



Environment Canada    Environnement Canada  
Fisheries and Marine Service    Service des pêches  
et des sciences de la mer

DFO - Library / MPO - Bibliothèque



09839369

# Types of Commercial Smelt Fishing Gear, Restigouche River Estuary, Chaleur Bay, New Brunswick, 1974

by

J.L. Peppar and R.S. Blair

Information Publication No. MAR/N-77-1

Freshwater and Anadromous Division  
Resource Branch  
Maritimes Region



TYPES OF COMMERCIAL SMELT FISHING GEAR,  
RESTIGOUCHE RIVER ESTUARY,  
CHALEUR BAY, NEW BRUNSWICK, 1974

J.L. PEPPAR AND R.S. BLAIR

FEBRUARY, 1977

INFORMATION PUBLICATION NO. MAR/N-77-1

FRESHWATER AND ANADROMOUS DIVISION  
RESOURCE BRANCH  
FISHERIES AND MARINE SERVICE  
DEPARTMENT OF FISHERIES AND THE ENVIRONMENT

HALIFAX, NOVA SCOTIA

## CONTENTS

LIST OF ILLUSTRATIONS. . . . .	v
INTRODUCTION . . . . .	1
SCOPE OF SURVEY AND METHODS. . . . .	1
RESULTS. . . . .	1
Bag Net With Trap . . . . .	3
Description. . . . .	3
Setting. . . . .	3
Fishing. . . . .	8
Bag Net Without Trap. . . . .	8
Description. . . . .	8
Setting. . . . .	10
Fishing. . . . .	10
Double-Ender Box Net. . . . .	10
Description. . . . .	10
Setting. . . . .	10
Fishing. . . . .	14
Single-Ender Box Net. . . . .	14
Description. . . . .	14
Setting. . . . .	14
Fishing. . . . .	16
Big-Mouth Box Net . . . . .	16
Description. . . . .	16
Setting. . . . .	16
Fishing. . . . .	16
MATERIALS USED IN NETS . . . . .	16
CARE AND DURABILITY OF NETS. . . . .	19
FISHING TIME AND CREW SIZE . . . . .	19
HANDLING OF CATCH BY FISHERMEN . . . . .	20
REGULATIONS ESTABLISHED IN THE 1974 FISHING SEASON . . . . .	20
<u>PHOTOGRAPHS</u>	
APPENDIX A: EQUIPMENT - GENERAL. . . . .	21
APPENDIX B: OPERATIONS - BAG NETS. . . . .	23
APPENDIX C: OPERATIONS - BOX NETS. . . . .	27
ACKNOWLEDGEMENTS . . . . .	29
REFERENCE. . . . .	31

## LIST OF ILLUSTRATIONS

FIG. 1.	Locations of commercial smelt nets sampled in Restigouche River estuary and Chaleur Bay. . . . .	2
FIG. 2.	Bag net with trap: side view . . . . .	4
FIG. 3.	Bag net with trap: plan view . . . . .	5
FIG. 4.	Bag net with trap: end view. . . . .	6
FIG. 5.	Bag net with trap: plan view detail of toggle. . . . .	7
FIG. 6.	Bag net without trap: side view. . . . .	9
FIG. 7.	Double-ender box net: side view. . . . .	11
FIG. 8.	Double-ender box net: plan view. . . . .	12
FIG. 9.	Double-ender box net: end view . . . . .	13
FIG. 10.	Single-ender box net: plan view. . . . .	15
FIG. 11.	Big-mouth box net: side view . . . . .	17
FIG. 12.	Big-mouth box net: plan view . . . . .	18

## INTRODUCTION

A survey of commercial fishermen engaged in a winter (ice) fishery for smelt (*Osmerus mordax*) in Restigouche County, New Brunswick, was conducted in 1974 to gather catch and effort data, and smelt samples for biological analyses.

## SCOPE OF SURVEY AND METHODS

The survey covered nets (under licenses issued in New Brunswick) in the Restigouche River estuary and Chaleur Bay, from Dalhousie Junction (about 13 km west of Dalhousie) to Benjamin River (about 23 km east of Dalhousie) (Fig. 1). Information on the fishery was obtained through close cooperation with the fishermen involved, local fishery officers (Conservation and Protection Branch) and fish buyers. Catch statistics collected by the survey have been presented (Peppar 1976).

This report presents data on the construction, setting and fishing of the various types of smelt nets. Data were obtained by first-hand observation of the gear, and of the setting and fishing operations.

## RESULTS

The smelt-fishing gear employed falls into two major categories, with five sub-types: bag nets (with and without a trap), operating in the estuary; and box nets (double-ender, single-ender and big-mouth), operating in the estuary and Chaleur Bay. The two most common types of gear employed are the bag net with trap and the double-ender box net.

In 1974, the following numbers of nets of each type were in operation:

bag nets (4 fishermen)	- with trap (14)
	- without trap (0)
box nets (11 fishermen)	- double-ender (25)
	- single-ender (2)
	- big-mouth (2)

None of these nets are fished in open water; all are fished through the ice. When the ice is considered safe and permanent, gear is "hauled out" by snowmobile or horse-drawn sleigh. The setting site is located by reference to landmarks and/or by sounding through holes cut in the ice. The direction of current flow is ascertained and the net is set relative to this, as required. Specific setting procedures will be discussed for each gear type.

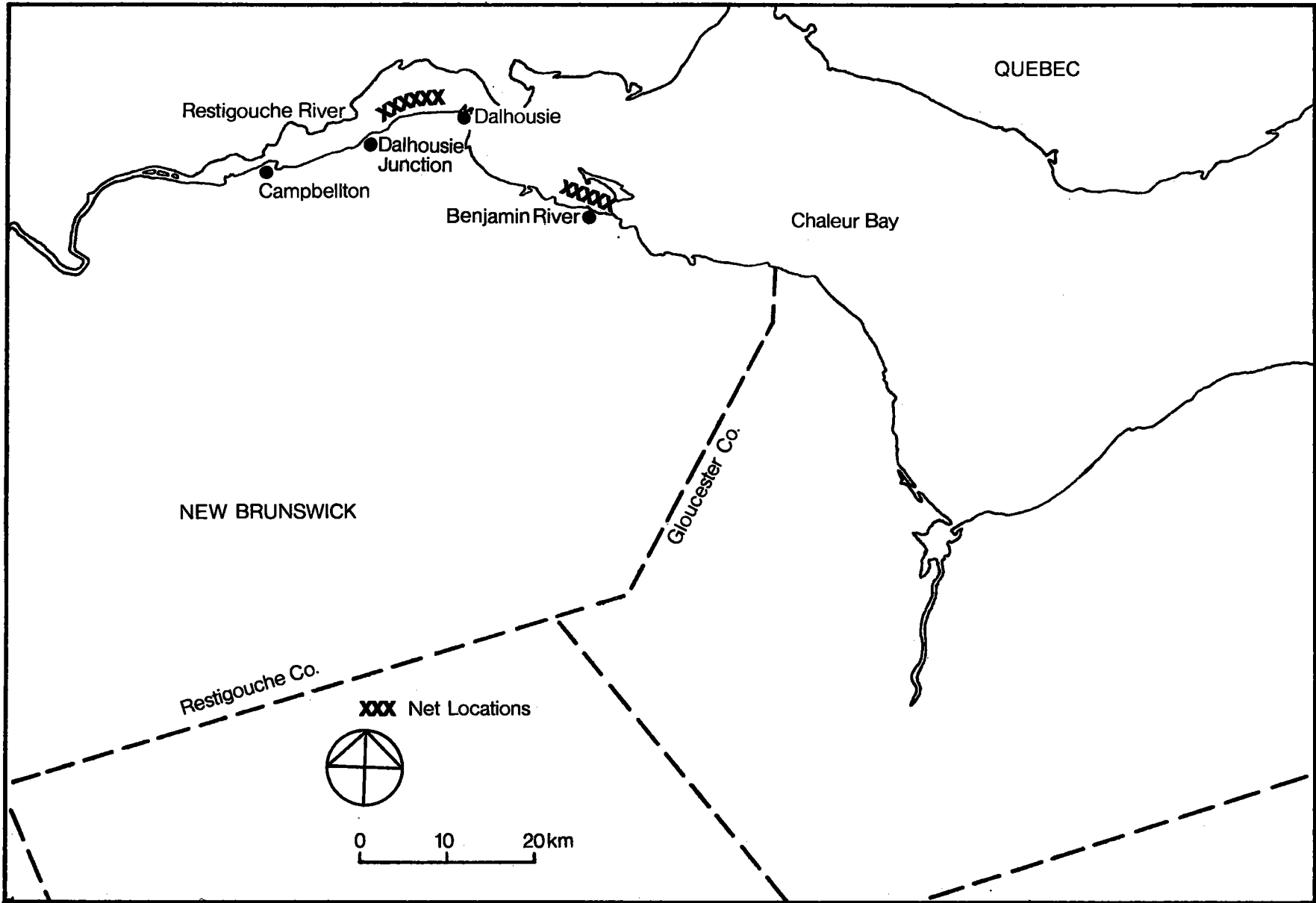


FIG.1. Map of Restigouche estuary and Chaleur Bay showing location of smelt nets.

## Bag Net With Trap

### Description

A bag net (Figs. 2-5) is set and fished through an oblong "fishing hole", about 0.6 m in width and 0.9-1.2 m longer than the width of the net. The hole lies perpendicularly to the direction of tidal flow.

At each end of the hole is an upright wooden picket. These pickets have a diameter of up to 0.6 m at the butt-end and a length of up to 18.3 m, depending on current strength and water depth. Each picket is weighted at the butt-end with sand-bags and/or steel rails of sufficient weight to sink it about 1.5 m into the bottom substrate. The tops of pickets are braced by a horizontal picket or "brail", tied across at a height of about 3 m above the ice surface (at low tide). Each upright picket has two pulleys, one near bottom (below water) and the other near the top. Two hardwood "toggles" (see detail, Fig. 5) move freely on each picket. At each picket a rope passes through both pulleys and is tied to the bottom toggle. The four toggles provide the means by which the net itself is attached to the supporting frame of upright pickets and brail.

A bag net with trap is basically an open-mouthed tapered sock, with a funnel-shaped secondary structure within. The small end or "bunt" is also open, but is normally tied closed by a bunt rope. The net is considered to have three major sections: mouth, trap and bunt. At each corner of the mouth a steel hook is attached to the net. These hooks are hooked into the toggle loops (Fig. 5), thus, anchoring the net to the supporting frame. However, the net is free to "bag" in the direction of tidal flow.

### Setting

Most bag nets are set in the main channel of the Restigouche River estuary. These nets fish in about 12.2 m (40 ft) of water at low to mid tide. Other bag nets are set in shallower water between the channel and the shore. These nets are smaller, but of similar construction. Setting and fishing methods are identical, regardless of net location or size.

Two bag nets are sometimes set side by side to form a "stand". Regulations specify that stands of bag nets be spaced at least 91.4 m apart when located one above the other (east and west) and 45.7 m apart when located side by side in the river (north and south).

The following is a typical setting procedure for a bag net with trap. The site is determined and the fishing hole is cut across the tide. The weighted pickets, complete with pulleys, toggles and pulley ropes, are planted in the substrate at each end of the fishing hole. The brail is then tied across the pickets.

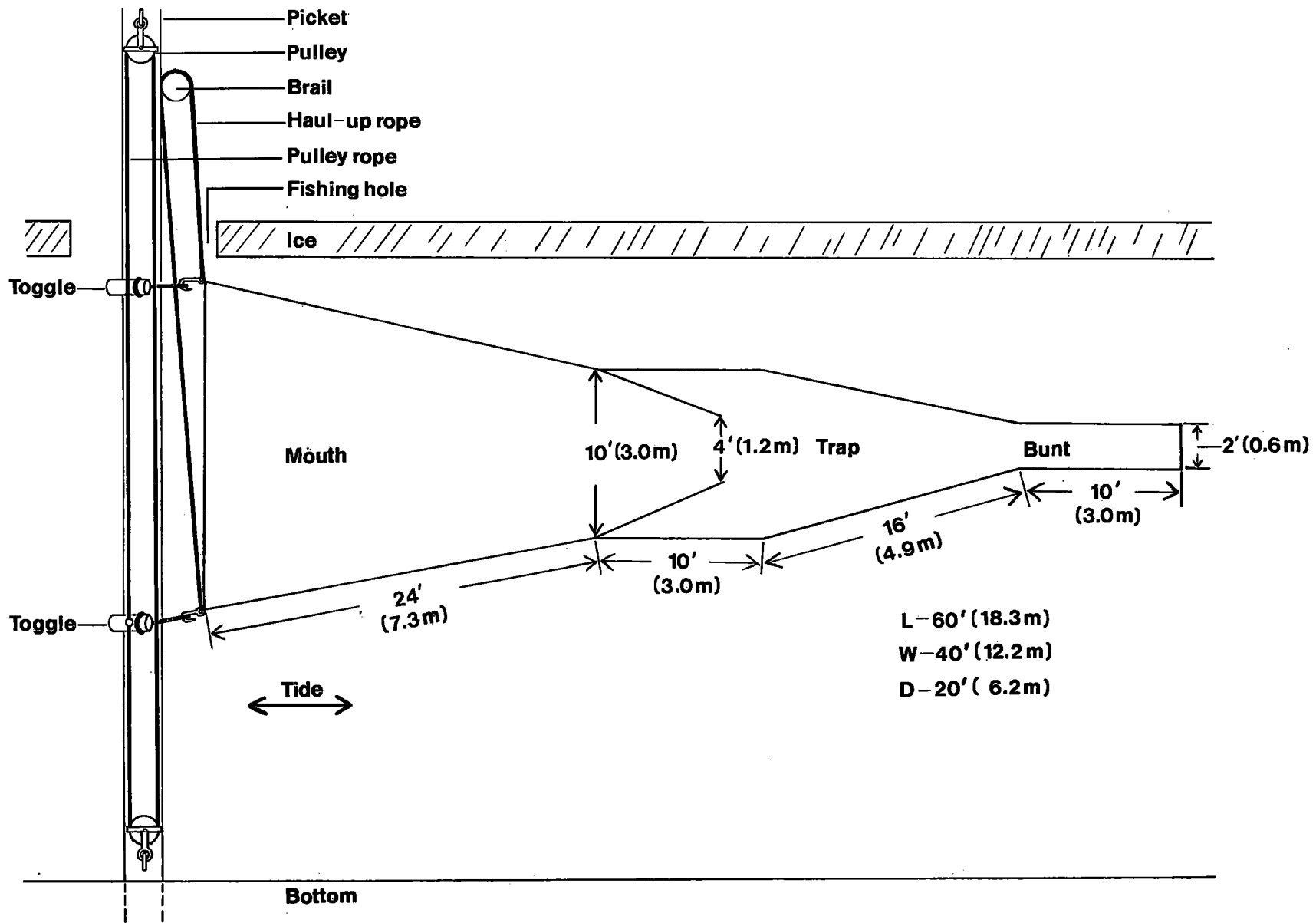


FIG. 2. Bag net with trap: side view.

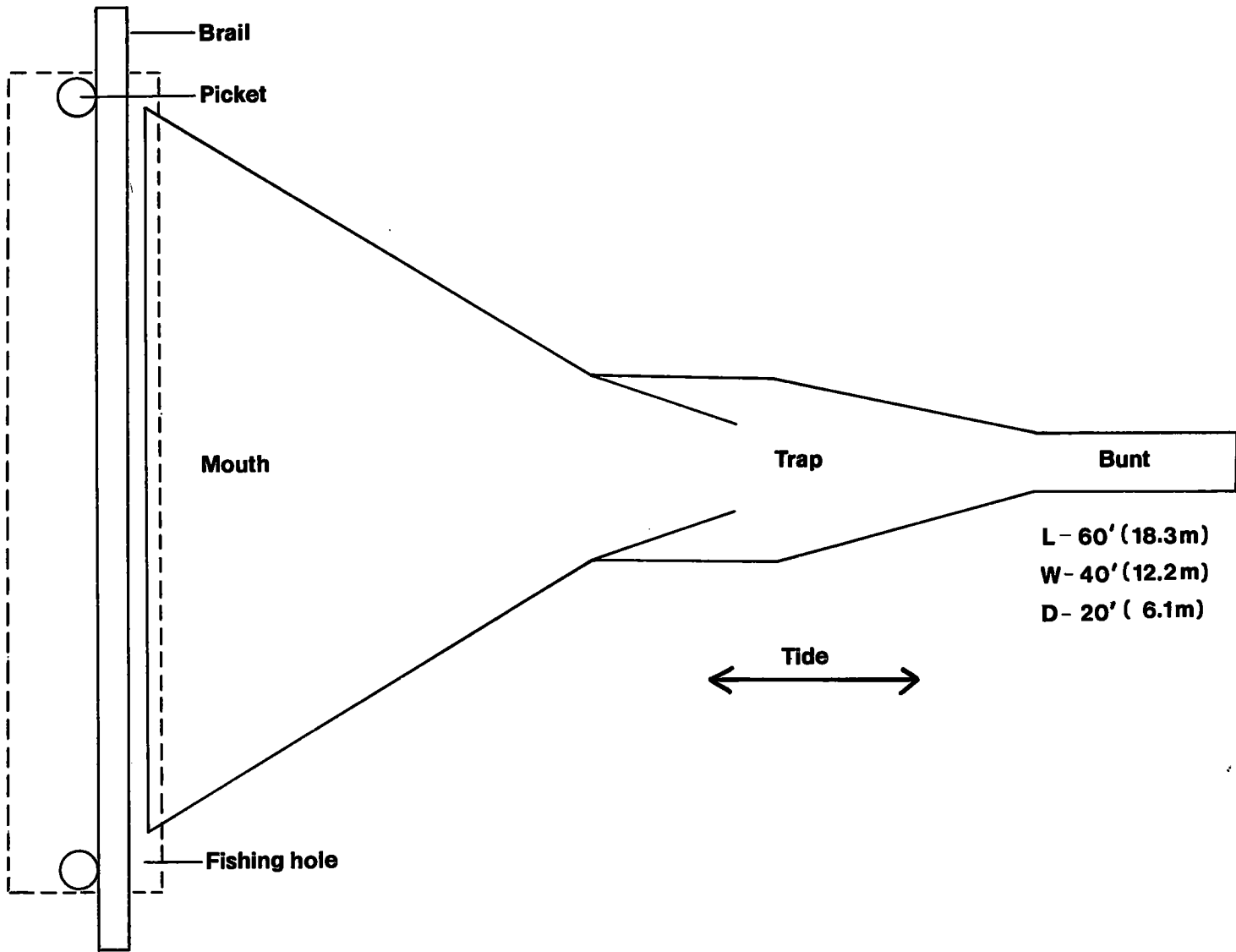


FIG. 3. Bag net with trap: plan view.

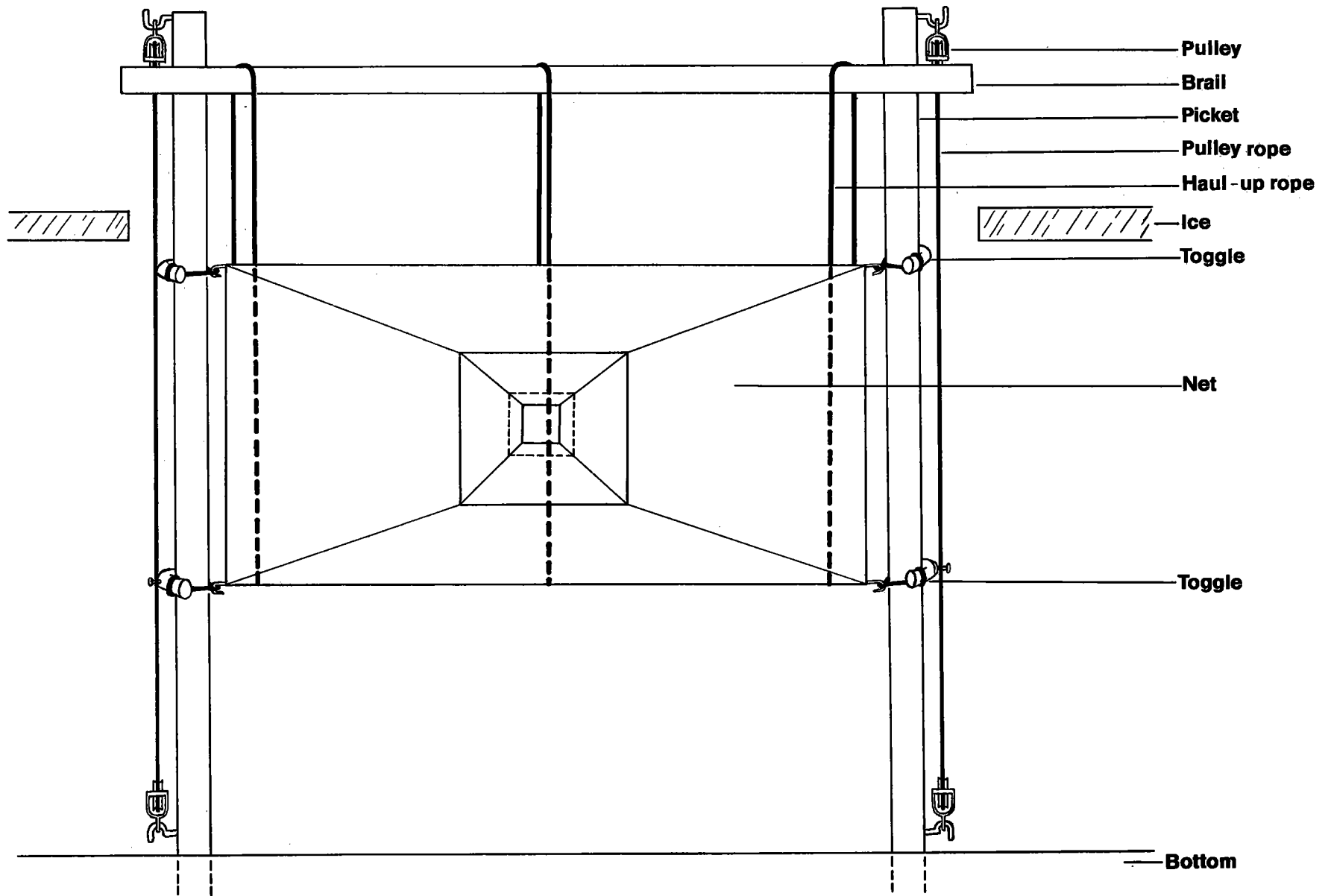


FIG. 4. Bag net with trap: end view

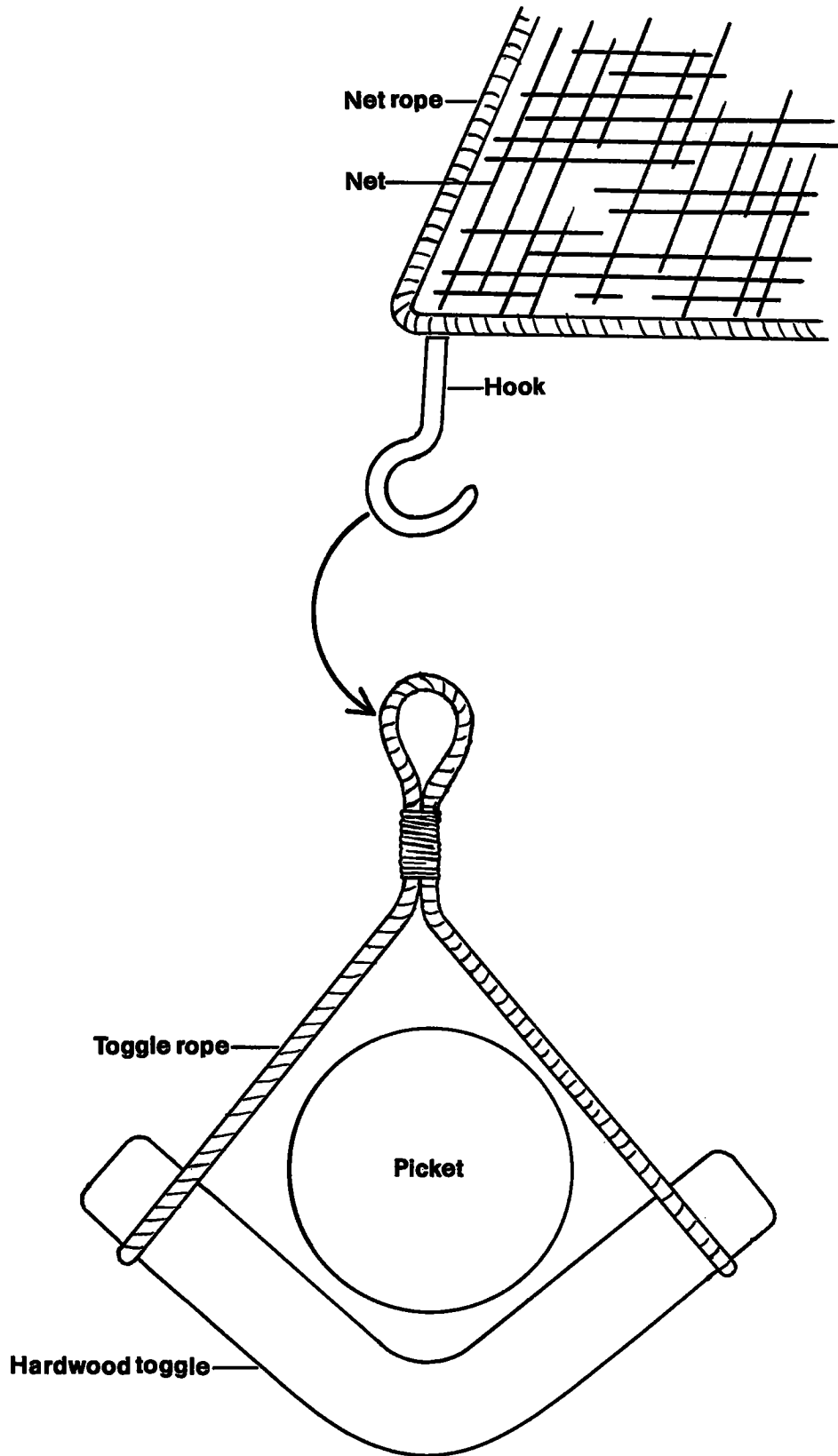


FIG. 5. Bag net with trap: plan view detail of toggle.

The net is spread out on the ice adjacent to the fishing hole. Three "haul-up" ropes are passed over the brail and each is attached to top and bottom mouth ropes of the net (Figs. 2 and 4). The pulley ropes are hauled so as to bring the toggles to the water surface, and the hooks on the mouth of the net are hooked to the toggles. The net is then pushed into the fishing hole; bottom toggles are pulled down the pickets by the pulley ropes and top toggles are pulled up the pickets by pulling up the haul-up ropes. The net is now properly set, i.e., the mouth is fully opened and the net is stretched out or "bagging" in the direction of current flow. Pulley ropes and haul-up ropes are secured to pickets so the net will hold its shape.

### Fishing

Bag nets are fished for a 10-day period during each 14-day "set of tides". During this time nets are fished four times daily, at roughly 6-hr intervals, when the tide is about to turn. Between fishing periods the net is either removed from the water for cleaning and/or repairs, or left in the water tied in such a manner that it is not fishing.

Fishing a bag net begins with the pulley ropes and haul-up ropes being untied. The pulley ropes are pulled, causing the bottom toggles to come to the surface of the water. The toggles on each picket are now together and the mouth of the net is "closed". The haul-up ropes are pulled so as to bring the top and bottom mouth ropes onto the ice next to the fishing hole. Two men, one working from each side toward the center of the net, haul the net onto the ice—fishing back through the mouth area, into the trap, and finally to the bunt. Fish contained in the net are shaken back from the mouth and trap areas into the bunt as they haul. The bunt is hauled onto the ice and untied, and the fish are removed. Then the hooks are "changed" (details follow), the bunt is retied, and the net is reset.

Each time a bag net is fished the hooks are "changed", i.e., at each picket, the hook which had been attached to the top toggle is attached to the bottom toggle and vice versa. This operation is necessary because a bag net is anchored only at one end, the mouth end; and, therefore, is free to bag up- or down-river according to current direction. Changing the hooks allows the net to swing through a 180° arc when the current direction changes. Sometimes, due to poor catches, or severe weather conditions, a net is not fished every 6 hours, i.e., with every change of tide direction. However, it is still necessary to haul the toggles to the water surface and change the hooks.

### Bag Net Without Trap

#### Description

The only difference between this type of net (Fig. 6) and the

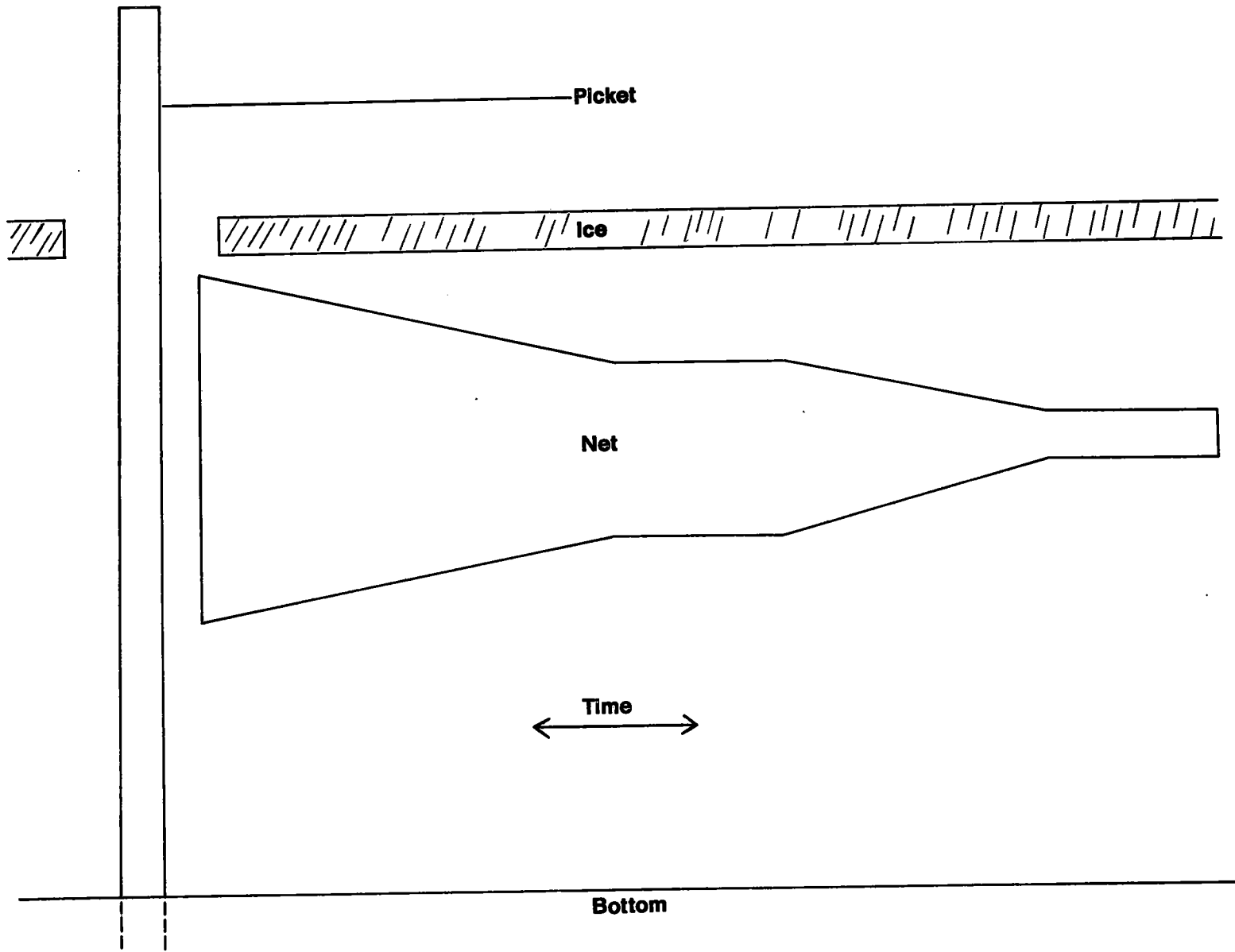


FIG. 6. Bag net without trap: side view.

bag net with trap is that there is no secondary structure (trap) within the main sock.

### Setting

Since this net has no trap to deter fish from escaping, it is usually set in areas of strong tide, where the force of the flowing water suffices to keep fish in the bunt end. This type of net is set in the same manner as the bag net with trap.

### Fishing

This type of net is also fished in the same manner as the bag net with trap.

## Double-Ender Box Net

### Description

A double-ender box net (Figs. 7-9) is rectangular in shape, has two traps and two bunts, and is completely enclosed except for a 1.8-2.4 m gate in one side, at the mid-point of the length. Unlike a bag net which is anchored to the bottom with pickets, a box net is anchored to the ice. This is done by five tie-back ropes. These ropes attach to the four top corners and the mid-point of the length opposite the gate, pass up through holes in the ice and tie to short pickets frozen in the ice. The four bottom corners and mid-point of the length opposite the gate, are weighted.

The fishing hole lies across the length of the trap (and across the direction of current) at the mid-point of the length.

A 30.5-m leader leads into the gate of the box (trap). The leader is attached at 6-m intervals to pickets frozen in the ice and is weighted at 3-4.6 m intervals.

The bottom corners of a box net are sometimes "tied-back" in the same manner as the top corners. This is done in areas of strong tide, where the weights may not be sufficient to hold the net in shape. These bottom "tie-backs" are not shown in the figures and are not mentioned in describing the setting and fishing procedures.

### Setting

Box nets are set in from 2.4 to 6.1 m of water. Usually they fish to the bottom at low to mid tide and are suspended 0.9-1.2 m off the bottom when the tide is high.

The setting procedure for the double-ender box net is as

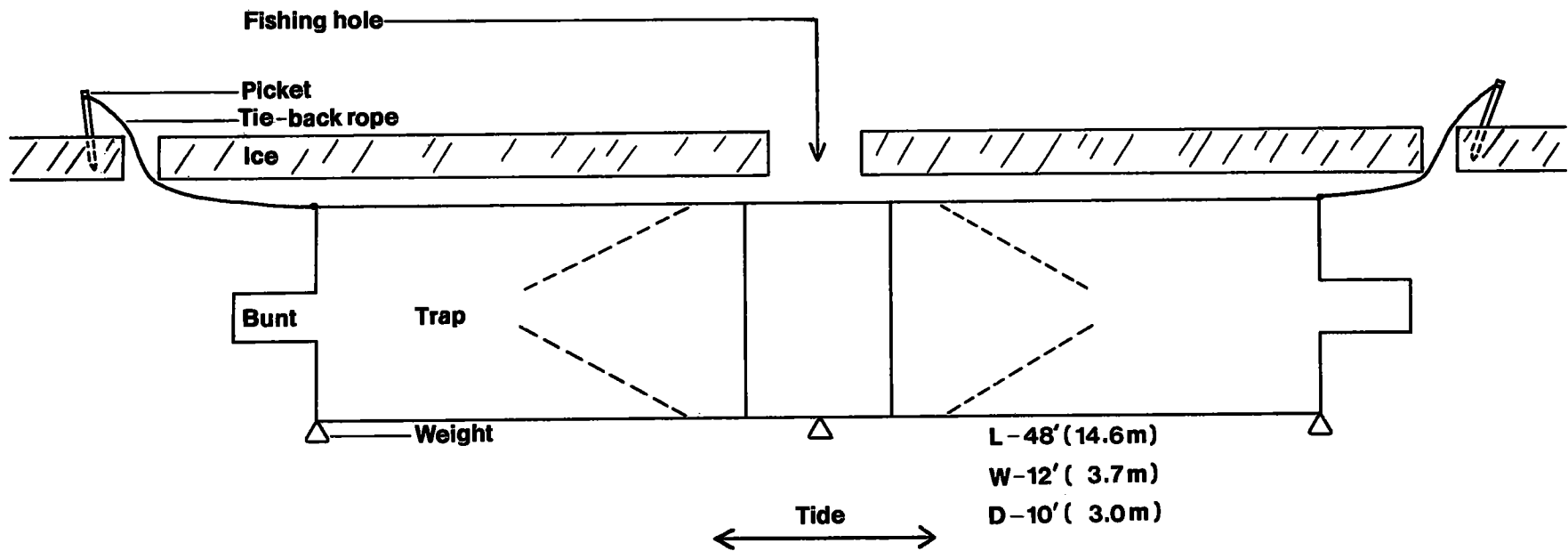


FIG. 7. Double-ender box net: side view.

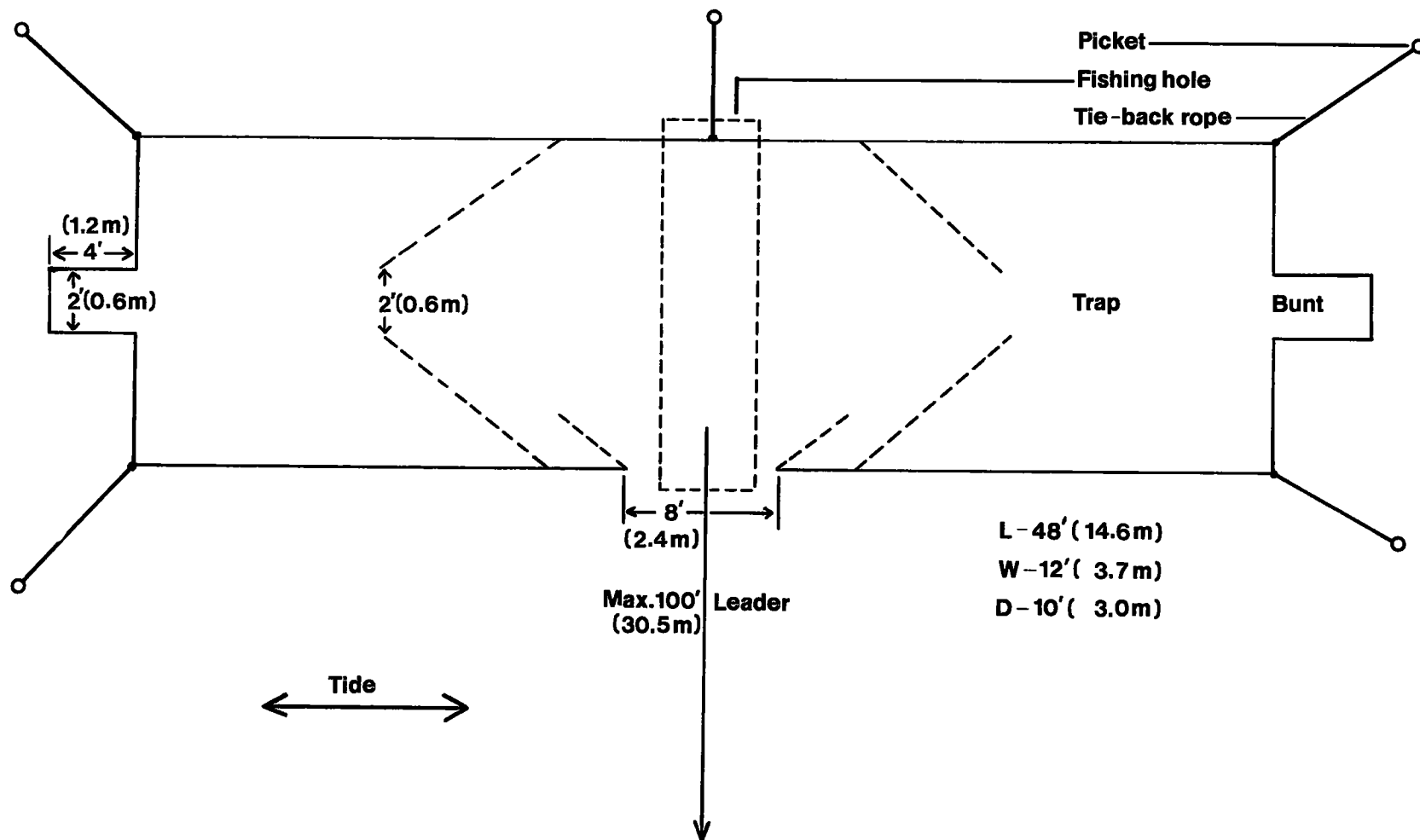


FIG. 8. Double-ender box net: plan view.

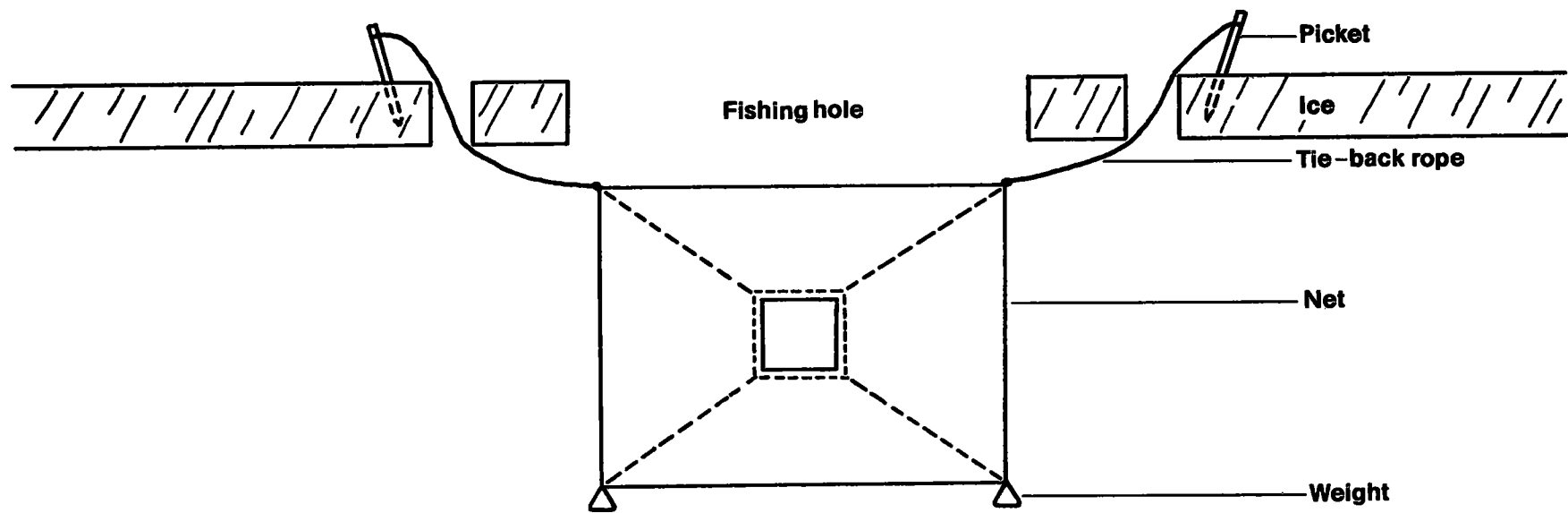


FIG. 9. Double-ender box net: end view.

follows. The site is located and the direction of current is ascertained. The fishing hole is cut across the current. Distances are measured off on the ice to locate the smaller holes through which the tie-back ropes will pass. These holes are then cut. Lines are passed underneath the ice from these holes to the fishing hole. There is no set procedure or sequence for this part of the operation; however, it is carried out in such a way that the direction of current at the time of setting facilitates passing the lines from one hole to another. This part of the setting operation is the most difficult and time-consuming.

With all lines in position, the net is laid out on the ice adjacent to the fishing hole. Weights are then attached to the bottom rope of the net. The lines, which become the tie-back ropes, are attached to the top rope of the net at the four corners and mid-point of the length. Tie-back ropes are then hauled, and the net is pulled into the water through the fishing hole and gradually moved into position beneath the ice. Tie-back ropes are then secured to the pickets, thus, holding the net in shape. In a similar manner, the leader is brought into position and secured.

### Fishing

Box nets can be fished at any time in the daily tide cycle and with any frequency. When catches are good, they may be fished twice a day; when catches are poor, or weather severe, they may be fished only once or twice a week.

Fishing procedure is as follows. The tie-back ropes on one end of the net are slackened; then, this end of the net is gradually hauled onto the ice through the fishing hole. As the net is hauled, fish are "shook back" from the trap into the bunt. The bunt is untied and the fish removed; the bunt is then retied. The tie-back ropes are tightened, hauling the net back into position beneath the ice. Tie-back ropes are then secured. The other end of the net is then fished and reset in the same manner.

## Single-Ender Box Net

### Description

A single-ender box net (Fig. 10) is essentially one end of a double-ender, i.e., it has only one trap and one bunt. Also, the lead and entrance are located in the end opposite to the bunt, rather than mid-way along one side, as in the double-ender.

### Setting

Single-ender box nets are set only in areas where the current is not strong. Since this net is set with its length perpendicular

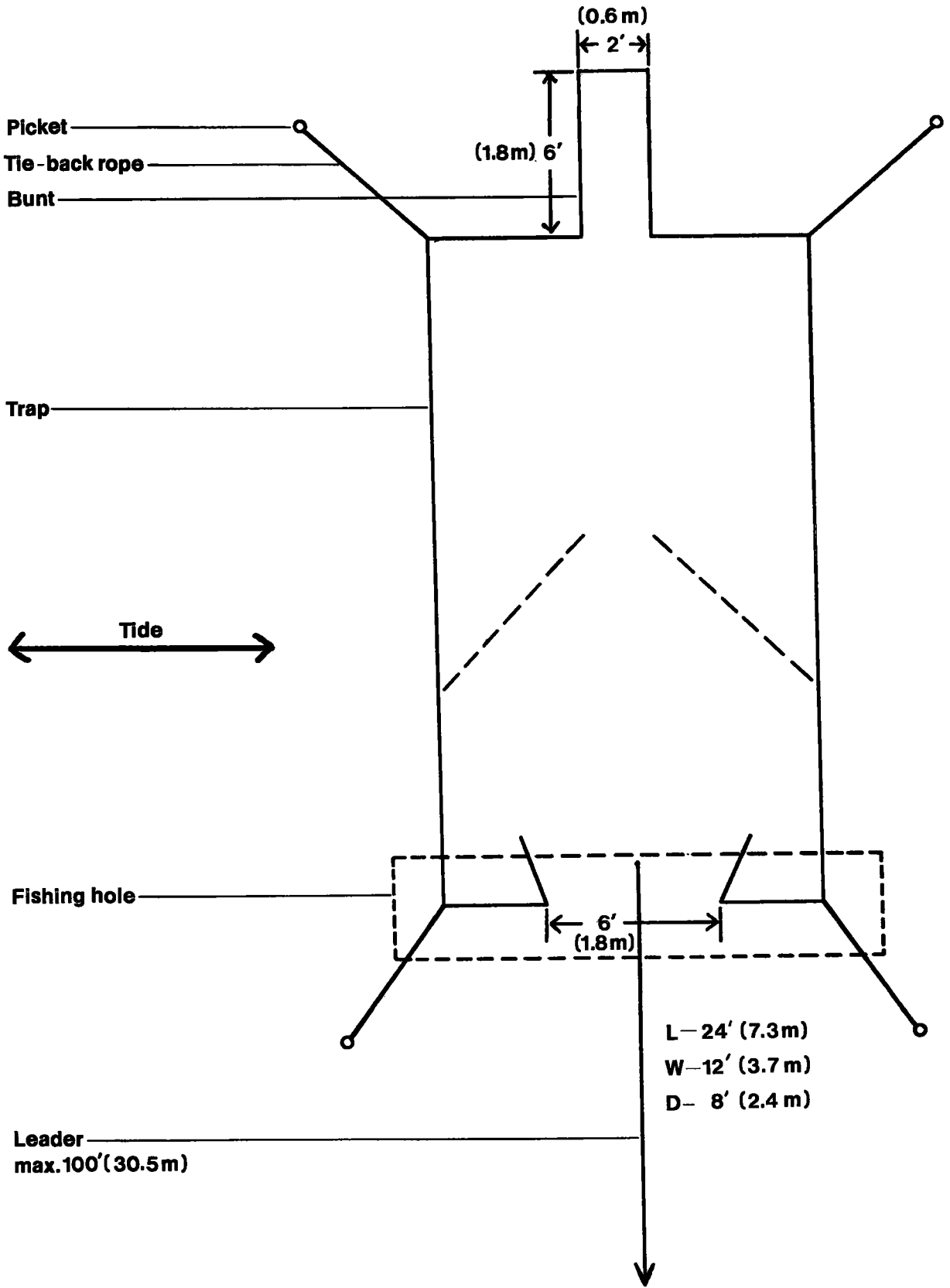


FIG. 10. Single-ender box net: plan view.

to the direction of tidal flow, a strong current tends to deform it or cause it to lose its shape, such that the gate into the trap may be practically closed.

The procedure for setting this type of net is essentially the same as that for setting in the double-ender box net.

### Fishing

A single-ender box net is fished in the same manner as the double-ender.

## Big-Mouth Box Net

### Description

A big-mouth box net (Figs. 11 and 12) incorporates features similar to both a bag net and single-ender box net. Like a bag net, it has no leader. Fish are "led" into the trap by a funnel-shaped mouth. The mouth has a bottom and two sides, but no top; the under surface of the ice serves as the top of the mouth. The mouth is attached to the ice with short pickets and ropes. At the small end of the mouth is the trap, which is simply one end of a double-ender box net.

A big-mouth box net fishes only "one-way", i.e., depending on whether the mouth opens up- or down-river. Thus, it traps fish moving up- or down-river, respectively.

### Setting

A big-mouth box net can be set in any depth of water and in any strength of current. Techniques used in setting this type of net are essentially the same as those employed in setting other box nets. The mouth end of the net is set first.

### Fishing

A big-mouth box net can be fished at any time of the tide and as frequently as desired. The fishing procedure is generally the same as that employed for the other box nets.

## MATERIALS USED IN NETS

Some nets, the older ones, are constructed of cotton web and manila rope. The newer nets are constructed of either knit or bonded nylon web. Nylon or polypropylene rope is used.

Few nets are made from bonded web, but one bag net in the north channel of the estuary had this type of web and had an

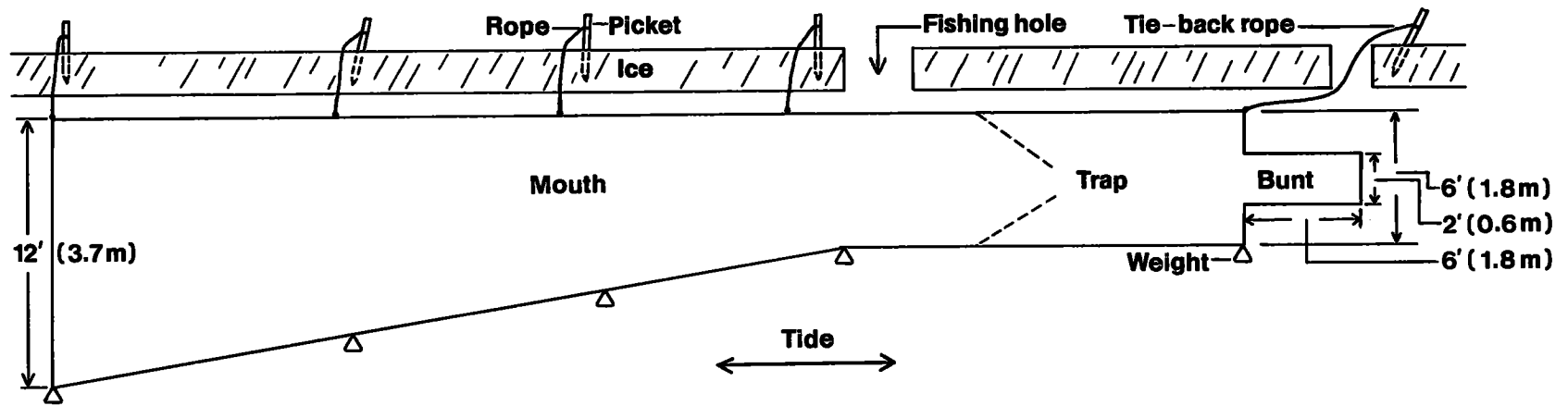


FIG. 11. Big-mouth box net: side view.

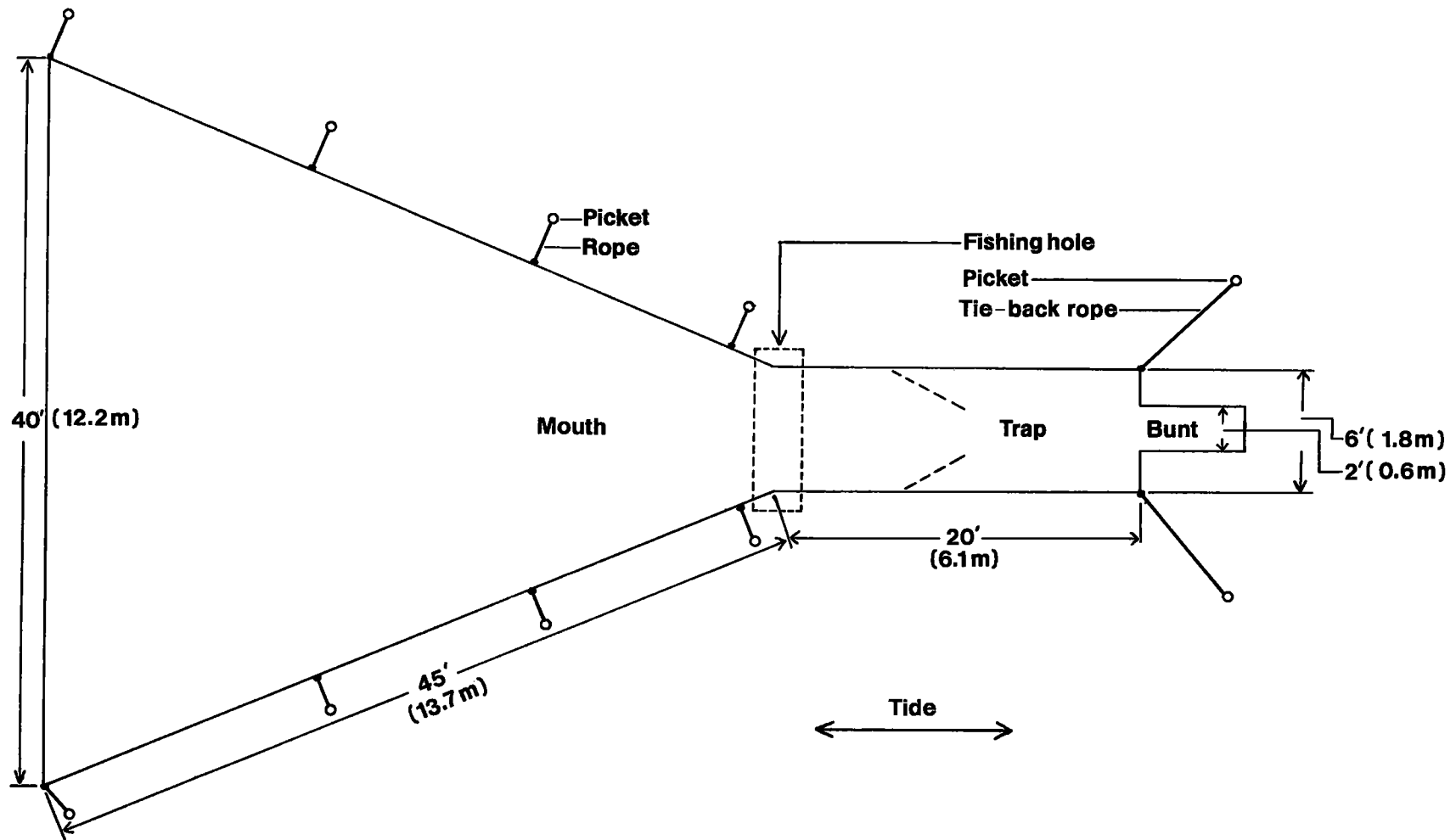


FIG. 12. Big-mouth box net: plan view.

interesting advantage over the knit variety simply because it has no knots. If a bag net is improperly tended and the hooks are not changed when the tide turns, the net may eventually roll up around the mouth ropes. A net can roll up tightly and be very difficult to disentangle. This task is much easier if the net is constructed of bonded web, simply because there are no knots to bind the rolled up net.

Web is generally 1 1/8-inch mesh. The box nets have 1 1/8-in. mesh in the trap; the leader mesh varies from 1 1/8-in. up to a maximum of about 2-in. mesh. The bag nets all employ 1 1/8-in. mesh in the trap and bunt areas. The web used near the mouth in these nets is usually larger, up to a maximum of 2 in.

Rope is generally 3/8 in. or 1/2 in. in diameter. Smaller rope can be used for the tie-back lines on a box net and larger rope is always used for the pulley ropes at either side of a bag net.

#### CARE AND DURABILITY OF NETS

Nets, whether cotton or nylon, are not treated in any way by the fishermen. When hauled at the end of the fishing season, nets are cleaned, dried and stored.

Various fishermen stated the life-expectancy of a nylon net at anywhere from 5 to 20 years. One fishermen reported that he used the same cotton bag net for 20 successive seasons. This is probably a maximum; the average durability of a cotton net is considered lower than that of the nylon.

If a fisherman has more than one net, he will usually place his oldest net in a location where there is less current, dirt and the like. As he buys newer nets, he places them in the locations where tide is strongest. By such rotation he gets maximum life from his nets.

#### FISHING TIME AND CREW SIZE

Box nets are fished by one or two men. Fishing time in good weather with no difficulties encountered is 1/2-1 hr per net.

The north channel bag nets are fished by two or more men. Fishing time is usually 20-30 minutes per net. The smaller bag nets were, at most times, fished by one man. Fishing time would be about 30 minutes. There were two crews fishing bag nets in the north channel; one crew (2 or 3 men) fished four nets, the other crew (4-6 men) fished six nets.

## HANDLING OF CATCH BY FISHERMEN

The catch from the north channel bag nets is, weather permitting, frozen in the ice. The catch is dumped from the bunt onto the ice, spread out, scrap fish picked out, and the smelt left to freeze. If it is snowing or mild, the fish are covered. The frozen smelt are bagged or boxed and hauled ashore once a day, where they are picked up by the buyer. No systematic grading of the catch takes place on the ice. Occasionally the fish are hauled ashore "green" (unfrozen) if the buyer is expected to be there.

The catch from all other nets is generally hauled ashore green and frozen on a garage or shed floor, outdoor platform, or hand-cleaned area on the snow. Most of these fish are sold locally at the fisherman's home.

REGULATIONS ESTABLISHED IN THE  
1974 FISHING SEASON

The open season for smelt extended from October 15 to March 31. There were no restrictions on who could buy a license; however, one license/net was required. Licenses specified either "box" or "bag" and cost \$1.00/net regardless of net type.

Nets could be set anywhere; the license did not specify a particular site. It was allowable to set two bag nets side by side to form a "stand". However, should such a stand be placed in a channel, it had to be situated such that two-thirds of the channel remained unblocked.

The allowable leader length for a box net was set at 100 feet.

## APPENDIX A

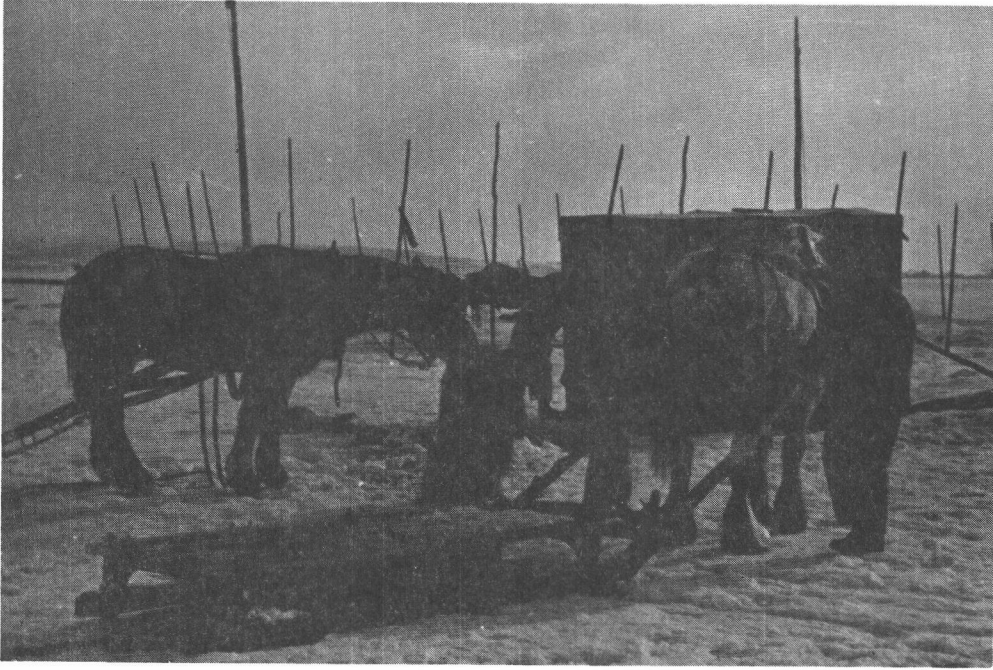
## EQUIPMENT — GENERAL



Fishing shanty, near bag nets.



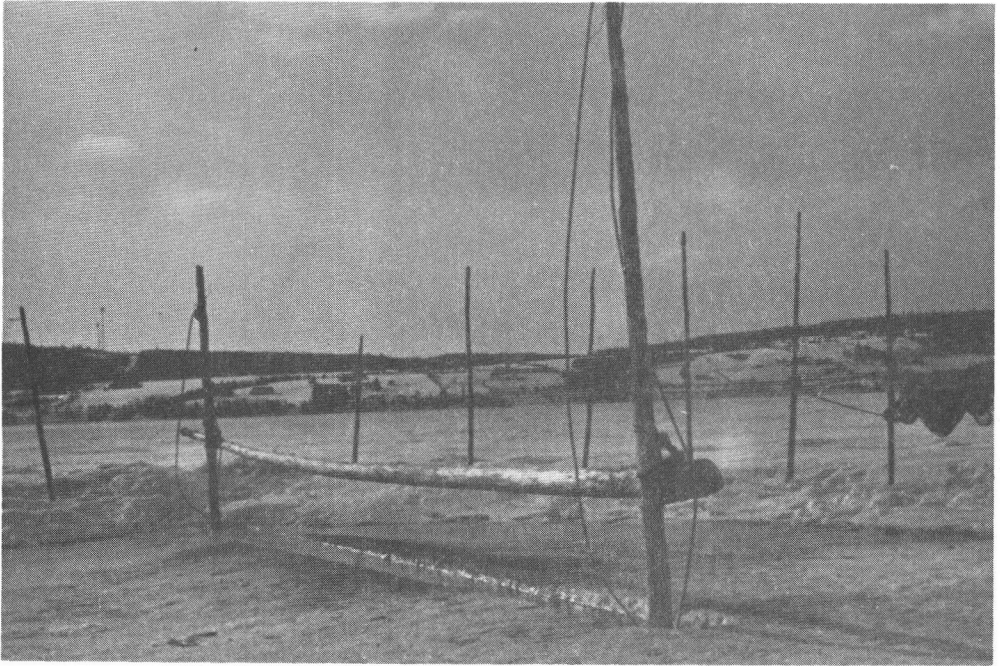
Crew and snowmobiles — transportation to nets.



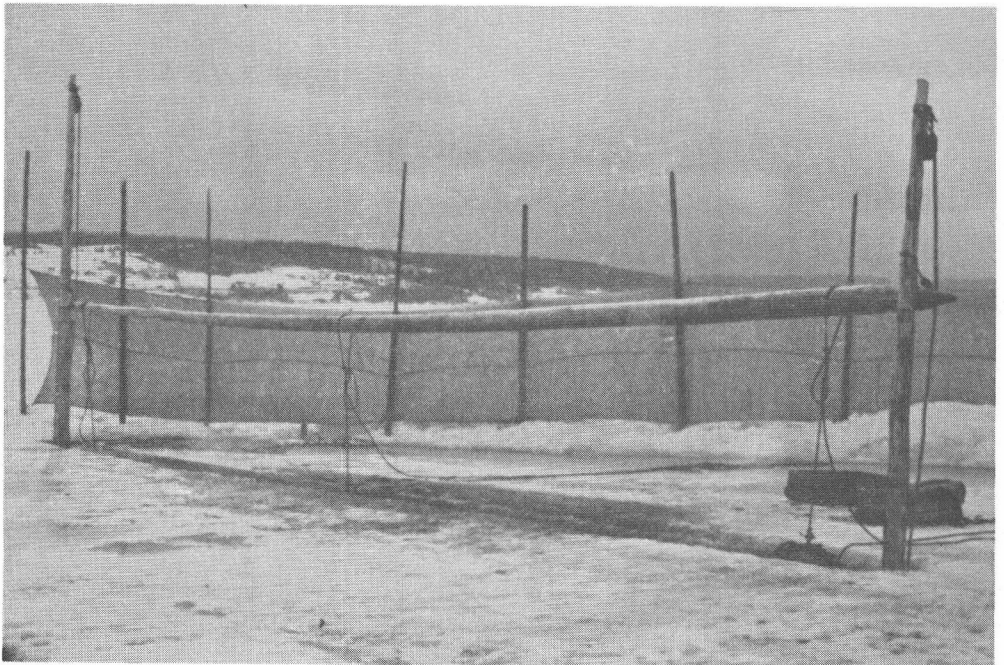
Crew and horses used to haul gear and catch.

## APPENDIX B

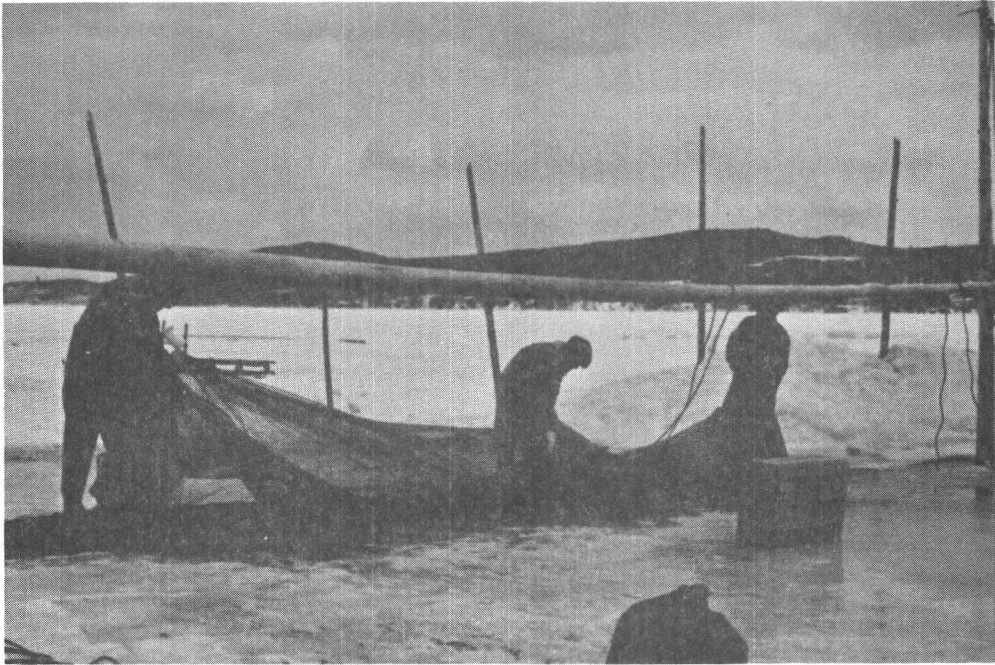
## OPERATIONS — BAG NETS



Set bag net.



Set wind-break around hole for bag net.



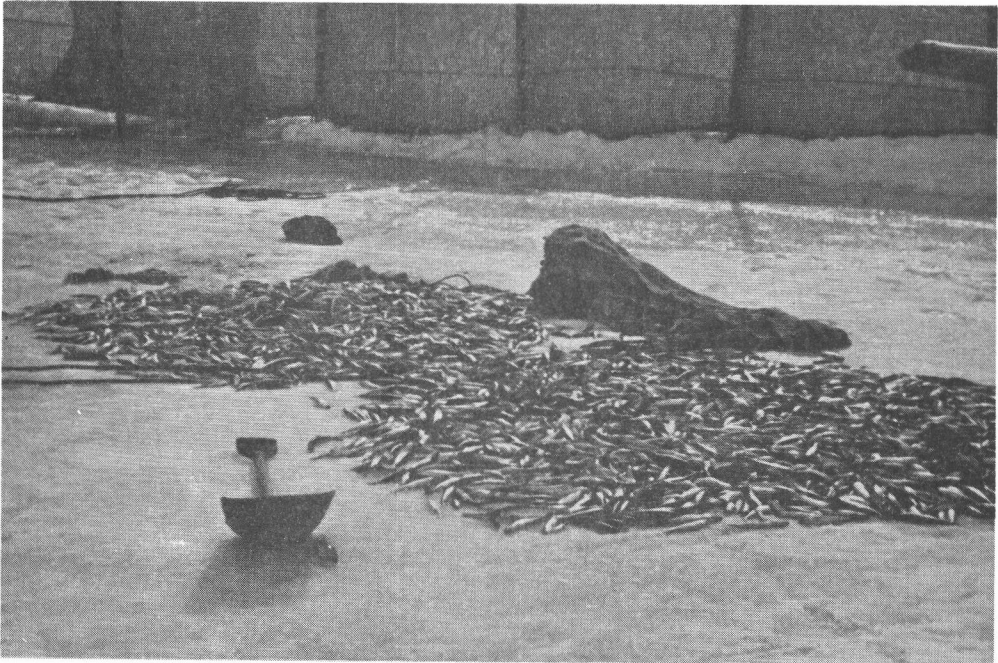
Hauling a bag net.



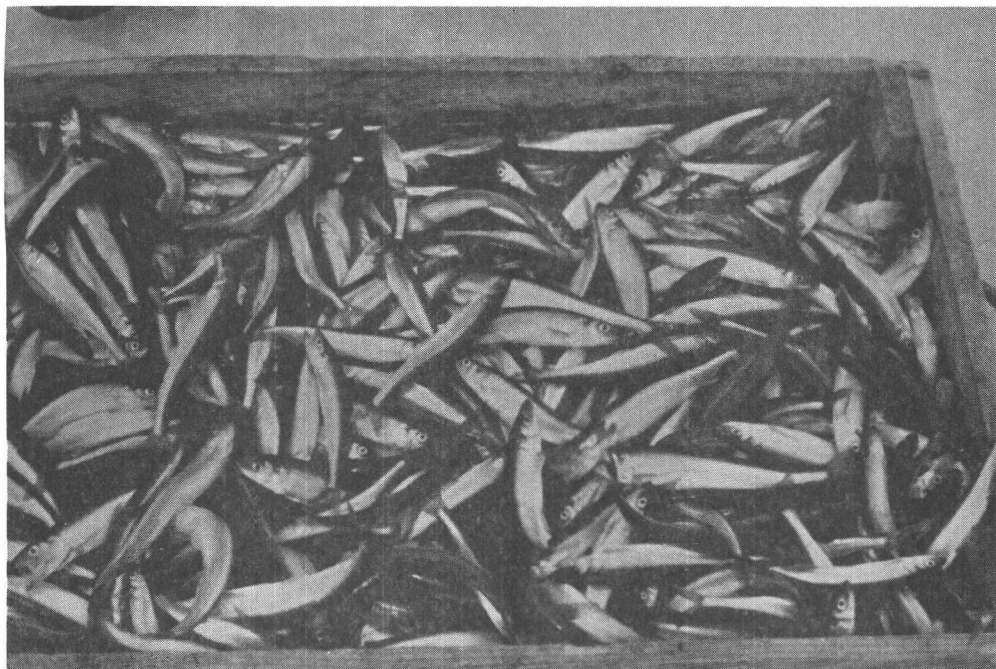
Reversing the hooks on a bag net.



Bag-net catch (approx 125 lb).



Smelt being frozen on the ice.



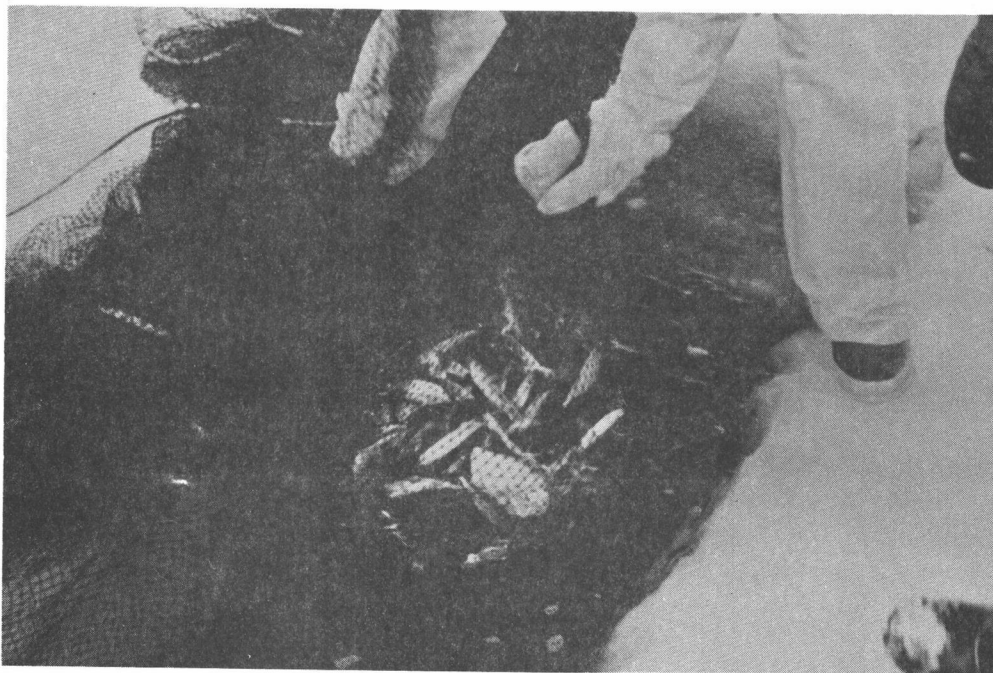
"Green" (unfrozen) smelt in buyer's box.

## APPENDIX C

## OPERATIONS — BOX NETS



Reopening fishing hole of set box net.



Box-net catch (approx 15 lb).



Hauling a box net.

#### ACKNOWLEDGEMENTS

The authors wish to sincerely thank the local fishery officer, Mr. D. Brown, and the commercial fishermen for their assistance and cooperation in providing information for this report.

## REFERENCE

- Peppar, J.L. 1976. Survey of commercial smelt fisheries in the Restigouche River estuary and Chaleur Bay, New Brunswick, 1974. Freshwater and Anadromous Division, Resource Branch, Fisheries and Marine Service, Dept. of the Environment, Maritimes Region, Halifax, Nova Scotia. Data Record Series No. MAR/D-76-7, 10 p.