odor, flavor, and texture.

collected were used both for storage tests and for chemical analyses for proximate composition (protein, fat, moisture, and ash content). Round (whole) fish whenever obtainable in sufficient amounts were used for cold-storage tests, otherwise, only fillets or dressed fish were used.

The fish were handled and shipped by two general methods. Deviations are indicated in the tables showing the cold-storage keeping quality. The fish used had been out of the water no longer than 12 hours before shipment.

ICED FISH: Whole fish were properly iced and shipped to Seattle by railway express. The fish were continuously maintained in a chilled condition until delivered to the laboratory. The fish were in ice no longer than 5 days from the time they were initially prepared for shipment until delivered to the laboratory. At the laboratory the fish were (1) washed in tap water, (2) placed in a blower-type freezing unit, (3) frozen at a temperature of -20° F., (4) properly glazed by dipping in water at a temperature of 34° F., (5) wrapped in moisture- and vapor-proof cellophane, (6) packed in fibreboard boxes, and (7) stored at 0° F. (Use of the fibreboard boxes was an extra precaution to prevent dehydration of the samples during storage. Since the fish were stored in a room with a blower-type refrigeration unit, the extra protection was needed to eliminate frequent reglazing of the fish.)

Fillets were cut from washed whole fish, wrapped in moisture- and vapor-proof cellophane, frozen, packaged, and stored in the same manner as the whole fish.

FROZEN FISH: Whole fish were frozen, ice-glazed, and packaged, (as previously described), in commercial freezers, packed in suitable containers with dry ice, and shipped solid-frozen to Seattle by railway express or by air freight.

Fillets, cut from frozen fish which had been thawed in cold running water only until soft enough to handle, were packaged in moisture- and vapor-proof cellophane, frozen, packed in fibreboard containers, and stored at 0° F.

RESULTS

Data on the cold-storage life of fresh-water round fish are shown in table 1; data on fillets or dressed fish, in table 2.

Table 2 - Cold-Storage Life of Certain Fresh-Water Fish Stored Either as Dressed Fish or as Fillets at 0° F.

Description of Samples					Condition of Samples Stored at 0° F. 2/			Estimated Cold-Storage life of the Test Samples
Species		Source	Date Caught	Method of Handling, Shipping, & Packing 1/	Initial Examination Just Prior to Storage	After 3 to 4 Months of Storage	After 5 to 6 Months of Storage	
Common Name	Scientific Name							Months
Smelt	Osmerus mordax	Lake Michigan	March 1952	A	Good; mild and sweet-flavored; tender and moist	Belly flaps off-flavored	Belly flaps off-flavored	6
Eulachen	Thaleichthys pacifious	Cowlitz River, Wash	April 1952	B	Good; distinctive-flavored; soft and moist	Nape discolored; belly flaps slightly off-flavored	Fish pungent in ordor and slightly sour and slightly rancid in flavor	5
Lake trout	Cristivomer namaycush namaycush	Lake Superior	June 1952	C	Good; mild-flavored; tender and moist	Some fillets discolored and slightly off-flavored; one sample rancid in flavor	Fatty portions somewhat rancid; body meat slightly sour; fillets discolored	3 to 6
Buffalofish	Ictiobus species	Mississippi River	June 1952	D	Light meat flat-flavored; dark meat strong-flavored; portions of belly flap off-flavored	Dark meat faded in color and rancid in flavor	Fillets badly discolored, rancid in odor, and mushy	Less than 3

1/ Method A. These fish commercially packed. They were headed, eviscerated, packed in one-pound waxed cartons with a cellophane overwrap, frozen, and then shipped in dry ice to Seattle.
Method B. These fish commercially packed. They were headed, eviscerated, packed in one-pound waxed cartons with a wax overwrap, frozen, and then shipped in dry ice to Seattle.
Method C. Eviscerated fish were iced and shipped by railway express to Seattle. At the laboratory, they were filleted; each fillet was wrapped in moisture- and vapor-proof cellophane, frozen, and stored at 0° F.
Method D. Whole fish were frozen, packed in dry ice, and shipped to Seattle by air freight. At the laboratory they were thawed and filleted; each fillet was wrapped in moisture- and vapor-proof cellophane, refrozen, and stored at 0° F.
2/ Factors determining quality were appearance, odor, flavor, and texture.

DISCUSSION

The results of the cold-storage life studies are limited to the conditions of this experiment. Additional studies on such variables as seasonal variation, method of handling, and methods of packaging and storing are necessary before general conclusions can be made on the cold-storage life of fresh-water fish. Furthermore, those species stored as fillets or dressed fish probably would show a much longer cold-storage life if stored as round fish.

Of the species studied, yellow pike had exceptionally long storage life. Even after one year, it lost little of its original flavor, developed no off-flavors, and showed little or no change in texture.

The quality of sheepshead varied from good to poor. The body meat was variously described by the taste-panel members as mild, moldy, muddy, oily-rancid, and/or similar to animal meat. The texture varied from tender to extremely tough. As it was not possible to segregate and use only the better-quality fish for cold-storage purposes, this variation in quality was found among the samples throughout the 12 months' storage period. At the end of the 12 months, some of the sheepshead still rated good in flavor and in texture.

Species Currently Undergoing Storage Tests

In addition to the species listed in tables 1 and 2, the following species of fish, all caught in 1953, are currently undergoing storage tests:

1. Squawfish (*Ptychocheilus grandis*) caught in Drano Lake, Washington, in February and June.
2. Sheepshead (*Aplodinotus grunniens*) caught in Lake Winnebago, Wisconsin, in July.
3. White bass (*Lepibema chrysops*) caught in Lake Winnebago, Wisconsin, in July.
4. Utah Chub (*Gila atraria*) caught in Hebgen Lake, Montana, in July.
5. Crappie (*Pomoxis annularis*) caught in Two Rivers Lake, Minnesota, in October.
6. Chub (*Leuchichthys*) caught in Lake Michigan in August.

--D. T. Miyauchi, Fishery Products Technologist, and
M. E. Stansby, Chief Pacific Coast and Alaskan Technological Research,
Fishery Technological Laboratory,
U. S. Fish and Wildlife Service,
Seattle, Washington

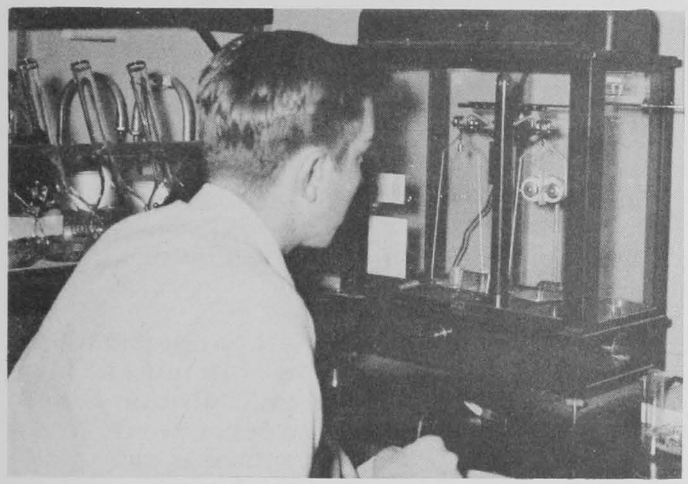
GLAZING FROZEN SALMON

Experiments have been carried out to confirm the reported beneficial effect of glazing frozen salmon in ascorbic acid solutions and solutions of cellulose thickening agents (Tylose, Modocol, etc.). Because of favorable storage conditions, no improvement was found by glazing in Tylose and Modocol solutions. Glazing in a 1-percent ascorbic acid solution was found to delay onset of rancidity.

--Arsberetning fra Fiskeriministeriets
Forsogslaboratorium,
Copenhagen 1953

TECHNICAL NOTE NO. 30--PROPOSED METHOD FOR ESTIMATING AMOUNT OF SOLUBLES ADDED TO WHOLE FISH MEAL

"Whole fish meal" is a term commonly used to describe a mixture of regular fish meal with solids from stickwater, usually added in the form of condensed fish solubles. A Norwegian herring-research group has done considerable work with this type of product, studying methods of manufacture, vitamin content, storage properties, etc. Quite recently plans were announced for the large-scale recovery of stickwater by the South African pilchard industry. These plans indicated that the entire production of condensed solubles would be returned to the meal to make whole meal. This process does, of course, materially increase the output of meal. There are indications that this whole fish meal will soon be offered for sale on the United States market. However, at the present time, most members of the byproducts industry in this country prefer to market condensed solubles as a separate product.



Weighing samples for nitrogen analyses.

One explanation for the general lack of interest in the production of whole meal in this country may be related to the lack of a good method for estimating with reasonable accuracy the amount of solubles solids that have been added to a whole meal. The proximate composition is of little value for this purpose, since the differences between condensed solubles on a dry matter basis and the related fish meals are generally within the range of the naturally large variability in proximate composition which is characteristic of each. This is a matter of no great concern as long as whole meal and unmixed fish meal are sold at the same price. However, there is some possibility that whole meal might sell for a premium price if the important nutrients of condensed solubles can be shown to be retained in whole meals, and if a method for estimating the solids from added condensed solubles in the whole meal were available.

Heretofore, the only method suggested for estimating the amount of added solubles solids is that given in Meldinger fra Sildolje og Sildemelindustriens Forskningsinstitutt, Bergen, Norway, no. 1-3, pp. 15-16, 1950. An abstract of this article has been published in FAO World Fisheries Abstracts, vol. 1, no. 5, p. 23, 1950. The method is based on the fact that the major part of the solids contained in stickwater or fish solubles consists of proteins and other nitrogenous components which may be removed from the whole meal by water extraction. Thus the content of water-soluble protein can be used to distinguish whole meal from ordinary herring meal. The method is as follows: a 10-gram portion of whole meal is mixed with some 200 milliliters of hot water in a 250-milliliter volumetric flask and held in a boiling-water bath with occasional shaking for 30 minutes. After the contents of the flask have been cooled and diluted to volume, a portion is filtered through a folded filter paper and the nitrogen content is determined on a 50-milliliter aliquot. In Norway it was found that a minimum of 20 percent of the total crude protein of the whole meals from herring was soluble in water when all of the stickwater was returned to the meal. This was therefore selected as a tentative qualification for a meal to be designated "whole meal."

This method is satisfactory for the purpose of distinguishing between a meal with admixed solubles solids and a regular meal, or as a measure of the percentage of the total protein present in a water-soluble form. For the method to indicate the actual amount of solubles solids that have been added to a mixture of this type, it would be required that the protein of the added solubles should be entirely soluble and the protein of the regular meal should be entirely insoluble under the test conditions.

In order to test the validity of these premises, a number of menhaden meals with no added solubles were tested by this method and found to contain appreciable amounts of soluble protein. The reason for this is readily apparent since the presscake before drying contains about 50 percent solids (including residual oil) and 50 percent water. A typical lot of 1,000 pounds of menhaden (or herring or pilchard) contains roughly 200 pounds of solids, which will form the meal, and a highly variable amount of oil, most of which can be expressed. When these whole fish are cooked and pressed, approximately 400 pounds of presscake and 600 pounds of oil and stickwater (disregarding the water condensed from steam used in cooking) are produced. This mixture then goes through screens, decanters, and centrifuges to separate fine solids and oil from the stickwater. For purposes of illustration, it will be assumed that 100 pounds of oil are obtained, leaving 500 pounds of stickwater which contains approximately 6 percent of solids, or a total of 30 pounds. This is evaporated to give 60 pounds of condensed solubles. <u>But</u> 200 pounds of stickwater are left in the presscake. This stickwater contains at least as large a proportion of solubles solids as did the stickwater which was pressed out of the presscake, or a total of 12 pounds. This soluble material then remains in the scrap and meal, and repeated washing of the presscake with hot water would be required to obtain a fish meal free of this soluble fraction. The actual amount of the water-soluble fraction present in any meal will depend upon the condition of the fish before cooking and upon the efficiency of the pressing operation.

Analyses performed at the College Park laboratory of the U. S. Fish and Wildlife Service demonstrated that the average amount of soluble protein in menhaden meals is slightly less than 6 percent, or about 10 percent of the total protein content of the meal. Any fish meal prepared by the wet-rendering process would probably not differ greatly from this value. However, when the percentage of the total protein that is water-soluble is used as an indicator of the amount of added condensed solubles in the whole meal, it is evident that a somewhat erroneously high estimate will be obtained since there is in effect a 10-percent bias from the soluble protein that is in the regular meal.

If this bias were the only factor involved, it could be compensated for by simply subtracting 6 percent from the analyzed value for soluble protein before using this value as the basis for estimating added solubles. However, analyses of some samples of pure dried menhaden solubles showed that the protein in them was not 100 percent water-soluble. Instead the soluble portion averaged only about 85 percent of the total protein. This also is understandable since the screens and decanters are not 100 percent efficient in removal of insoluble solids, and these insoluble solids, whether derived from plankton or fine meat particles, are highly proteinaceous.

The effect of the insoluble protein in the solubles is partially to compensate for the soluble protein in the basal meal, and both must be taken into account if an accurate estimate is to be made of the amount of condensed solubles added to the whole meals. The percentage of added solubles solids in the whole meal (X) can be estimated when the percentage of the total protein that is water-soluble for the basal meal (A) and for the solubles (B) for the specific type of meal is known, and when the percentage (C) of the total protein of the specific whole meal that is water-soluble has been determined by analysis. Since the whole meal contains only basal meal and solubles solids, 100 - X is the percentage of basal meal solids, and $A(100 - X) + BX = 100C$. Hence, the percentage of added solubles solids,

$$X = \frac{100(C-A)}{B-A}.$$

In the case of menhaden meal-solubles mixtures, A = 10 and B = 85, so $X = \frac{100(C-10)}{75} = 1.33C - 13.3$. One example will illustrate the application of this formula. A whole meal mixture is found on analysis to have 25 percent of the total protein soluble in hot water. Then $X = 1.33 \times 25 - 13.3 = 20$ percent as the modified estimate of the percentage of added solubles solids in the mixture, rather than 25 percent as indicated by the simple ratio.

It has been impractical to prove the accuracy of the proposed method of estimate, because no commercial whole meals could be obtained for which accurate information was available regarding the amount of solubles solids added in their manufacture. However, fairly satisfactory estimates were obtained when the method was applied to experimental mixtures of menhaden meal containing high levels of some atypical samples of added solubles. There is every reason to believe that the formula will give a quite accurate estimate for mixtures containing lower levels of more typical condensed solubles.

Since herring meal and herring solubles, or pilchard meal and pilchard solubles, might have slightly different average values for (A) and (B) of the above formula, somewhat greater accuracy would be attained in work with pilchard and herring whole meals if these values were known. At present most of these meals are imported. Consequently the average user of whole meal will not have this information available. Lacking the specific data for each species, the values determined for menhaden meal in the above formula will probably give a more accurate estimate of the amount of solubles solids added to a whole meal mixture than will be obtained when the simple ratio of soluble protein to total protein is used.

--Charles F. Lee, Chemical Engineer,
Fishery Technological Laboratory,
Branch of Commercial Fisheries,
U. S. Fish and Wildlife Service,
College Park, Maryland

WHALE OIL EXTRACTION BY PRESSURE

Japanese experiments in extracting whale oil by pressure instead of cooking are said to have produced oil of better quality; in addition, the residual tissues can be used to manufacture synthetic textiles.

--La Peche Maritime, La Peche Fluviale et La Pisciculture, June 15, 1953.

THE DEVELOPMENT OF FEDERAL SPECIFICATIONS

ASSIGNMENT: A new method of developing Federal specifications was put into effect on July 6, 1954. By this method the responsibility for the development of specifications will be assigned by the General Services Administration to other Federal agencies with their consent. Normally the assigned agency will also be responsible for maintaining the specification.

SCOPE: The assignment will include responsibility for:

1. Development and coordination with Federal agencies and the industry.

2. Amendment, revision, or further development as found to be necessary.

BASIS: An important factor in the assignment of the specifications projects is the technical staff and facilities of agencies and their competence in the science and technology of the item. Most of those projects on fishery products, therefore, have been assigned to the Fish and Wildlife Service. The actual work is being carried out by the Technological Section of the Branch of Commercial Fisheries.

DEFINITION: A specification is a clear and accurate description of the technical requirements for a material, a product, or service, including the procedure by which it will be determined that the requirements have been met.

1. Federal. A specification covering those materials, products, or services, used by two or more Federal agencies (at least one of which is a civil agency), or new items of potential general application, promulgated by the Administration for mandatory use by all Federal agencies.

2. Interim Federal. A specification intended for final processing as either a new or revised Federal Specification, issued in interim form for mandatory use by the agencies specified in the preamble to the specification, but which may be used by other agencies; or issued to cover immediate procurement needs of one agency but which may be of interest to another Federal agency.

BASIC REQUIREMENTS: The basic requirements observed in the development of a specification are:

1. The requirements of all Federal agencies having an interest in the items shall be considered.

2. The number of types, grades, colors or finishes, and varieties specified shall be held to the minimum consistent with optimum over-all efficiency and economy of the operations or services to be performed.

3. Wherever practicable, functional or performance requirements, rather than design, construction, or compositional requirements, shall be specified.

4. Requirements shall be written to give full consideration to end use and economy and to encourage maximum participation by industry in the Government supply program.

5. Nationally recognized industry, technical society, and other commercial specifications and standards shall be used and adopted to the maximum extent practicable.

6. Specification requirements which can be met by products of standard commercial construction, manufactured by business enterprises for general commer-

cial use, shall be adopted to the maximum extent consistent with Government requirements.

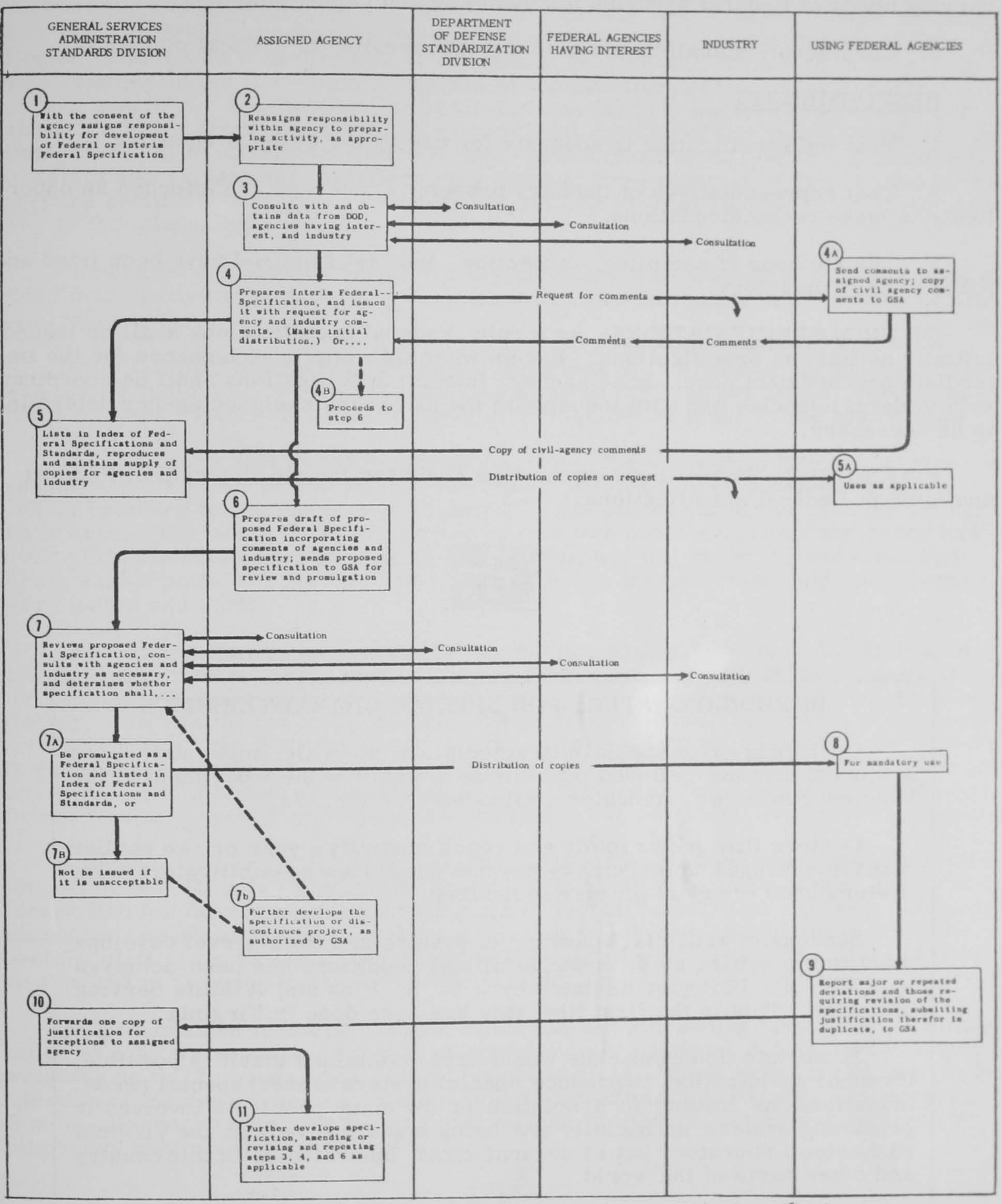


Figure 1 - Flow chart for development of Federal and interim Federal specifications.

7. The preservation, packaging, packing, and marking requirements in specifications shall be uniform to the greatest extent practicable consistent with the varying needs of Federal agencies for domestic and export shipment.

8. Consideration shall be given to the conservation of critical materials.

RESPONSIBILITY:

1. That the specification is adequate for use by the Federal agencies.

2. That representatives of industry properly concerned are afforded an opportunity to make recommendations.

3. The methods of sampling, inspection, and test required have been tried and found to be satisfactory.

INTERIM SPECIFICATIONS: As a rule, Federal Specifications shall be issued initially as Interim Specifications. Except when GSA approves issuance for the immediate procurement needs by an agency, Interim Specifications shall be coordinated with Federal agencies and with industry to the extent the assigned agency determines to be necessary.

PROCEDURE: Figure 1 shows the flow chart for the development of Federal and interim Federal specifications.

BREEDING OYSTERS FOR SPECIAL CHARACTERISTICS

Oysters bred for special characteristics, as cattle, hogs, and horses are bred, are now believed possible as a result of an experiment at the Virginia Fisheries Laboratory, Gloucester Point, Va.

Oysters that grow rapidly and reach maturity a year or two earlier than the average commercial oyster now does is one possibility foreseen; oysters bred to resist disease is another.

Successful artificial spawning of oysters and their larvel development to the setting stage under artificial conditions has been achieved by a Virginia biologist assisted by a U. S. Fish and Wildlife Service biologist. This is the first time this has been done in Virginia.

Biologists throughout the world have maintained that it is possible, through hybridization, to produce special oysters to meet special needs. Investigations leading to a solution of the many problems involved in producing oysters artificially are being made not only at the Virginia Fisheries Laboratory but at several other laboratories in this country and other parts of the world.

--Science News Letter, June 19, 1954

EXPERIMENTAL FREEZER-TRAWLER DELAWARE RESUMES OPERATIONS

The Service's experimental freezing vessel Delaware, operating out of East Boston, started its initial cruise of the season on June 29. This was its first trip since completion of fire-damage repairs and restoration of the galley and after crew's quarters. The purpose of the cruise was (a) to brine freeze in-the-round and store in the frozen-fish hold all commercial species of fish taken in the Georges Bank area, (b) to further test the operation of the freezing equipment, particularly in relation to certain automatic controls that had been recently installed, and (c) to prepare sample lots of iced, gutted fish of various species for use in projects under way in the laboratory.

The vessel returned to the laboratory on July 4 with a catch of 11,500 pounds of fish, principally haddock, cod, and yellowtail. Approximately 2,500 pounds of this total were frozen.

While fishing, mechanical equipment replaced or overhauled during the winter was tested under full operating loads. As a result of these sea trials, certain adjustments and replacements were made in the equipment prior to the next cruise.

The Delaware again went to sea on July 14. The purpose of this cruise was essentially the same as that for the first one. After a trip of about 13 days, the vessel returned to the laboratory on July 27. Fishing was done mostly in the Georges Bank area. The catch of 50,000 pounds of fish was largely haddock and scrod haddock, with the remainder consisting of cod, whiting, ocean perch, and other fish. About 43,000 pounds of the catch were brine-frozen in-the-round, and 7,000 pounds were gutted and iced.

Considering that the vessel operated only during daylight hours because a full crew of fishermen was not taken on these cruises, the quantity of fish brought in by the Delaware is believed to be very satisfactory. Translated into around-the-clock fishing, which is the normal commercial operating schedule, the catch would have been something over 100,000 pounds of fish. While all of the brine-frozen fish were in excellent condition, the fish caught during the first part of the trip and stored in ice were not of the best quality when landed. The second cruise demonstrated that frozen fish held aboard the vessel for two weeks can be landed in excellent condition.

A technologist from the Army Quartermaster Corps Food and Container Institute, Chicago, Illinois, was aboard on both cruises to select lots of both iced and frozen fish for later use in the preparation of frozen fillets, fish squares, and fish sticks for consumer acceptance tests under the direction of the Institute. The laboratory staff assisted him in handling the fish upon the arrival of the vessel at East Boston and in the processing of the fish into the desired types of samples.

On both cruises lobsters, caught incidental to the trawling operations about 200 miles at sea, were placed in a tank of circulating sea water. A total of 35 lobsters, weighing up to 12 pounds each, were brought in alive. They were turned over to the Division of Marine Fisheries, Massachusetts Department of Natural Resources, Boston, Massachusetts, for tagging and release in inshore waters for studies on migratory habits and survival rates.

NEW FORMAT

NOTE: Recent surveys of readers of Commercial Fisheries Review indicate that more detailed and complete reports of progress are desirable. Therefore, the content of the section "Research in Service Laboratories" has been changed with this issue of Commercial Fisheries Review. This will permit a prompt and more suitable means of reporting progress on projects carried out in the Service's four technological research laboratories. The section will, as in the past, be devoted principally to current progress on technological research projects. However, these reports will be prepared in more detail by the principal investigators or project leaders and will represent definite progress or phase reports on the projects. Complete reports of this type should prove to be of greater value in following the research work and in the prompt practical application of the results.

Such items as test cruises of the research trawler Delaware and other miscellaneous observations made by the research staff will be included as before.

The progress reports will be abstracted in the Service journal Commercial Fisheries Abstracts. Users of the abstract journal will have a ready reference file to the material appearing in the "Research in Service Laboratories" section of Commercial Fisheries Review.

The new format will not alter the present practice of issuing reports of completed research as feature articles in Commercial Fisheries Review, other Service reports, and in trade or scientific journals. The Technical Notes will not be changed and will consist of observations made in the course of study on research projects or other incidental technical observations that may be of interest to the industry.

152-YEAR-OLD LAKE STURGEON CAUGHT IN ONTARIO

A 152-year-old lake sturgeon (Acipenser fulrescens), caught in Lake of the Woods, Ontario, in 1953, has caused a mild furor in scientific circles. The age of the remarkable fish has been established by biologists of the Fish and Wildlife Division of the Ontario Department of Lands and Forests at Maple, Canada, according to an April 6 release by that Agency.

The fish was caught in July by a fisherman. It measured 81 inches in length and weighed 215 pounds. At time of capture, a pectoral fin was removed from the fish and later forwarded to Maple by Kenora District Wildlife Officers. It was from a microscopic examination of a cross-section of this fin ray that the age of the fish was determined.

To assess its great age, annual rings similar to those found in trees were counted. In fact, the figure arrived at appeared so fantastic that a section was sent to the Chief Limnologist of the Canadian Wildlife Service at Ottawa, and he reaffirmed the findings.

It is interesting to realize that this piscatorial curiosity was swimming the waters of Lake of the Woods at least ten years before the War of 1812 and had managed to escape commercial fishing gear and natural enemies until 1953.