SCTB16 Working Paper

FTWG–9

Proposal for a deep setting technique for longline fishing to enhance target CPUE and to avoid certain bycatch species

Steve Beverly

Coastal Fisheries Programme,
Secretariat of the Pacific Community
Noumea, New Caledonia

July 2003

SCTB16-FTWG

Proposal for a deep setting technique for longline fishing to enhance target CPUE and to avoid certain bycatch species

Steve Beverly, SPC

In Hawaii the longline fishery for broadbill swordfish has been closed and longline fishing for tuna has been curtailed with area and time closures as a result of lawsuits brought on by environmental organisations looking to close down longline fishing world-wide. These organisations have used the fact that longline fishing gear occasionally catches some species of endangered turtles as their main evidence of why the fishery should be closed. The court decision in Hawaii was not based on sound biological information, but on technicalities concerning the submission of environmental impact statements. The longline fishing industry and spin-off businesses such as fish processing, fish retailing, and seafood restaurants in Hawaii have suffered economic losses as a result of the closures. The National Marine Fisheries Service, the Hawaii Longline Association, and the Western Pacific Regional Fisheries Management Council in Hawaii, have attempted to increase the knowledge and awareness of all involved in the controversy and to ultimately reverse the court decisions by, among other things, conducting experiments to develop fishing techniques to mitigate bycatch encounters. Some of the experiments have involved settings techniques using weighted lines. Others experiments have used different hooks and baits. In some cases the courts have not allowed experiments to be carried out as more captures of unwanted bycatch species may result. It is important, however, that such experiments are carried out to answer questions about the fishery. Can a sustainable tuna and swordfish longline fishing survive alongside healthy turtle populations? In time the legal issues may spill over into SPC member countries and territories in the Pacific and it would do well for the industry throughout the Pacific to have a jump-start on the problem.

This paper briefly outlines a proposal for a new longline deep setting technique designed to mitigate the capture of bycatch species—especially endangered sea turtles—and to enhance the catch of target species—especially large bigeye tuna and broadbill swordfish (during the day). The purpose of the proposed project is to test a new method for setting monofilament longlines that sets all of the baited hooks at a prescribed depth, somewhere in the intermediate layer and down to the thermocline depth, avoiding having any baited hooks in the mixed layer (the top 100 m), where they are more likely to be encountered by endangered sea turtles and other unwanted bycatch species and where they are more likely to be encountered by target species such as bigeye tuna and broadbill swordfish (during the day). The objectives are to determine if the setting technique is feasible by testing it from an existing commercial tuna longline operation's vessel under normal conditions; to modify the technique as necessary during project trials; to fully document all details of the project including catch and effort data, and to make a comparison with a normal longline set by designing the trials so that part of each set is done in the traditional way or in the manner that is normally used by the project vessel. The project technique will be feasible if CPUEs for target species are equal to or greater than they would normally be. Another objective is to produce a project report in a timely manner so that any information gained as a result of the trials, be it positive or not, can be shared by all stakeholders.

The project will take place in an SPC member Pacific island country or territory using one or more commercial longline vessels during the normal course of their operations. The new setting technique was designed by one of the Fisheries Development Officers in the Coastal Fisheries Programme at SPC. It involves weighting the mainline in such a manner that the entire basket (one section of mainline between floats with normally six to 40 hooks) fishes at the same depth. Normally a basket of longline gear sags in a catenary curve and ends up fishing a variety of depths ranging from 50 to 300 metres or more. In order to set the entire line deep without using very long floatlines, normal floatlines will be used in pairs separated by a blank section of mainline (no baited branchlines) for a distance of 100 to 200 m. Part of the experiment will be to find the optimum length of this section. The section of mainline that holds the baited branchlines will be much longer—1000 m or more—and will be weighted down at each end by a 2 to 4 kg lead weight attached to the mainline by a standard snap. Therefore, portions of the mainline will actually act as long floatlines in this case and no new floatlines will need to be made up. These portions of the mainline being used as floatlines will be hauled the same as the mainline. All parameters will be simple to change and the only new gear needed will be lead weights with lines and snaps and TDRs (temperature depth recorders) to determine actual depth of the line. All other fishing gear will remain the same as the boat usually uses.

The new technique could be tested side-by-side with the traditional method of setting the line by doing the set half/half with the new method being tried on either end or in the middle of the set. Project data thus will have a control. Project results can also be compared with historical longline data for the same area and season and with catch and effort data from other vessels fishing at the same time in the general area. Outputs will be simple to verify: first output will be to determine if this setting technique is workable; second output will be to compare catch and effort data with known data and with side-by-side fishing from the same vessel to determine if CPUE for target species is sustainable and to determine if the project objectives to reduce by-catch and increase target catch have been met.

The project will use existing longline gear on a private commercial longliner using a monofilament longline system fishing out of a commercial port for sashimi grade export tunas and/or broadbill swordfish. One Fisheries Development Officer will accompany the crew to supervise gear rigging and line setting during the portion of the set where the new technique will be used. One SPC Oceanic Fisheries Programme Observer will be on the vessel to record all catch and effort data in the prescribed manner using official data collection forms. No other parameters will be changed in the normal day-to-day fishing strategy of the captain and crew. The company operations manager, vessel captain, fish master, and crew will be interviewed to determine what their views are on the new technique and whether or not they would employ it in the future (depending on outputs).

The experimental portion of the line would be set as follows: a float with normal floatline (usually 15 to 30 m in length) would be attached to the mainline and thrown as the boat is underway during setting. The mainline would then be paid out a rate nearly equal to the speed of the vessel (ie, with little or no sag). After 100 to 200 m of line is paid out a second float and floatline would be deployed. Then 100 to 300 m of mainline would be paid out in the same manner (depending on target depth). This

section of mainline will act as additional floatline. The length can be determined in a number of ways, the easiest of which is by timing, knowing the boat speed and using the formula *distance = speed x time*. Alternately, line can be ejected by the line setter for a set time knowing the circumference of the line setter drive wheel and speed of the drive wheel in RPM. Most boats use beepers to time setting sequence, eg, a hook is thrown at each beep of eight seconds interval. If hook spacing is 50 m then six beeps would indicate that 300 m of line has been ejected.

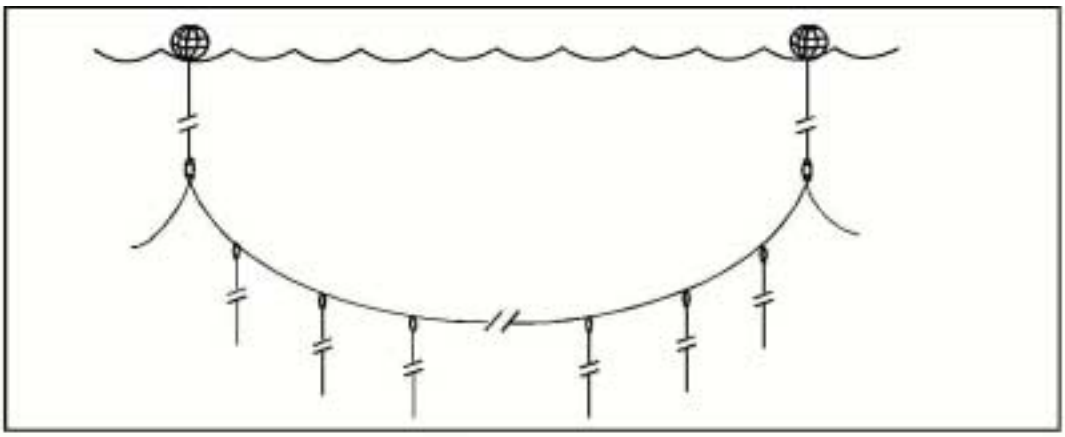
After 200 to 300 m of line has been paid out (four to six beeps), a weight of 2 to 4 kg will be attached to the line to sink it. It may be that the boat has to reduce speed for this manoeuvre (part of the experiment). As the weight is sinking and after it has reached its final depth, baited branchlines will be attached to the mainline in the normal fashion. After 20 to 40 branchlines have been attached to the mainline (one basket and again the optimal number of branchlines will be determined as part of the trials), a second weight will be attached to the mainline and the mainline will be allowed to sink as 200 to 300 m of mainline is paid out (acting again as a floatline). At this point a normal floatline and float will be attached (it may be that floats need to be doubled to accommodate the extra weight (again, part of the trials). A second blank section of 100 to 300 m will be deployed and a fourth float and floatline, and the whole process will then be repeated.

This technique should result in the entire fishing portion of the line sinking quickly to a prescribed depth of 200 to 300 m or more, where the target species are known to be and where the unwanted bycatch species are not found. The fishing portion of the line will be parallel to the surface and not lying in a catenary curve as is the usual case. (see figures below).

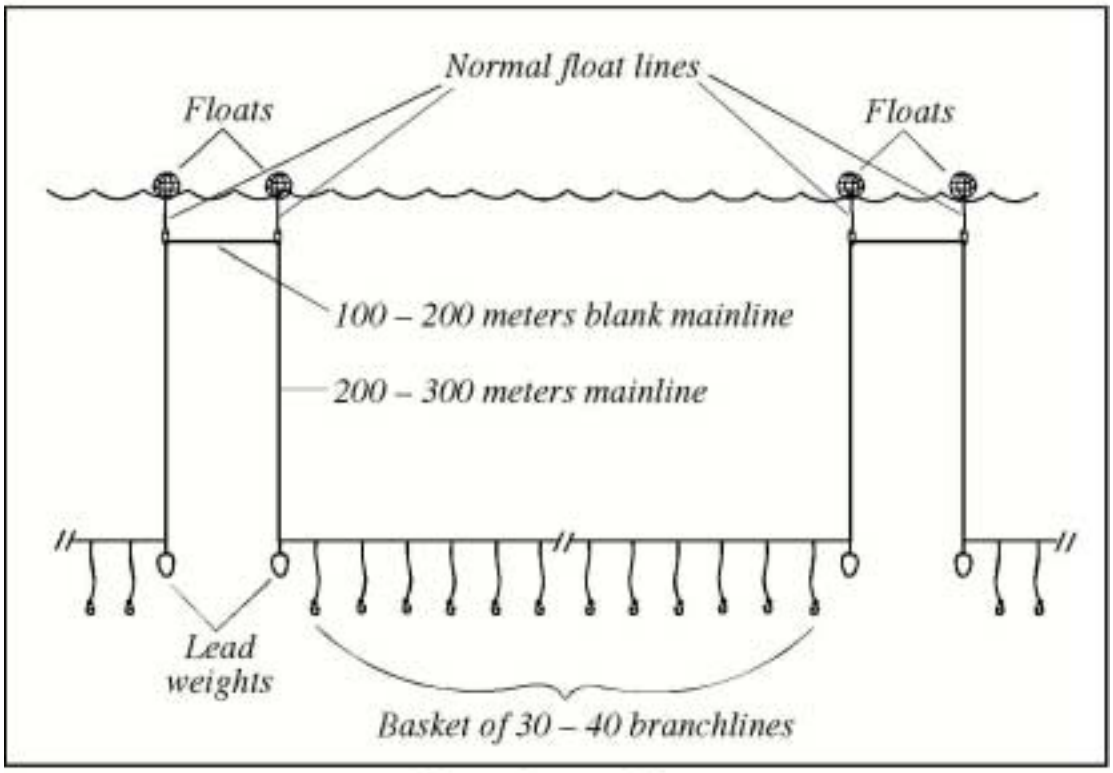
Attempts have been made in the past to target specific depths using very long floatlines. However, problems were encountered: the floatlines would tangle with the mainline and, even if they were free, they were difficult to haul while underway (anecdotal information from fishermen). Using single weights in the middle of a basket has also been tried by longline operations in the past (anecdotal information from fishermen). One problem with this technique is that as the weight continues to sink, it pulls the floats together and causes the basket to collapse (come together) resulting in huge tangles. Increasing the weight of the swivel snap on each branchline would also tend to collapse the line. The new technique should eliminate the problem of the line collapsing as each weight would be supported by a float directly above the weight. Another experimental technique has been tried using specially made monofilament mainline with bits of copper integrated into the mono to get it to sink faster. The line did sink faster but broke often as it was being hauled. The mix of mono and metal was weaker than normal monofilament (anecdotal information from POP in Hawaii).

This project, if successful, could serve Pacific island longline fisheries by not only mitigating by-catch interactions but by also by mitigating legal action by environmental organisations whose goal is to shut down an otherwise viable and sustainable fishing industry. The project is very low-tech in that it involves existing techniques with just some minor modifications. Therefore, it is technically feasible. The project is also financially feasible as it will be implemented by an existing fishing operation. Project funds would be needed to meet travel expenses of the two SPC staff

for the duration, some capital expenditures (lead weights, floatline material, longline snaps, branchline materials, and TDRs), and possibly some funding to compensate for lost fishing opportunities depending on negotiations with the implementing private sector company and outcome of fishing trials. The project is very sustainable. If project outcomes are successful, the new setting technique could be taken up by the tuna and swordfish longline industry throughout the Pacific region. In fact, the technique could become required as a condition of permit issuance, to domestic vessels as well as foreign operators fishing under access agreements. Capital expenditure for gear conversion would be negligible so compliance would be simple. The project could take place any time during the year as longline fishing activities in the Pacific continue year-round. However, it would be best to time the project so that it coincides with the bigeye or swordfish season in the implementing country.



Normal set



Experimental set