REMOVING PORPOISE FROM A TUNA PURSE SEINE

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Between 50 and 70% of the annual U.S. catch of yellowfin tuna in the eastern tropical Pacific comes from schools associated with porpoise (unpublished data, Inter-American Tropical Tuna Commission). Tuna primarily associate with two species, the so-called "spotters" and "spinners." At times, they may be found in the company of a third species, which fishermen call "whitebellies" (Perrin, 1968, 1969, 1970; Green, Perrin and Petrich, 1971). Once the seine has been set and pursed around a school of porpoise and the associated tuna, the problem arises of releasing the porpoise unharmed without losing the fish.

In the interest of disseminating information that will contribute to conservation of the porpoise stocks, this paper presents a detailed account of the equipment and methods used by one seiner that has attained a high degree of success in removing porpoise from its net.

VESSEL AND EQUIPMENT

The specifications of the vessel and its net skiff follow:

	Vessel	Net skiff
Length	165 ft (50.4 m)	31 ft (9.5 m)
Beam	34 ft (10.4 m)	18 ft (5.5 m)
Depth	17 ft (5.2 m)	5 ft (1.5 m)
Engine	2800 hp	250 hp
Hull	Steel	Steel
Year of construction	1970	1970
Brine well capacity	650 short tons	

The main purse winch on this vessel was a Marco model 1072 built by the Marco Corporation, Seattle, Washington. It was driven by a 333 hp Caterpiller diesel engine coupled to a Vickers hydraulic system providing 1500 psi at 70 gallons per minute. The Marco 42-inch diameter power block was integrated into the same hydraulic system.

The Net

The net used by this seiner was hung 570 fathoms long and about 52 fathoms deep in 1970; since then, it has shrunk to approximately 540 fathoms by 48 fathoms. The basic construction was described by McNeely in 1961--with the exceptions that the net was nine strips deep, and the bunt sections at the bunt end and at the single cutting strip at half net were made with number 96 twine. This net lacked the Medina escape panel of 2-inch webbing to prevent porpoise entanglement, which is currently being adopted by many boats in the U.S. fleet.

METHODS

The technology of tuna purse seining in general and "porpoise-fishing" in particular has previously been described (Green, et al., 1971). The following pertains to details of operation that bear on efficiency in removing porpoise from the net alive.

When the porpoise school has been bunched as tightly as possible, and the school is stopped or running generally upwind, the set is made in a slightly cross and downwind direction. Setting in this manner keeps the wind on the stern port quarter of the vessel while the net is being pursed, and the net stays open nicely. Even with a fairly strong current, setting with the wind on the port side, combined with the pulling of the net skiff, will usually keep the boat from drifting into the net.

While the net is being pursed, there is a tendency for the slack corkline and webbing to wrap around the bow and stern of the boat. This forms bags or pockets where porpoise may become trapped. The bow bend pocket is eliminated as it forms by pulling three 40-

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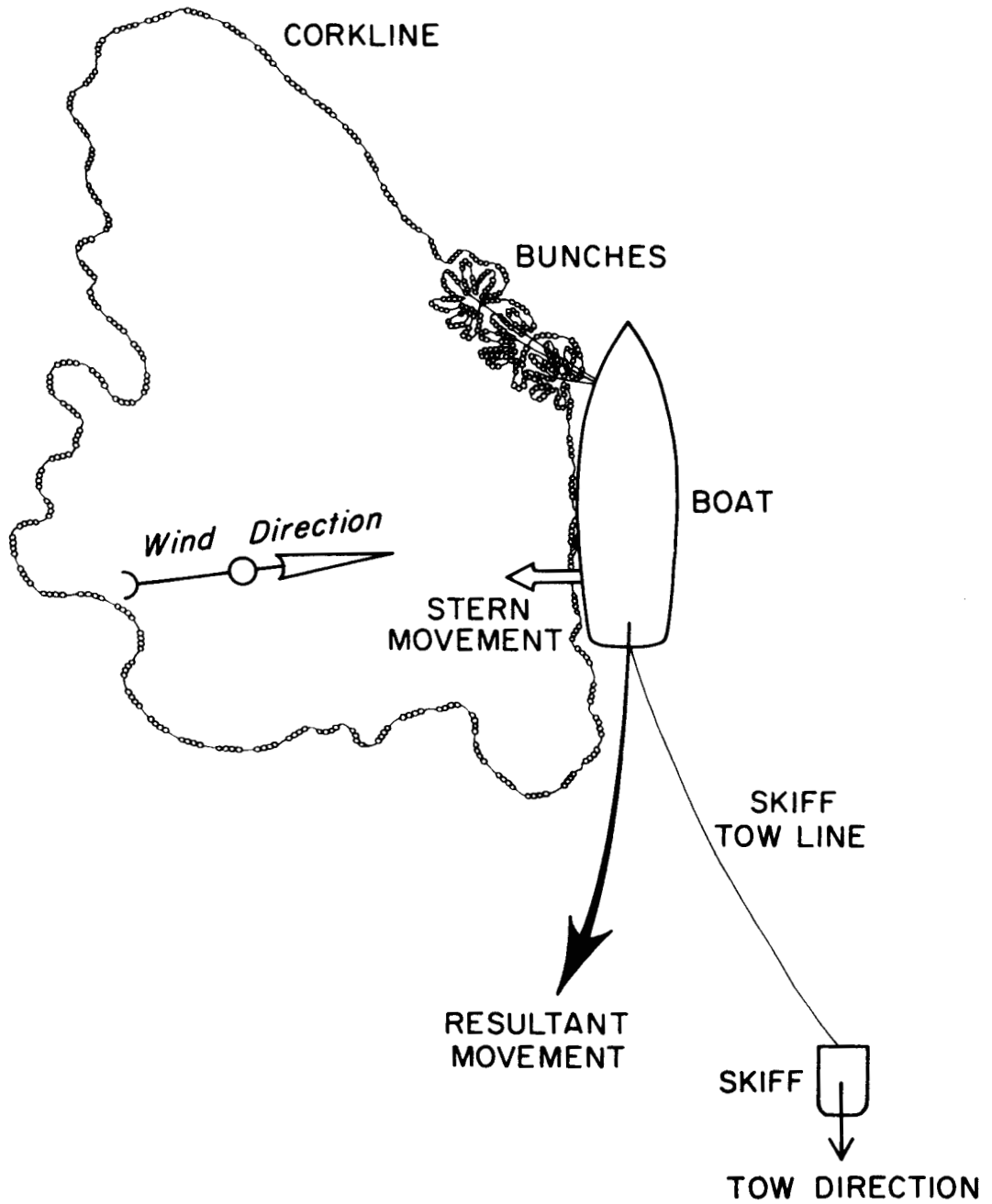

Fig. 1 Rolling net causes the stern of the boat to move into the net (double arrow) so that the skiff tows parallel to the axis of the boat, and the resulting movement is backward in a large clockwise semicircle (solid black arrow).

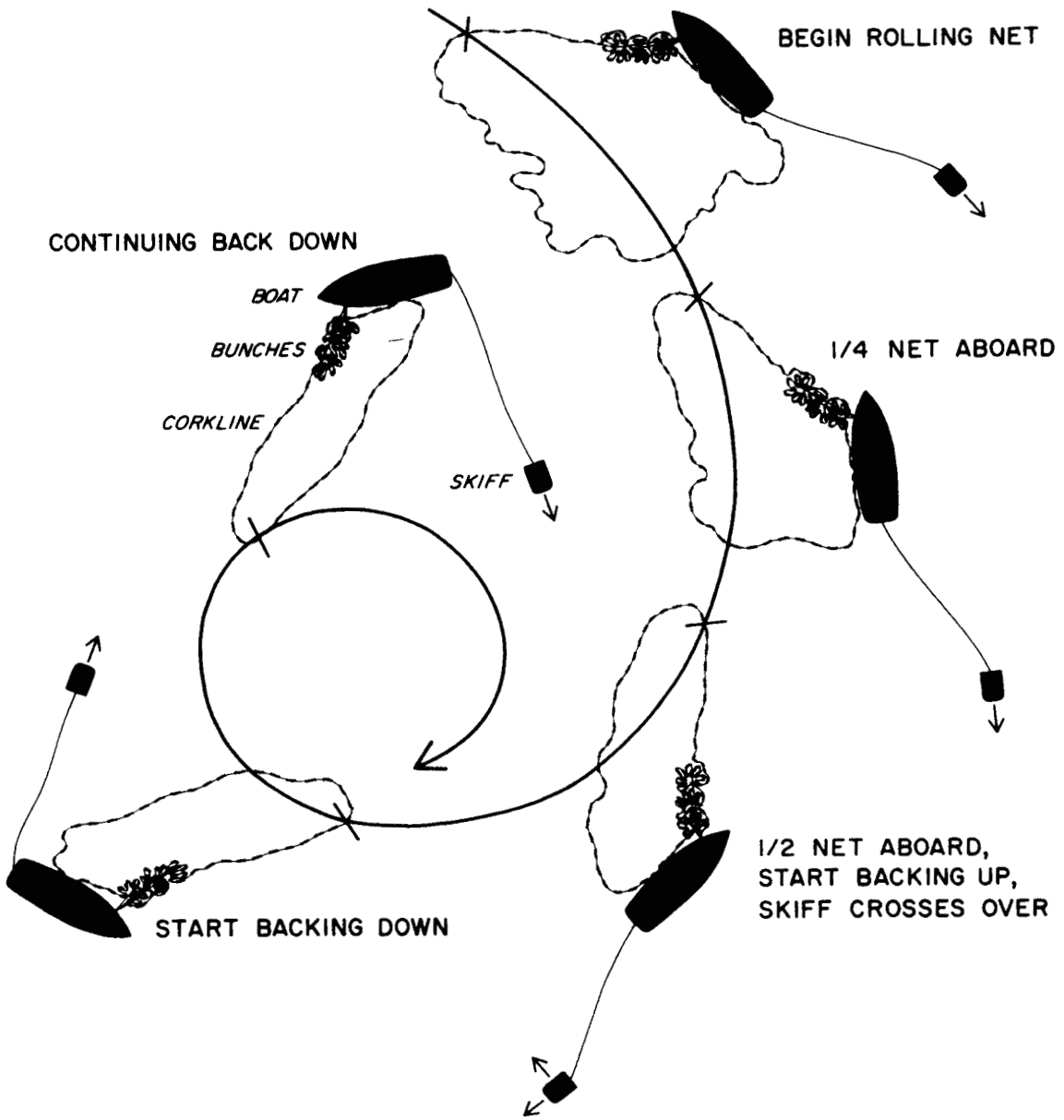

Fig. 2 - The general motion of the vessel and net through the water during the set is a tightening clockwise spiral with backing down taking place in a final tight circle.

fathom "bunches" in the bow corkline. The bunches are pulled in such a way that, as the purse rings rise to the surface, the corkline is fairly straight from the top of the third bunch to the area of corkline that will sink when the propoise are released. After the centerpiece of the purse cable starts to come aboard, the 60-fathom tow-line from the net skiff is transferred to a padeye on the stern of the boat, and the stern is pulled clear of the stern bag in the net (Figure 1).

By the time the rings are on the ring stripper (see Green, et al., 1971), the stern should be clear of the net. Then net can be "rolled" onto the boat, thus reducing its circumference. The net is rolled as rapidly as possible to reduce the time the porpoise must spend within the net, as well as to pull the stern of the boat into the net. The action of the net skiff pulling as shown (Figure 1) causes the boat to move astern in a large clockwise semicircle, keeping the corkline straight out to the "backing down" area.

'Cork-Tender' Skiff

A man in a "cork-tender" skiff remains at the corkline during the set to retrieve the bow bunch lines and to keep the porpoise away from the corkline or from any pockets that may form. As the net is rolled, the cork-tender circles in the stern bend of the corkline to keep porpoise away from the net as it is pulled out of the water.

The power block is adjusted so that it rolls the net evenly. In other words, the chain comes aboard as fast as the corkline, so there is no "balloon" of excess webbing below the corkline in the area where the corks will sink. When such a balloon develops, the porpoise may become trapped outside the corkline and unable to surface.

Twenty to 30 fathoms before the "half-net" marker comes aboard, the captain goes to the port-side throttle and steering controls. The net skiff now comes to the port side and begins towing at an angle of approximately 80^{0} to the main axis of the boat. The captain starts the boat astern slowly, giving it left full rudder and, as the half-net marker comes aboard, the net begins to stretch out evenly. This puts tension on the webbing and closes the meshes as much as possible--before the porpoise start coming in contact with the walls of the net-- and prevents a great deal of the entanglement that otherwise might occur. This marks the beginning of the "backing down" process.

After an additional 10 to 50 fathoms of net have come aboard, the exact amount depending on the number of porpoise, the captain orders the net secured with the choking winch. The cork-tender now moves to the area where the corks will sink during back-down and attaches a line to the corkline so that he may pull it to the surface when the tuna approach that area. The motor of the cork-tender must be shut off to avoid scaring the porpoise away from the opening.

Signal Tuna Clear of Corkline

After the net is choked, the net-tender skiff in position, and the boat headed astern so that the net is stretched out evenly, the man in the cork-tender signals when the tuna are clear of the corkline and headed towards the boat. Upon this signal, the captain opens the throttle approximately 1/ to 1/3 and begins to back the boat around in a tight clockwise circle (Figure 2), always watching to see that the corkline does not sink more than 2 to 3 feet. If the fish turn and head back toward the far end of the net, the man in the cork-tender pulls the corkline to the surface, and the captain closes the throttle. When the fish start back towards the boat again, the signal is given and the process is repeated until as many porpoise as possible are out of the net. Throughout this operation, the net skiff is pulling the seiner at full power at a sharp angle on the port side. Patience in this operation is rewarded by time and labor saved in brailing and in sorting out the porpoise from the tuna by hand.

Noise Diverts Reluctant Porpoise

At times, at the start of backing down, noise is generated near the third corkline bunch to divert reluctant porpoise away from the vessel into the backing-down area of the net. If a pocket of porpoise develops under the corkline, they can sometimes be disentangled by releasing 5 to 10 fathoms of corkline from the third bunch and continuing to back down. The boat (and net) are never allowed to come to a complete stop while backing down because stopping would take the tension off the webbing and allow the meshes to open up. If the meshes open, the porpoise may get their snouts or flippers into the opening, where they are held securely when the boat backs up again and the webbing tightens.

When all but the last few entangled porpoise have been released, the third bunch line is let go. This causes slack across the webbing and corkline so that the sunken corkline rises immediately. The cork-tender is now free to work his way down the corkline and pull the remaining live porpoise out of the net.

When the last half of the net has been rolled aboard, and while the bunt end is being "sacked up," if any porpoise remain in the net, one of the net skiff crew hangs a small aluminum platform over the side of the skiff next to the sack and removes them. In a substantial proportion of sets, all the porpoise are successfully removed by the combination of the backing down process and the cork tender.

In general, during bad weather or when a gear malfunction or "roll-up" (webbing wrapped around the purse rings slowing pursing procedure) occurs, every effort is made to roll enough net aboard to permit backing down as soon as possible. If adjustments to the net or gear must be made, the net skiff driver tows the boat in such a way as to keep the corkline stretched out evenly from the bow of the boat to the back-down area.

Efficiency and Speed Important

Efficiency and speed are very important to the entire operation. Average time spent by the vessel discussed here during three recent cruises was calculated for the "critical" time periods. It was found that 53 minutes, on the average, were required from the time the net was let go to the beginning of the backing down process. An average of 37 minutes elapsed from beginning of the set until the purse rings were on the ring stripper. Another 16 minutes were required for rolling net to the back-down position. These averages include sets made in adverse conditions of weather and sets on a wide range of porpoise school sizes.

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