DEPARTMENT OF THE INTERIOR

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CAPTURING FISH BY DECOYS OF LIGHT

Like moths to a candle flame, so fish have been lured by artificial light to quick capture in fishermen's nets.

When this inquiry--"Is there any type of electrically operated eye that could pick up schools of fish at a great depth?"--was received recently by the Division of Fishery Industries, Fish and Wildlife Service, United States Department of the Interior, subsequent research in early records revealed that artificial light had been used extensively in the capture of commercial species of fish.

Artificial light, as a decoy, seems to have been first used in catching fish in the herring fishery of New England in the early 1800's. It was known as "torching" or "driving", and was one of the oldest and most common methods of catching herring in early years.

"The well-known instinct of herring to follow a light was observed by the Indians prior to the settlement of the country by the whites", according to G. Brown Goode, second Commissioner of Fisheries, writing in 1887. "The discovery was doubtless the result of their extensive camp-fires, which were built along the shores in the principal fishing districts."

Torching was a very simple method.

"Fishermen usually selected a medium-sized boat", continued Goode, "which could be propelled rapidly by oars. The boat was provided with a small iron frame

called a 'dragon', projecting from the bow. In this dragon a fire of birch bark and other highly combustible materials was kept contantly burning while the fish were being taken. The fishermen usually went to the shore late in the afternoon and timed their departure so as to reach the fishing grounds shortly after sunset. As soon as it became sufficiently dark, the fire was lighted, one man took his position in the stern to steer the boat and another stationed himself in the bow, armed with a dipnet for securing the fish as they gathered in little bunches just in front of the light. Great numbers of herring were thus taken."

At Eastport, Maine, and vicinity, according to early records, torching seems to have been extensively employed from the earliest settlement of the region, and up to 1828 it was the principal method for taking small herring to be used for smoking. If the fishing was done at night, a torch was lighted and held over the edge of the boat in order that the fish might be drawn to the surface, where they could be readily seen.

That light exercises a certain influence on fish is a known fact. Generally, light is said to blind and dazzle the schools of fish so that they are brought to a standstill and thus may be scooped up easily in a dipnet. In other instances, however, fish may be repelled by light. For example, an overabundance of phosphorescence in the sea has been known to frighten away herring because so much light was produced by the nets during their movement in and through the water.

An early Norwegian paper, "Use of Light in Sea Fishing" (1884), gives this account of a welled fishing boat with its under-sea light decoys: "During the London Fisheries Exhibition there was exhibited from Tarragonia, Spain, a boat with an open well in the middle in which well could be placed a box furnished with a glass bottom and in its lower portion with glass sides, in which box lamps could be placed. The box was lowered so far that the glass sides, and the flame of the lamps, were below the bottom of the boat so that the light could shine in all directions. This was especially intended to be used for the capture of cuttle fish."

In Newfoundland, also, light was often used to catch cuttlefish. Continuing from the same Norwegian account, "The fishermen make a fire on the shore and the light so absorbs the attention of the cuttlefish that with the incoming tide they are stranded on the beach where they are picked up.

"Another method employed an artificial decoy fish made of wood formed nearly like a flat-bottom boat with pieces of glass set in the bottom and sides. It is of the size of the body of an average cuttlefish, and is trolled after the boat. The ancient Greeks towed after the boat a female in order to attract the males, which were then scooped up with the net. Since at the present time it is often difficult to procure a female, the modern Greeks substitute for the natural decoy an artificial one."

In Hawaii, as well, considerable fishing was done with torches at night, United States Fish Commission investigators discovered. In a report published by one of these scientists, John N. Cobb, in 1901, the method was described as follows: "The torches are usually made of split bamboos secured at regular intervals with ki leaves or trigs of the naio. They are sometimes made of a number of kukui nuts strung on rushes, or the stems of cocoanut leaves, which are then wrapped around with ki leaves so as to make the torch round like a candle. These latter will burn in almost any kind of weather. The natives have a notion that if the torch burns with a pale flame the fishing will be poor, but if it burns with a bright red flame it will be very good.

"In shallowwater the fish are frequently speared or taken in a small scoop net by the fisherman as he wades around with the lighted torch in one hand and the spear or net in the other.

"Sometimes, while the fish is blinded or dazzled by the light, a scoop net is slipped in front of it by one of the fishermen; a companion then gently tosses a

stone just back of the fish, which causes it to dart forward into the net, and it is captured. This manner of fishing is called by the natives 'lamalama'."

Another favorite Hawaiian method consisted of placing in the bow of a boat a can which had been filled with inflammable fuel and covered with oil. At night the boat was rowed to a selected spot and then the fuel was set on fire. This blaze drew the fish to the boat, and while in their dazzled condition it was a simple matter for the natives to strike them down with a heavy stick, either stunning or killing them. They were then picked up and put into the boat and the same procedure was repeated a short distance farther on.

In "Galapagos: World's End", William Beebe has this to say about the effect of light on fishes: "When at anchor, and the searchlight was turned down into the water, fish assembled in schools, hosts of small ones which were instantly chased away by some great fellow, all returning in another moment to the lure of the bright circle.

"That this strange attraction is a powerful one is proven by the flying fish which come aboard, as migrating birds are drawn to lighthouses. I do not remember a voyage of any length, when sooner or later a flying fish did not land on the ship at night, skimming high over the rails, held by the irresistible fascination and falling with a plop on the deck. Six or eight boarded the Noma in the Atlantic and two in the Pacific. I once caught one on the deck of the Lusitania forty-five feet above the water line, and in the Pacific, many years ago, a flying fish shot clear into my cabin through the open port hole."

Boats used in the sardine fisheries of the Adriatic were equipped with an iron basket (Graticola) for the purpose of holding fuel which was required for artificial illumination for night fishing. Resinous pinewood was used for fuel.

The Norwegian report already quoted made this prediction. "The development of the electric light will probably lead to its more extended use in the fishery service than hitherto, but we assume that its especial use must be as a means of dazzling the fish, which will arrest them until they can be caught with other implements; therefore, its use in the pure-set and trawl-net fishing is only a question of time." However, there is little information at hand regarding the use of electric light in fishing. There has been a custom, though, in some of our Southern States whereby a gasoline torch was used to catch flounders which approach the shallow waters near shore. It was claimed by the fishermen that the strong light blinds the fish, which remain stationary in the water and, accordingly, were easily gigged or speared.

There is record, however, of the use of electric light in the collecting of bottom and surface free-swimming animals around biological research vessels.

In this connection, the first application of this important method of collection appears to have been made by the United States Fish Commission in 1884, on board the steamer Albatross. On that occasion an arc lamp was merely suspended above the surface of the water, and it was found to attract Amphipods, Squids, and young fish to the surface. In the following year the same naturalists experimented further by lowering an Edison incandescent lamp into the water, with similar good results.

Word of the Albatross' electric light fishing apparatus spread abroad and, in 1885, Oscar Hatfield, United States Consul at Batavia, directed a letter to Lieut. Commander Z. L. Tanner, of the Albatross, in which he wrote in part, "Some time ago a company was started here for the purpose of fishing by electric light. A variety of apparatus, etc., was ordered and received from Europe, a

steamer was especially constructed, etc., but the company cannot catch any fish. The result is an apparent failure and the loss of the funds invested. What system or patent is worked on the Albatross? Where can it be purchased? Any hints upon the subject will be thankfully received."

To this request, Lieut. Commander Tanner replied, "Electric lights are in constant use on board the Albatross in our work of investigations. We have used an arc light hung near the water, but the form in use at present, which has been most successful, is an Edison incandescent lamp attached to an insulated cable. Although certain species of fish in rivers, and near the coast, are attracted by a bright light, sea fish, as a rule, are rather repelled by it than otherwise. We do not use the light for the capture of edible fish, but only in collecting minute forms of crustaceans and surface specimens which we could not procure by any other means. My opinion is that the electric light would be of very little service in sea fishing."

So, whether all fish are actually attracted or repelled by light is still a moot question.