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A LONG-LINE (SET-LINE) CRAB POT SYSTEM

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A Long-Line (Set Line) Crab Pot System

R. BARRY FISHER

Preliminary investigation by the Department of Fisheries and Wildlife indicates that a long-line crab pot retrieval system has definite advantages over the individual pot retrieval method currently in use on the Oregon coast. The comparative study is part of a research project established to determine the relative merits of the two retrieval systems.

The most obvious advantage of the long-line system is in the area of cost economy. Using this method crab pots do not need weights and individual buoys, and in depths greater than 15 fathoms, additional savings can be realized on warps. Smaller, lighter gear can be used successfully because the pots are anchored by the holding strain of the line anchors as opposed to the insertion of heavy weights in the individual pots. Old crab pots can be used simply by cutting out the weights and inserting double opposing triggers.

Fishing conditions in the Dungeness fishery on the Oregon Coast generally do not require large pots except in "bumper" fishing periods. Smaller pots of approximately 36 inches with $\frac{1}{2}$ -inch frames can be used instead of the 42- or 44-inch pots with $\frac{3}{4}$ -inch frames, substantially reducing per pot costs. The savings which can be realized by using the lighter gear is apparent from the following comparison. In Newport, 42- or 44-inch pots made of $\frac{3}{4}$ -inch frames and 80- or 90-pound weights, with individual warps and buoys, cost approximately \$42 to \$45 per pot, completely rigged. Thirty-six-inch gear made of $\frac{1}{2}$ -inch frames, with no weights, would cost approximately \$22 to \$26 per pot.

For ease in handling, the lighter pots should have the lid bar mounted exactly halfway across the top of the frame. One lid-retaining hook on a large rubber band harness should be used rather than the two lid-retaining hooks common on larger pots.

Lighter-weight pots will not sink in as readily and, as a result, they can be set into bottom that is too soft to be fished with the conventional heavier pots. Because the gear is anchored and the holding power of the anchors is greater than the unanchored but weighted pots, the long-line gear will not "walk" as much in bad weather as there is no constant surge on the buoy line going to the surface.

The trials that have been run with this gear on a Newport crabber have demonstrated that it can be run as fast, if not faster, than individual pots. During trial runs with the power block running in the wrong direction for long lining, a crew inexperienced with the long-line system consistently managed to break out the anchor line, run 10 pots, and reset the gear in 10 minutes. It seems apparent that with the power block running in the right direction this hauling rate could be increased.

If a boat were to fish the entire string of crab pots in a long-line system, and the engine, clutch and throttle, and remote steering control were mounted by the power block, it would be possible to eliminate a boat puller. When fishing long-line gear, the helmsman steering the boat to individual buoys becomes unnecessary. The boat can be controlled from the power block and changes in course, speed, etc., can be made at the power block.

If gear becomes stuck, it is still possible to "blow it out" by running a hose down the line as is done with traditional gear. When a pot on a long line is stuck, both ends of the gear are hauled from each end up to the stuck pot. The ground lines are then cut, buoys are attached, and the pots are left until gear can be brought in to blow them out. However, the probability of gear sticking or sinking into the bottom is greatly reduced with lighter pots fished on long lines.

One hazard in using this gear is the possibility that a sunken log or other submerged obstruction might snag the ground line. If this should occur and the first end hauled is snagged and cannot be broken loose, the vessel should proceed to the other end of the line and attempt to retrieve the gear. However, even with a difficult snag probably only the one pot caught will be sacrificed because the gageon is of less strength than the ground line and will part.

If a large number of boats adopt the long-line system, fishermen will have to exercise care to assure that one string is not set across another. However, boats fishing individual pots will not normally interfere with long-line gear. In the event that buoys are cut off and/or lost, gear can be easily retrieved by dragging a grapple since the set location is known

and the long line covers such a large area.

The long-line system should be considered for deep-water fishing where long buoy warps become items of considerable expense and in areas with soft bottom. Gear also can be set close on the beach because the superior holding power of the anchors

allows fishing in those areas where individual pots would wash ashore.

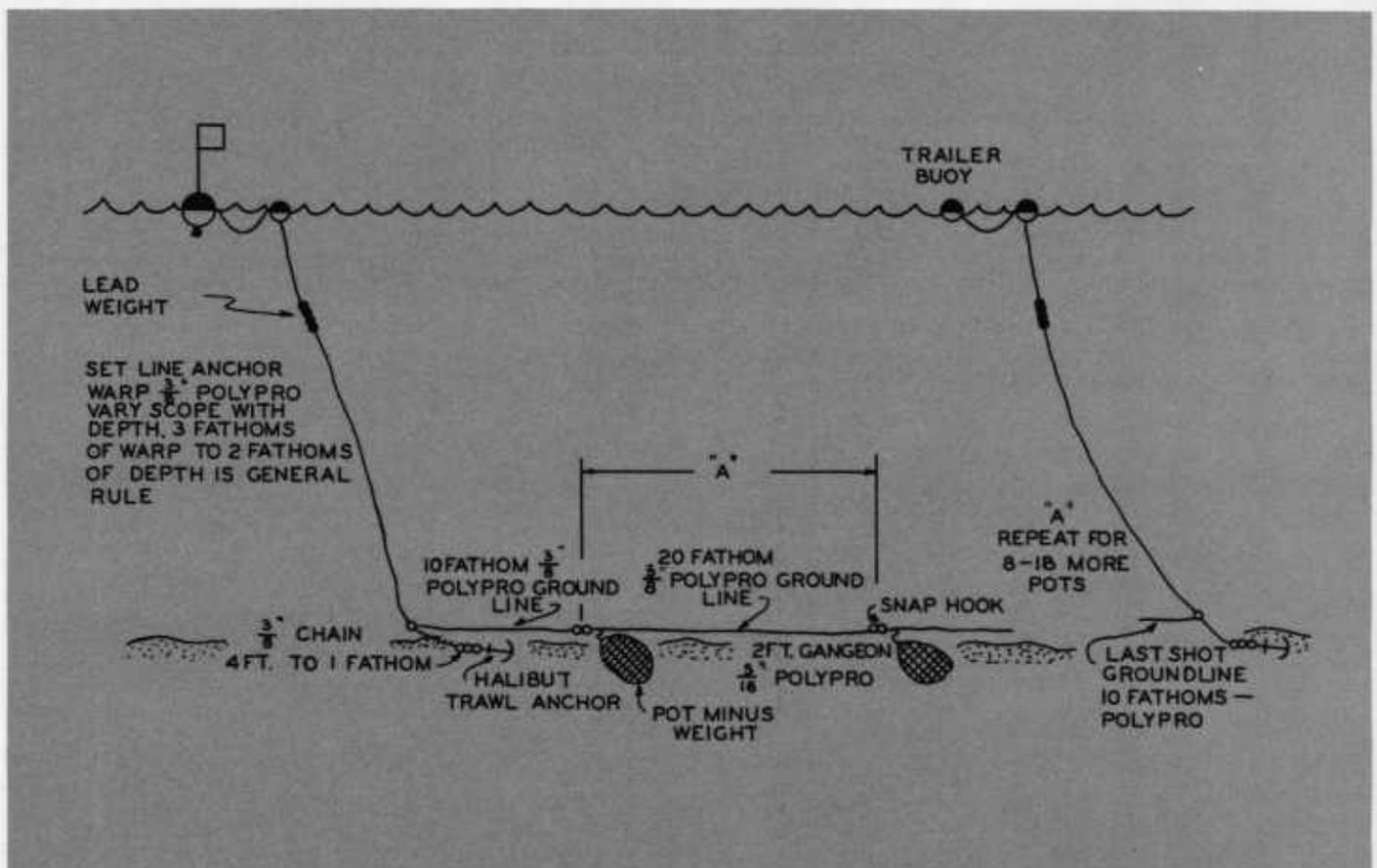
The Department of Fisheries and Wildlife at Oregon State University is planning further research and exploratory fishing with the long-line crab pot system during the 1970-71 crab season.

Rigging the Gear

The illustrations on the following pages present a method of rigging a long-line crab pot system. The sketches first present an overall view of the gear and then show specific details of the individual equip-

ment. Personal preference may indicate different-sized lines than are recommended. Also, the length of line between pots is a matter of individual preference and may differ in various local fishing situations.

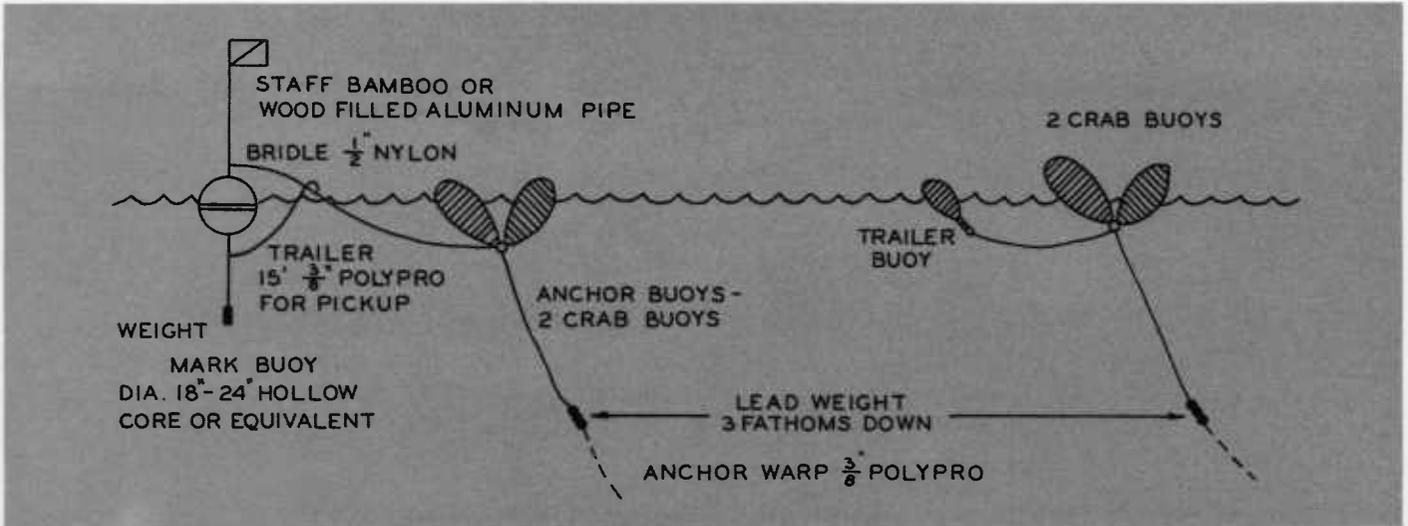
Figure 1. Overall sketch of Long-Line Crab Pot System.



The long-line crab pot system is buoyed and anchored at both ends to keep the string tight and straight. Large buoys and ample scope on the anchor lines will ensure retrieval even in conditions of strong current. Braided or hard-laid polypropylene in 3/8-inch diameter should be used for anchor warps and the ground line and a 3/8-inch swivel should be used between every three to five pots to prevent line kinking. Swivels of larger diameter may slip in the

power block. It may be helpful to make the ground line of a different color than the anchor warp so that the tail end of the anchor line can be slipped off the block and the ground line can be kept on the block when the first end of the gear is hauled. Ten to twenty pots constitute a string for initial fishing; subsequent experience may dictate strings with more pots.

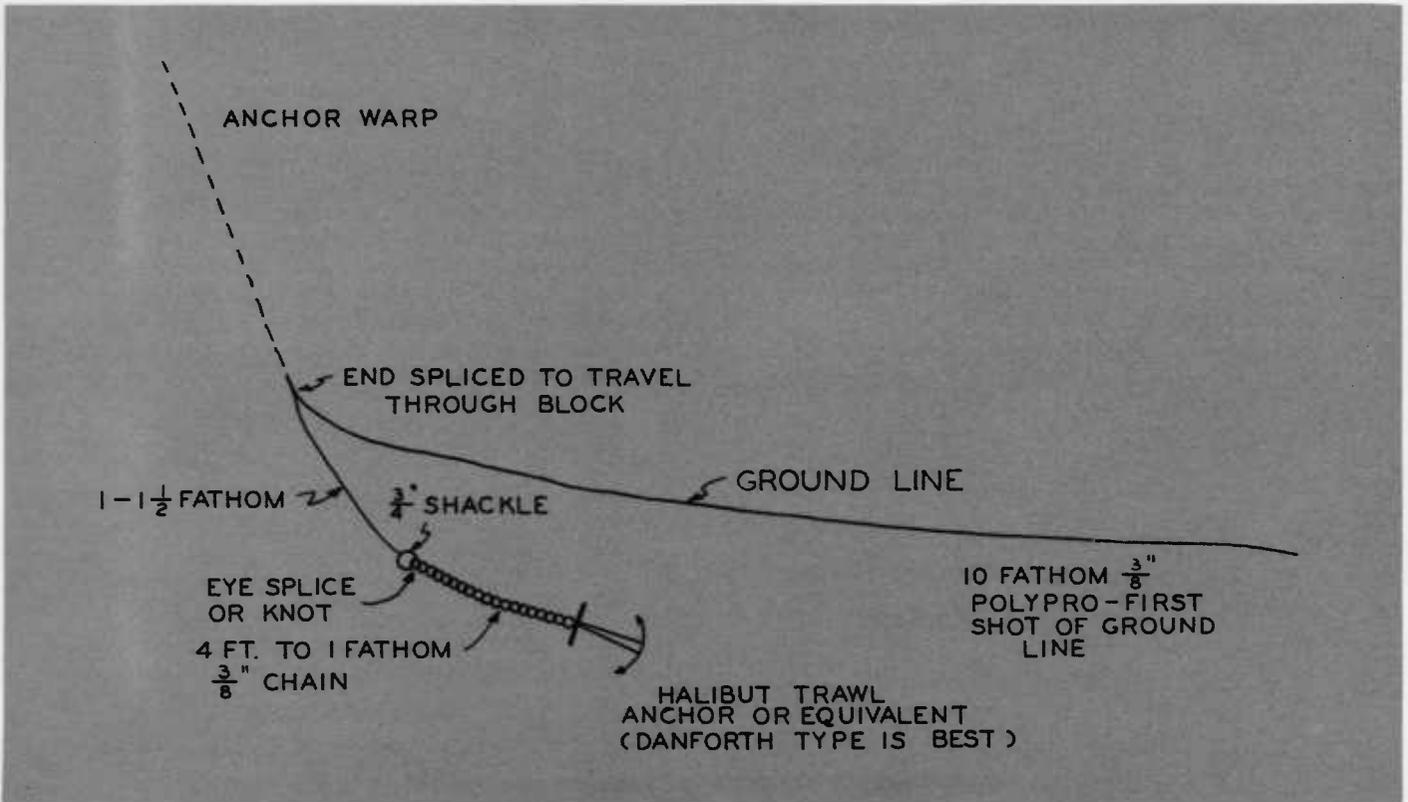
Figure 2. Buoys.



The buoy system used in long-line gear should have enough flotation to allow retrieval in any current conditions. Trailer buoys should be used on both ends to ease grappling and hoarding under adverse conditions. Also, buoys at either end mark the spread of

the long-line gear. The flag buoys can be made of slabs of polyfoam lashed to the staff or covered with webbing which is then seized to the buoy staff. The flag buoys should be bridled and weighted so the marker flag remains upright for easy visibility.

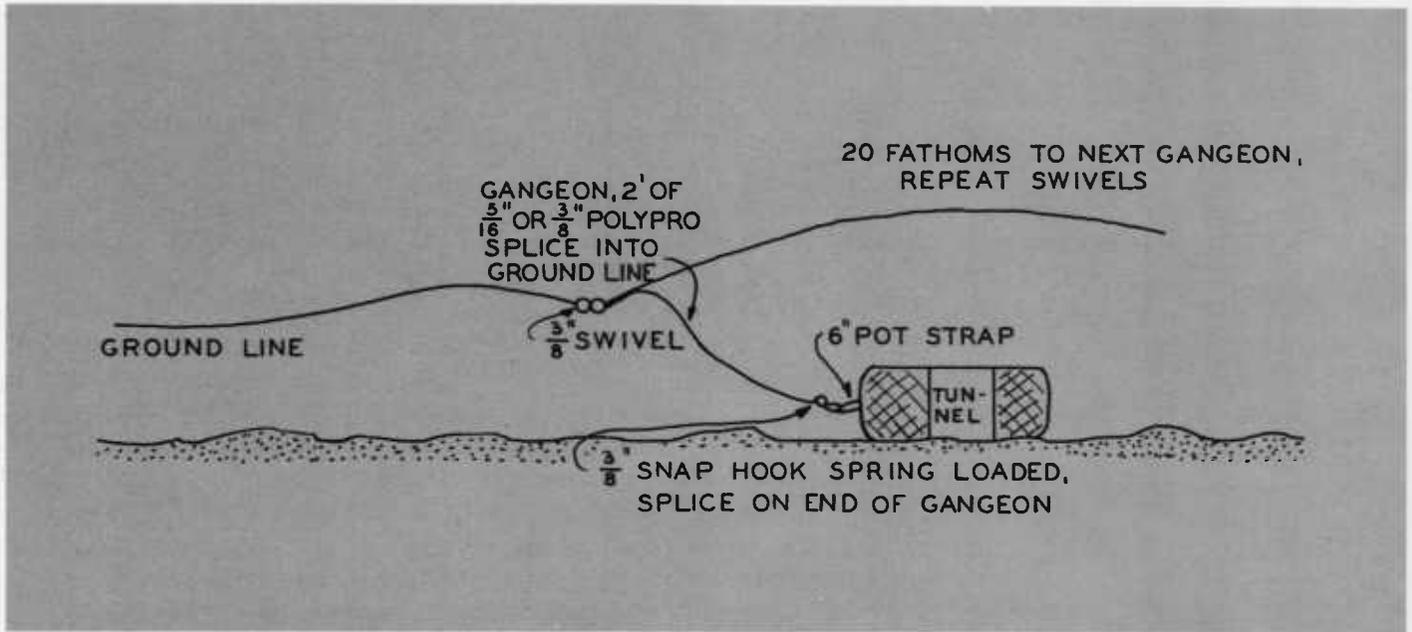
Figure 3. Anchor and ground line securing details.



The anchor line should be rigged the same on both ends. A shot of chain is used on the end of the anchor line to ensure positive hold-

ing of the anchor. The anchors should have good holding qualities (at least the equivalent of a halibut trawl anchor).

Figure 4. Gangeon and gangeon fastening details.



The ground line should run for at least 10 fathoms from the anchor end to the first pot to ensure that the anchor is well away from the boat before the first pot comes up. From the first pot on, the pots should be spaced at least 20 fathoms apart. Experience may dictate longer shots than 20 fathoms, but this appears to be an effective distance to cut down overlapping fishing radius between pots and

at the same time economize on line. Short gangeons of two feet work best. The pot straps should be approximately 6 inches long. The combined length of 2-foot gangeons, snap hooks, pot strap, and the height of the pot represents a length that most boats can handle at the maximum lift position of the power block ram.

Pot Rigging

Pots are rigged so they will fish regardless of which side falls to the bottom. Figure 5A shows the double triggers rigged so the bottom triggers fall open by force of gravity. The tunnels in new gear should be built to allow the same tunnel slope on each side. Figure 5B shows the single-lid cover harness which is practical for easier pot handling. New long-line pots should have the lid cover bar made halfway across the top to facilitate handling with the single-lid cover retaining harness. Figure 5C shows rigging details of the gangeon. The gangeon should be two feet in length with one end spliced into the ground line and the other end spliced into a $\frac{3}{8}$ -inch spring-loaded snap. The springs must be lubricated from time to time with heavy grease. The splice on the snap end of the gangeon should be seized into the small end of the snap to hold it in place (welding the links of chain onto the snap, as shown in Figure 5D, right, is not recommended as heat from the weld causes the snap springs to become stiff). Figure 5D illustrates the snap being attached to the six-inch-long pot strap. Hold the end of the strap in one hand,



Figure 5A. Double triggers rigged so bottom triggers fall open by gravity.

grasp the back with the other, and push it on. To unhook the snap, the lower part of the hinged snap bar is depressed and the pot strap is pulled out. The pot straps should be mounted halfway up the side brace.



Figure 5B. Single-lid cover harness. New longline pots should have lid cover bar made halfway across the top to ease handling with single-lid cover retaining harness.

A piece of $\frac{1}{2}$ -inch or $\frac{3}{8}$ -inch concrete reinforcing rod is fastened into the pot for anode or "eating" purposes to counteract electrolysis. Anodes of this type are inexpensive and can be replaced easily. The anodes are welded to furnish a good ground.



Figure 5C. Rigging details of gangeon. Gangeon should be two feet in length with one end spliced into the ground line and the other spliced into a 3-inch spring-loaded snap.



Figure 5D. Snap being attached to six-inch-long pot strap.

Rigging the Vessel

The power block and ram or davit must be rigged high enough to allow the pots to be swung in and lowered to the dumping box.

The power block should have both fairleads mounted on it and must be set to run in a clockwise fashion. Figure 6 shows a block rigged for long lining. A hinged, folding platform three feet long by two feet wide is anchored to the rail as a ready base for the emptied and rebaited pots (Figure 6-1). The platform is mounted four to six inches below the rail to hold pots inboard in rough weather, and is

stowed flat against the bulkhead in a vertical position when not in use. Approximately two feet is allowed between the dumping base and the front end of the pot platform (Figure 6-2).

A spur fairlead six to eight inches high and curving slightly inboard is mounted at a distance of no more than six feet forward of the vessel's propeller. This fairlead keeps the ground line clear of the propeller when running the gear and will also keep it inboard in the event it is lost from the power block sheave while running the gear.



Figure 6. Block rigged for long lining. A folding platform is anchored to the rail as a ready base for pots.

Setting the Gear

Long-line gear must always be set tight and straight to prevent bows or loops and to insure full holding potential from the anchors. Coil the ground line in a fish box or other large box with the top and bottom end free outside the box for attaching the anchors. Gangeons and snaps are laid in the coils so the ends are all free outside the box and in sequence to allow easy snap-on of pots.

The pots to be set are stacked on the stern; buoys, anchors, and ground line gear is placed next to the stern rail. In setting the gear the top buoy is launched over the stern and the vessel steams ahead in the direction of the set. The anchor is bent on and dropped overboard when the first buoy line is run out.

The first part of the ground line is run out under a slight strain.

When 10 or 12 coils of line are left in the box before the first gangeon, a pot is snapped on. After the ground line has run out down to the first gangeon, the first snapped-on pot is held on the stern until a good strain is maintained to insure setting the gear tight and straight.

Continue setting the string, snapping on pots and holding each one long enough to tighten the ground line. After all the gear has been run out, bend on the other anchor. Slow the vessel and tow the gear tight and straight, then release the anchor and run out the last buoy line.

Running the Gear

The gear should always be hauled close into the wind or current, whichever is stronger, with the wind maintained on the hauling side of the vessel. The buoys are gaffed and brought aboard. Lay the anchor warp in under the forward fairlead, around the block and down around the after fairlead. Then throw the buoy overboard and "under-run" the anchor warp with the vessel. The ground line should be either a different color polypro or should be marked, so that when the anchor comes to the block the line leading to the anchor can be slipped from the sheave and the power block will then continue to haul the ground line. Continue to jog the vessel ahead so as to maintain only a slight tension on the gear. The course should be parallel to the ground line as it leaves the water.

As the first pot comes to the block, it is boarded and the gangeon unsnapped from it. The after boatpuller then leads the gangeon clear of the power block, snaps the spare pot onto the ground line and pushes it overboard.

After each pot is snapped on and pushed overboard the after boatpuller lifts the ground line clear of the fairlead to allow passage of the pot by the stern. The ground line is then flipped inboard of the fairlead again so that it will remain clear of the propeller. If the ground line slips off the block, it is re-

tained by the fairlead and can be placed back on the block.

The boarded pot that has been unsnapped from the ground line is emptied and rebaited by the boatpullers as the vessel continues down the line. As soon as the pot is emptied and rebaited, the after boatpuller shifts it to the platform, clearing the dumping box for the next pot.

The vessel continues down the string with the boatpullers unsnapping full pots as they come aboard and replacing them with empty, rebaited pots. Only slight tension should be kept on the gear as the line is run. After all the pots have been retrieved the vessel continues to run the ground line until it arrives at the second anchor warp. At this point the block is shut off and tension is held on the anchor warp. The line leading to the anchor is passed around and clear of the power block and stern fairlead and the vessel then jogs against the gear until a good tension is put on the string to straighten and stretch it.

After the gear is pulled straight and tight, the anchor warp is released from the power block. The buoy line is slacked out under soft tension to maintain straight and tight gear until the gear is reset.

The sketch in Figure 7, next page, illustrates the sequence of events in running the gear.

Figure 7. Running the gear.

1. Gear in water, boat approaching the end buoy. Note that the gear is to be pulled into the current.

2. Anchor coming to block. Buoy let go astern. Vessel approaching first long-line pot.

3. Midway through the gear, anchor warp and buoy out and set again.

4. Vessel at end of string, all gear out, steaming out and tightening the gear in the direction of the current.

5. Gear completely set, vessel proceeds to next string.

