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SMOKING LAKE HERRING, WHITEFISH, LAKE TROUT, AND CARP

By Norman D. Jarvis, Technologist,  
Division of Commercial Fisheries

The smoking of lake herring, whitefish, lake trout, and carp is concentrated in the Great Lakes area, and comprises the major production of the fish smoking industry in the interior region of the United States. Some carp is smoked in the Atlantic Seaboard States.

LAKE HERRING AND WHITEFISH

The same method is used in smoking both lake herring and whitefish. The finished product is somewhat similar, and unscrupulous retailers sometimes attempt to sell smoked lake herring as the more expensive whitefish. Most of the lake herring and whitefish are imported as frozen fish from Canada. The fish is held in cold storage, and is withdrawn as required for smoking.

The frozen fish is first thawed in a tank of cold water. The temperature of the water should be only slightly above the freezing point. If it is too warm it should be chilled. Some smokers leave the fish in tanks overnight without changing the water. Others thaw the fish in running water for about four hours. The fish are removed before they are completely thawed as they are firmer and easier to handle. After thawing, the fish are split down the belly to the vent and are eviscerated. The dressed fish are washed thoroughly, taking especial care to remove all traces of blood near the backbone.

After washing, the fish are allowed to drain for a few minutes and are then packed in layers in a brining vat. Some smokers use rectangular vats about four feet in width, ten feet long, and three feet deep; others use hogsheads. A small amount of salt is scattered among the fish as they are packed in the vat - from 5 to 10 pounds per 100 pounds of fish. The vat is then filled with brine testing 90° salinometer. Sometimes the fish are packed in dry salt, without brine. Sufficient salt to cover

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Note: This leaflet supersedes F.I. 23, issued by the former Bureau of Fisheries.

the fish is scattered over each layer. The fish may be taken out of the salt after periods varying from 3 to 10 hours, depending on the flavor desired, season, and length of time for which preservation is desired. This method is usually followed in summer. Sometimes in winter the fish are cured in brine without the addition of salt. The fish are taken out of brine after a period of from 10 to 16 hours, varying with the preference of the trade, season of year, and amount of fish in the salting vat.

After draining a few minutes the fish are hung for smoking. The most usual method is to pass a round smoke stick in through the right gill and out the mouth, but there are a number of variations. In some establishments the stick is passed through the eyes of the fish; in others, an iron wire curved S-shape is used to attach the fish to the stick, one end of the wire passing through the fish at the head or beneath the nape bone, and the other being over the smoke stick. Some smokehouses use sticks about 2 inches thick and 3 inches wide. Nails are driven through the sticks so that the points project at an angle on each side at 3- or 4-inch intervals. The fish are impaled on these points either under the nape bones, or through the vertebrae near the tail.

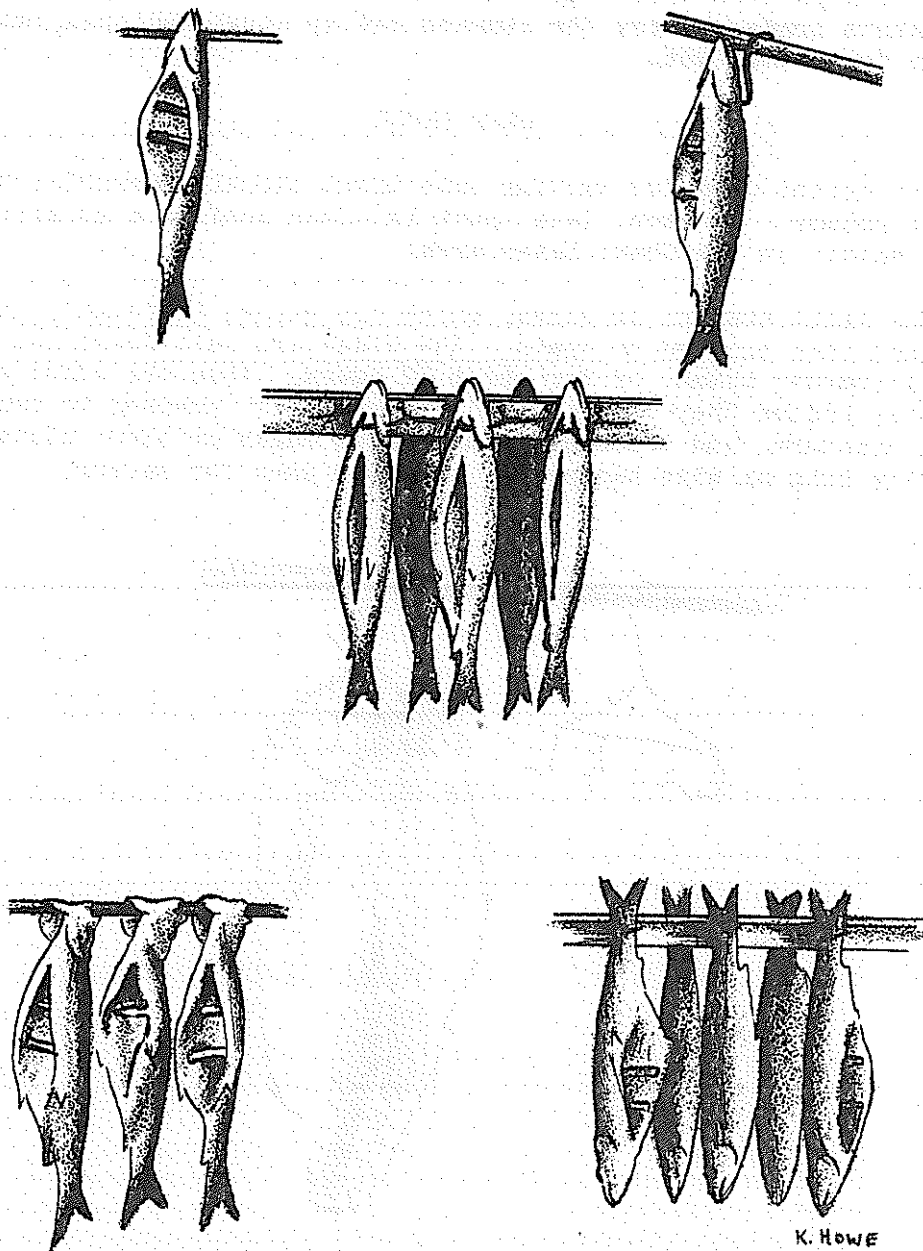
The method described by Stevenson <sup>1/</sup> is also used: "the fish are secured by having stout smoke sticks, about  $1\frac{1}{2}$  inches thick and  $2\frac{1}{2}$  inches wide, in the top of each, and about  $\frac{1}{2}$  of an inch from the edge is driven a row of tacks or small wire nails at intervals of about 3 inches, projecting about  $\frac{1}{2}$  inch above the surface. Ordinary cotton wrapping cord is tied to the wire nail at the end of each stick, and by means of this cord passing around each nail, a single herring is held in place between each two nails throughout the length of the stick, the fish being placed with the back of the neck against the stick and the cord passing from one nail around the throat of the fish entering under the gills on each side, and then around the next nail, and so on to the end. By having the stick of sufficient width a row of such nails may be placed on each edge, so as to attach a row of fish at each side. This removes nearly all the risk of the fish falling, and their appearance is not marred by holes through which the smoke stick has passed."

When the herring or whitefish are hung, the sticks are dipped in fresh water to remove any brine or excess salt from the surface of the fish. The sticks are then hung in a current of air until no moisture is apparent on the surface of the fish. Large mechanical fans are used by some smokers. The sticks are then hung in the smokehouse from 6 to 8 feet from the ground. The smokehouse is of the ordinary type as used in smoking other fishery products, and has no special features. Any hard wood may be used for fuel. Hardwood sawdust and chips, from woodworking plants, are used quite commonly.

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<sup>1/</sup> Stevenson, C.H., "The Preservation of Fishery Products for Food", Bull. U.S. Fish Comm., 1898.

The fish is cured over a light smoke, with the smokehouse dampers open, for 5 or 6 hours. The temperature at this time should not be more than 90° F., preferably 80° F. At the end of this time the fires are built up, the smokehouse dampers are closed, and the fish are cooked in a dense smoke at 170° to 180° F., for from one to two hours, depending on the height at which the fish are hung, size of fish, and type of cure demanded in the locality. The fish are allowed to cool,



K. HOWE

Methods of Hanging Lake Herring  
and Whitefish for Smoking

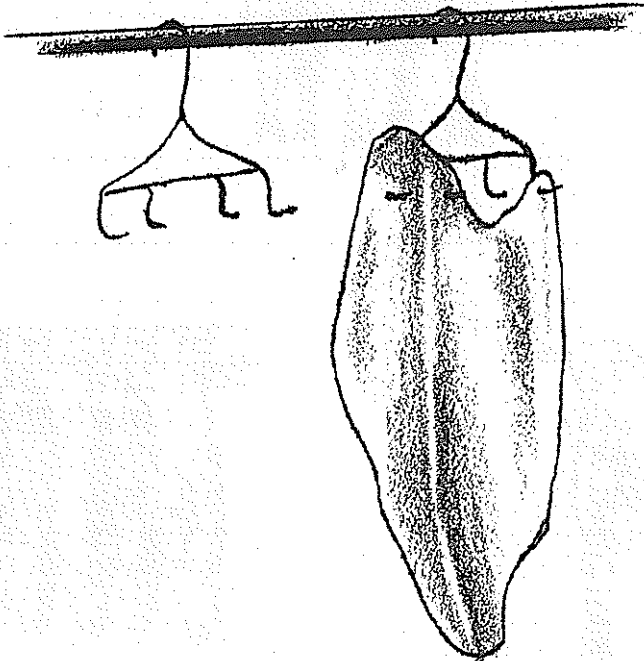
and are then packed in wax-paper-lined wooden boxes for distribution to retailers. The loss of weight in cleaning and smoking averages 50 per cent. The product has a durability of about ten days.

Some markets prefer the herring well smoked on the inside so in these localities the belly cavity is held open by means of toothpicks or somewhat thicker small wooden sticks, two sticks to each fish. This allows the smoke to strike into the belly cavity more completely and gives a product with a greater length of preservation. In general, the western trade prefers the stomach cavity stretched open, while the eastern trade does not.

#### LAKE TROUT

The method used for smoking lake trout closely resembles that for Pacific salmon. In fact, lake trout is often used as a substitute for smoked salmon in the Great Lakes area.

The trout are cut in sides, which are washed thoroughly in fresh water and then allowed to drain. The sides are held overnight in a 90° salinometer brine, or for about 12 hours. When the sides are sufficiently brined they are rinsed in fresh water, pressed to remove excess moisture, and trimmed of any ragged edges or blood clots. The sides are hung on wire hangers of the type used for salmon.



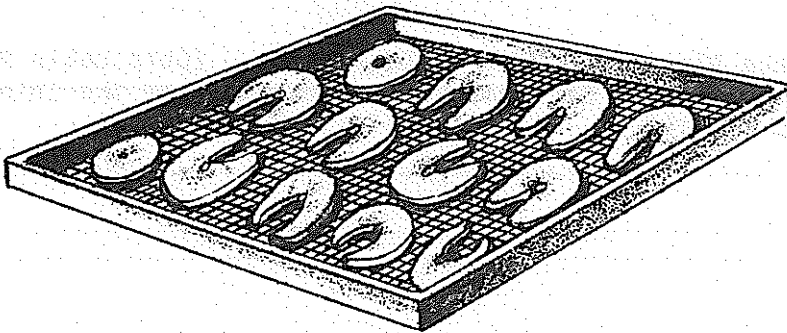
Lake Trout Hung for Smoking,  
Showing Wire Hanger

If possible, they are then hung in the air until a thin, shiny "skin" forms on the cut flesh surface. Fans are sometimes used for drying. If the fish must be hung in the smokehouse immediately, extra time must be allowed for drying before starting the fire. When the fish have all been hung in the smokehouse, a fire is started on the floor, the dampers are closed, and the fish is cured in a dense smoke from 12 to 48 hours, depending on length of preservation and degree of smoke flavor demanded by the trade. The temperature in the smokehouse should not be higher than 80° F.

### CARP <sup>2/</sup>

There is considerable variation in methods of smoking carp, but the following description may be considered typical. The fish are headed, gutted, and cleaned thoroughly, then cut in "steaks" or "chunks" of from a half pound to a pound each. The steaks are brined from 10 to 12 hours in a brine from 60 to 70° salinometer. The length of time varies with the size and condition of the pieces. Fish not in the best of condition is given the heavier brining for the longer period.

The pieces are hung on smoke sticks in some instances; in others they are placed on wire mesh bottom trays, previously oiled to prevent the fish sticking. Some smokers then sprinkle spices and condiments on the fish, such as red pepper, cloves or bay leaves. Others do not.



Smoking Carp Steaks on Wire-Mesh Trays

The carp is then placed in the smokehouse where it is cooked or "dried" over a hot fire without much smoke for a period averaging 3 hours. The temperature in the smokehouse during this period is about 225° F. The hot fire is then broken down and dampened with sawdust so

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<sup>2/</sup> The information on carp was supplied by Leo Young, Fishery Marketing Specialist, Fish and Wildlife Service.

that a dense smoke is built up. The carp is smoked for about 1 hour at a temperature ranging from 90° to 110° F. When the fish has cooled, the pieces are wrapped in parchment paper and packed in boxes.

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Additional References

TRESSLER, D. K.

Marine Products of Commerce. Reinhold Publishing Corp., 330 West 42nd St., New York, N.Y.

JARVIS, NORMAN D.

Home Preservation of Fishery Products - salting, smoking, and other methods of curing fish at home. Fishery Leaflet 18. (Obtainable from the Fish and Wildlife Service, U. S. Department of the Interior, Chicago 54, Ill.)

Mild-Curing, Pickling, Dry-Salting, and Smoking Salmon. Fishery Leaflet 60. (Obtainable from the Fish and Wildlife Service, U. S. Department of the Interior, Chicago 54, Ill.)

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Smoked Haddock or Finnan Haddie. Memorandum S-28. (Obtainable from the Fish and Wildlife Service, U. S. Department of the Interior, Chicago 54, Ill.)

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How to Make Bloaters. Fishery Leaflet 44. (Obtainable from the Fish and Wildlife Service, U. S. Department of the Interior, Chicago 54, Ill.)

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