

ALTERNATIVE ARTISANAL FISHERY RESOURCES SESSION

Chairman—Carlos R. Villalobos

Comision Nacional de Pesca, San José, Costa Rica

Artisanal Fisheries for Herrings in Jamaica

GUY C. Mc N. HARVEY
Zoology Department
University of the West Indies
Mona, Kingston 7, Jamaica

RESUMEN

La industria pesquera jamaicana de la sardina (herring) está localizada casi enteramente en la costa sur, región donde la plataforma insular es más ancha. La pesca de peces costero-pelágicos pequeños ha crecido marcadamente debido a la disminución de los tradicionales recursos pesqueros del arrecife.

Ocho especies de sardinas (herring) han sido identificadas, de las cuales sólo cinco son explotadas comercialmente. *Opisthonema oglinum* es la más importante, especialmente en la pesca de Kingston Harbour y Portland Bight. Se explotan también *Sardinella braziliensis*, *S. aurita*, *Harengula jaguana* y *H. humeralis*.

Un reconocimiento detallado sobre los métodos artesanales para la captura de sardinas demostró que las redes agalleras flotantes están más en uso, seguidas por chinchorros, trasmayos, atarrayas y el cordel y anzuelo que se emplea en la pesca para carnada viva. El tamaño de la malla más en uso fluctúa desde 2.54 cm hasta 4.44 cm.

Se investigó el sistema fragmentado de mercadeo. Demostró que hay un gran número de personas, cada una manejando una pequeña cantidad de pescado fresco, lo cual acelera su rápida distribución.

Mediante un caso de estudio único, se ha obtenido la primera información estadística concerniente a la tasa de capturas y esfuerzo de los pescadores de Kingston Harbour que explotan la *Opisthonema oglinum*.

INTRODUCTION

The Jamaican fishing industry may be described as artisanal, that is, it is not highly technologically developed and is conducted by fishermen in small vessels. In Jamaican waters 75% of all catches are taken by fish traps. In descending order of importance are some other types of gear that are used: hand-lines, gill nets, beach seines, trolling lines. The use of trawls or other gear which is dragged over the sea floor is impossible in most areas due to the presence of coral growth and rocky formations (Hamblyn, 1976). 80% of the total island catch is landed on the south coast where the island shelf is widest; on the north coast the shelf is narrow and does not exceed 1 mile in width at any point (Fig. 1).

Industrial fishing for clupeids, especially *Opisthonema oglinum*, takes place in the Eastern Gulf of Mexico, where clupeids are abundant and their

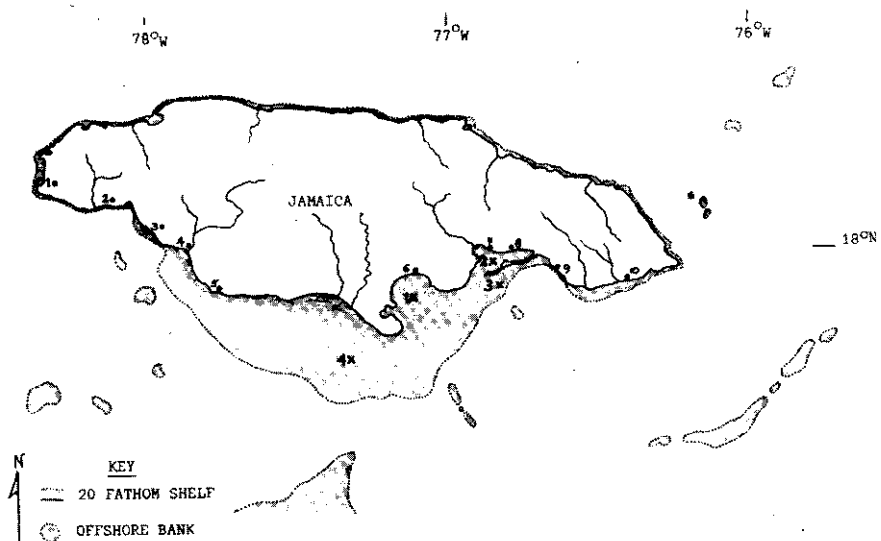


Figure 1. Jamaica: Principal Herring Fishing areas (x) and landing sites (.): 1x, Portland Bight; 2x, Kingston Harbour; 3x, Kingston Bight; 4x, South Jamaica Shelf. Herring Landing Beaches (.): 1, Negril; 2, Savanna-la-mar; 3, Whitehouse; 4, Black River; 5, Great Bay; 6, Old Harbour Bay; 7, Greenwich Town; 8, Rae Town; 9, Cow Bay; 10, Morant Bay.

fishery potential has been recognized for many years (Butler, 1961; Fuss 1968; Fuss et al., 1969; Kinnear and Fuss, 1971; Klima, 1971; Houde, 1972). Commercial fishing for clupeids around Jamaica has continued for the last 60 years, however there are as yet few data on the number of boats, nets, effort and catch. Because of a decline in the traditional inshore reef stocks, there has been a redirection of effort by many fishermen toward gill-net fishing for the relatively underexploited and readily accessible coastal pelagic fish resources (Wagner, 1974; Grant, 1980).

STUDY AREAS AND FISHING METHODS

Portland Bight, Kingston Bight and Kingston Harbour (Fig. 1) support an intensive fishery for small coastal pelagic fish—mainly clupeids, engraulids, mugilids, carangids, scombrids and hemiramphids. There are eight species of clupeids occurring around Jamaica; these are shown in order of commercial importance in Table 1.

The herring fishery predominantly utilizes surface floating mono- or multi-filament gill nets of various length, depth and mesh dimensions. Beach seines, lift nets, cast nets, dip nets, hook and line and, unfortunately, dynamite, are also used.

GILL NETS. These are floated from the surface, and, having a weighted foot rope, hang vertically in the water, nearly reaching the substrate. The use of gill nets is efficient in impoverished regions, such as the Caribbean, where

Table 1. Clupeidae of Jamaica in order of commercial importance
(Distribution is islandwide)

Scientific Name	Vernacular Name (F.A.O.)	Local Names
<i>Opisthonema oglinum</i> (Le Sueur, 1818)	Atlantic thread herring	Herring sprat, Herring, sprat, Big sea sprat
<i>Sardinella braziliensis</i> (Steindachner, 1879)	Brazilian sardinella	Bang, Black back herring
<i>Harengula jaguana</i> Poey, 1865	Scaled sardine	Sprat, Double-scaled sprat, Black-bill sprat
<i>Harengula humeralis</i> (Cuvier, 1829)	Red ear sardine	Sprat, Yellow-bill sprat, Pinchers
<i>Sardinella aurita</i> Valenciennes, 1847	Round sardinella	Bang
<i>Harengula clupeiola</i> (Cuvier, 1829)	False pilchard	Sprat, Double-scaled sprat, Black-bill sprat
<i>Jenkinsia lamprotaenia</i> (Gosse, 1851)	Dwarf herring	Cay Fry, Fry, Jagana
<i>Chirocentrodon bleekerianus</i> (Poey, 1867)	Dog tooth herring	Fry

they can be fished from small boats with minimal capital and manpower investment (Hamley, 1975). Herring fishing with gill or "sprat" nets is mostly conducted at night from dugout or fiberglass canoes which may or may not be mechanized. The net is shot at dusk across the prevailing current and is hauled within 3 h. The net is picked clean of fish which are sold immediately at the home fishing beach. The net may be set again in the same or in a different location an hour or two before dawn and is recovered soon after dawn.

Lights are used on the nets and in the tender boats to attract fish to the net and also to warn off neighboring fishermen, especially on moonless nights (Fig. 2A).

Herring are also caught at night when a gill net is set between two boats, each with a bright light (Fig. 2B). The light in each boat is alternately flashed for a short period so the herring, being attracted to the lights, swim back and forth and strike the net between the boats.

Seawater temperatures range from 25°C to 31°C. Enmeshed fish cannot remain in the water for more than 4 h because their quality deteriorates rapidly after death and they have to be discarded.

The dimensions of a typical gill net are 250 m long by 350 meshes deep with the most popular mesh for *Harengula* sp. being 2.54 cm (1") stretch mesh and 3.81 cm (1.5") or 4.44 cm (1.75") stretch mesh for *Sardinella* and *Opisthonema*, depending on availability of the netting.

Gill nets may also be used in the day to encircle a dense school of feeding

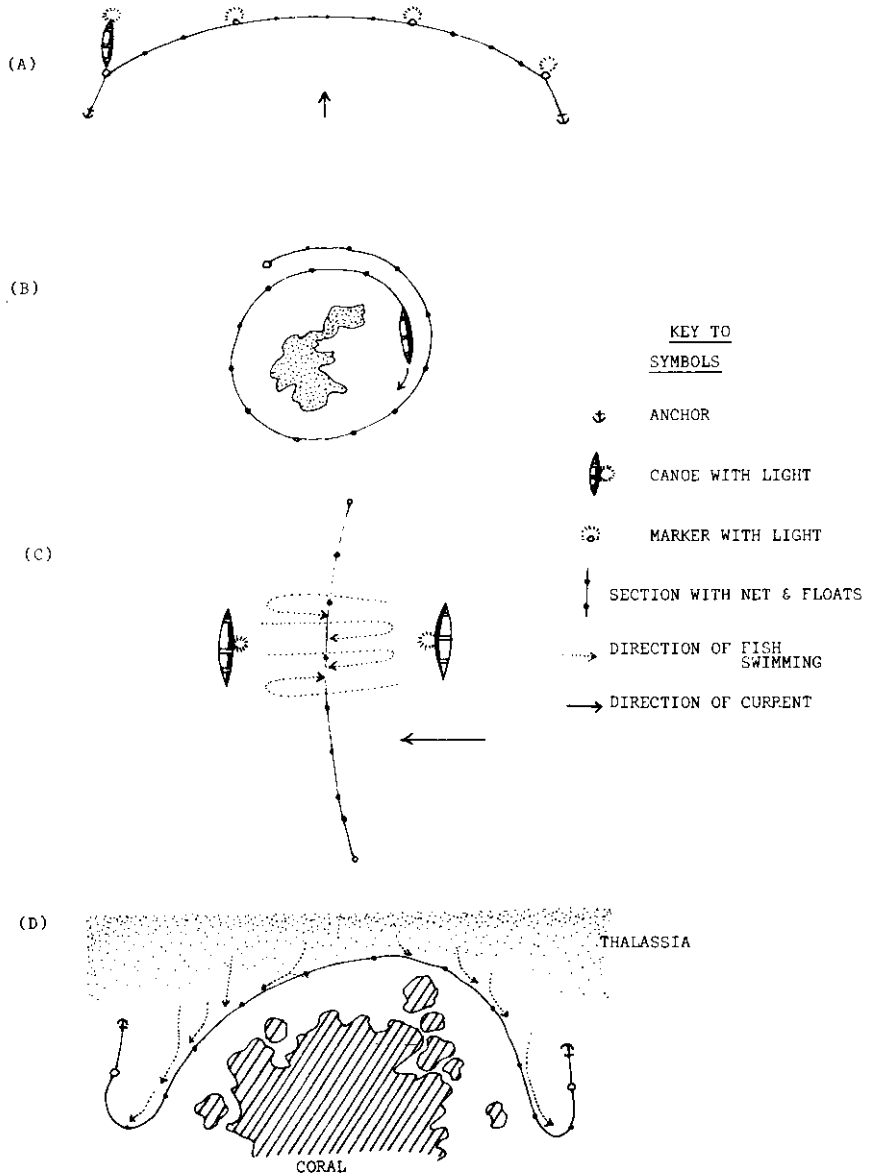


Figure 2. The Use of Gill Nets for Catching Herring: A, Standard surface floating gill net set at night; B, Use of gill net to encircle herring during the day; C, Use of lights to attract herring to net; D, Use of the trammel net during day or night (See Text For Details).

herring. The net is hardened (fish concentrated in the bag of the net) thus inducing the fish to strike the mesh (Fig. 2C).

A "Chinee" or trammel net is a gill net of varying dimensions and of a mesh larger than that found for sprat nets, either 6.35 cm (2.5") or 7.62 cm (3"). This is usually set on the bottom in a special configuration to semi-enclose a coral shoal or other underwater obstruction during the day or night (Fig. 2D). This method is directed at catching predominantly benthic fishes, but large *Opisthonema* are often caught.

BEACH SEINES. With this gear the herrings are penned and guided ashore where the total catch is hauled onto the beach or ladled into canoes. The mesh in the wings of the seine is generally 7.62 cm (3") and rapidly decreases in panels of 1.27 cm (0.5") decrements to the bunt where the mesh may be as small as 1.90 cm (0.75"). Only the smallest herring can escape this gear. When a school of feeding herring is sighted close to shore, it is partially encircled by the net, using two or more canoes. The wings of the net are then drawn close together and pulled toward the shore by men standing on the beach (Fig. 3). If the catch is large (>500 kg) the fish may be kept alive, penned in by a small area of netting in shallow water until ready for sale.

The methods outlined above are used in the capture of herrings for sale as food fish.

Small clupeids and engraulids are also widely used as a bait, especially live bait fishing. For this purpose the following methods are usually employed to capture live, undamaged individuals.

LIFT NETS. These are operated close to shore near piers or adjacent to any underwater obstruction where small herring commonly aggregate. Lift nets are square, approximately 4 m × 4 m and of mesh 0.75 cm (0.3"), stretched between two iron pipes and operated by a minimum of two men. Fish are caught undamaged by suddenly raising the net from below a passing school. The fish are then immediately placed in a live-well.

CAST NETS. These are operated in shallow water. They are of standard design and 1.90 cm (0.75") mesh. Using considerable skill, bait fish are caught and kept alive.

HOOK AND LINE. This technique is also successful at procuring live bait. *Harengula* sp. in particular are either jigged (using a treble hook) or they may be induced to bite on a small, shiny, bare hook.

MARKETING

The marketing system (for all fish) is diffuse due to the catch being landed at over 160 sites around the island. The fragmented marketing system which has evolved from the physically separated landing points employs a large number of persons each handling relatively small quantities of fish. It has been estimated that there are normally three vendors (higglers) who are directly dependent on each fisherman at a herring fishing beach.

In spite of its limitations the existing system offers considerable flexibility, keeps more people employed and ensures that fish are moved rapidly from the beach to the consumer. Herring are almost always sold in the wet or fresh

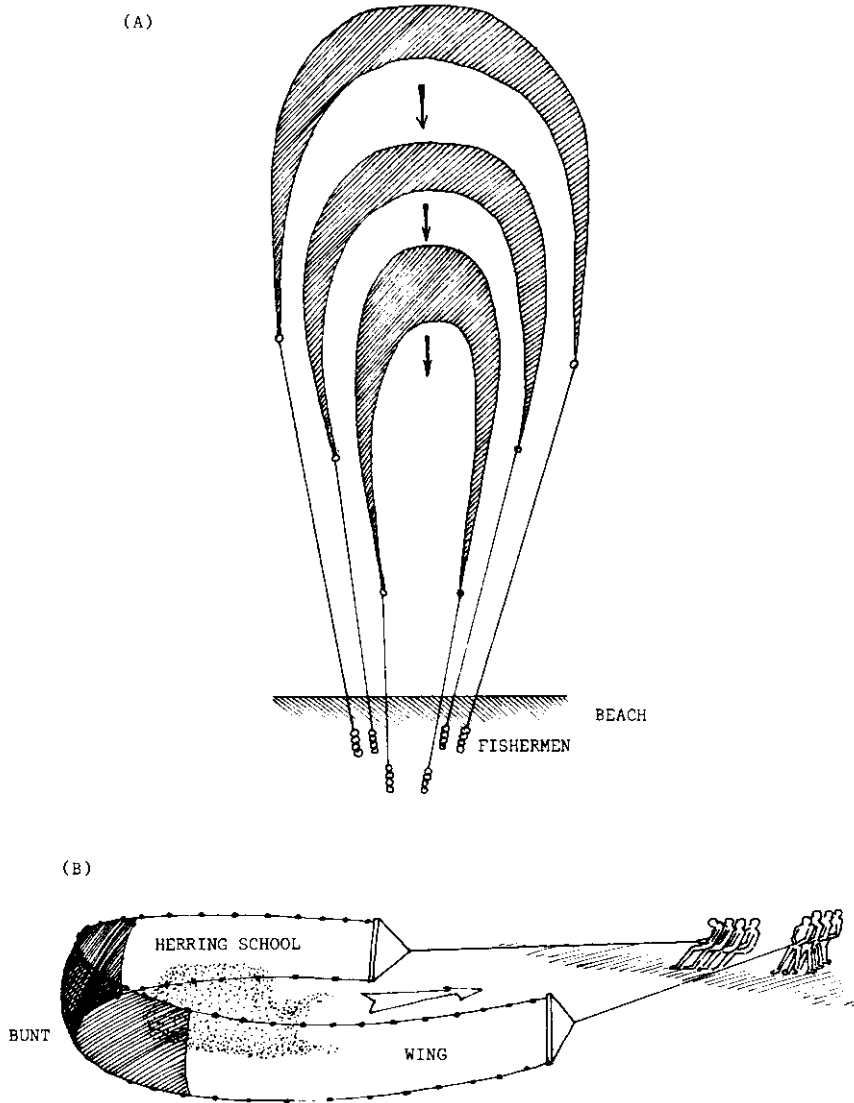


Figure 3. Beach Seine in Operation: A, Plan View; B, Lateral View.

state and they go through a vendor or other middleman with a consequent increase in price with each change of hands.

Apart from some effort in smoking large size *Opisthonema*, there is no processing of herring. The lack of development of this area of the fishing industry is related to the fact that the strong unsatisfied demand for fish leaves no surplus and this continual demand creates a high priced raw material which is economically unattractive for processors.

Currently, *Opisthonema* and *Sardinella* may be purchased at J\$1.00/lb (J\$1.20 for large herring) and then sold in uptown Kingston for as much as J\$2.00/lb, scaled and gutted. (J\$1.00 = US\$0.56).

HERRING STOCKS AND CATCHES

No form of fishing in Jamaica is subject to management, and until recently there has been no regular monitoring of catches. For the last 18 months I have used a satisfactory arrangement for collecting statistics about the Kingston Harbour thread herring fishery which are of significance for fisheries management. Great care was taken with the preparatory work of building up the confidence of the fishermen and their respective vendors. Most of this work was done at two large fishing beaches on the Kingston waterfront where marketing is hasty and competitive. The application of these findings, either whole or in part, is impractical under present conditions because activity in the fishing industry is not subject to close regulation and because of the long established practices of the fishermen which cannot easily be changed.

Table 2. Monthly catches by one fisherman operating a gill net for *Opisthonema oglinum* in Kingston Harbour, from Rae Town fishing beach

1980-1981	Highest Catch (lb)	Lowest Catch (lb)	Total Catch (lb)	Average Catch (lb)	Nights Fished (No.)
April	200	8	523	65.4	8
May	70	7	380	29.2	13
June	56	14	272	30.2	9
July	46	7	240	26.6	9
August	100	8	429	42.9	10
September	60	7	651	29.6	22
October	45	10	536	29.8	18
November	45	7	714	28.6	25
December	110	30	1211	67.7	19
January	400	16	2540	110.4	23
February	200	7	1737	82.7	21
March	400	50	2115	117.5	18
April 1980 - March 1981: Totals			11348	55	195
April	225	17	2352	87.1	27
May	104	5	588	30.9	19
June	92	8	620	47.7	13
July	100	12	530	40.8	13
August	60	6	333	25.6	13

CASE STUDY

A study of the activities of several herring fishermen working out from Rae Town fishing beach, Kingston, has resulted in the collection of a large amount of data concerning size of fish caught, catch and effort. Figures of monthly catch and effort are shown in Table 2. Knowing the number and dimension of the nets used in Kingston Harbour and the effort, it is possible to estimate an average monthly and yearly catch.

ACKNOWLEDGMENTS

This study was conducted from the University of the West Indies Port Royal Marine Laboratory as part of the UWI/ODA Fisheries Ecology Research Project.

I am grateful to the following members of staff of the Zoology Department of the University: Professor I.M. Goodbody and Dr. A. Cooper for their constructive criticism of this manuscript; Messrs C. Watson and K. Aiken for their unselfish assistance in the field.

LITERATURE CITED

- Butler, J.A.
1961. Development of a thread herring fishery in the Gulf of Mexico. United States Fish and Wildlife Service. *Comm. Fish. Rev.* 23(9): 12-16.
- Fuss, C.M.
1968. The new thread herring fishery in Eastern Gulf of Mexico. *Comm. Fish. Rev.* 30(6): 36-41.
- Fuss, C.M., Kelly, J.A. and Prest, K.W.
1969. Gulf thread herring: Aspects of the developing fishery and biological research. *Proc. Gulf Caribb. Fish. Inst.* 21: 111-125.
- Grant, C.J.
1981. Gill net selectivity and catch rates of coastal pelagic fish in Jamaica. *Estuarine Coast. Shelf Sci.* 12: 167-175.
- Hamblyn, E.
1976. Jamaican fishing industry report. Ministry of overseas Development. London.
- Hamley, J.M.
1975. Review of gill net selectivity. *J. Fish. Res. Bd. Can.* 32 (11): 1943-1969.
- Houde, E.D.
1972. Estimating abundance of sardine-like fishes from egg and larval surveys, eastern Gulf of Mexico. Preliminary report. *Proc. Gulf Caribb. Fish. Inst.* 25: 68-77.
- Kinnear, B.S. and Fuss, C.M.
1971. Thread herring distribution off Florida's West Coast. *Comm. Fish. Rev.* 33(7-8): 27-29.
- Klima, E.F.
1971. Distribution of some coastal pelagic fishes in the western Atlantic. *Comm. Fish. Rev.* 33(6): 21-34.
- Wagner, D.P.
1974. Results of live bait and pole and line fishing exploration for pelagic fishes in the Caribbean. *Mar. Fish. Rev.* 36(9): 31-35.