

SOUTH PACIFIC COMMISSION

TWENTIETH REGIONAL TECHNICAL MEETING ON FISHERIES

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Regional Tuna Tagging Project

(Paper Prepared by the Secretariat)

1. The South Pacific Commission (SPC), through its Tuna and Billfish Assessment Programme (TBAP), and its predecessor the Skipjack Survey and Assessment Programme, has conducted biological research on pelagic fish stocks on a regional basis since 1977. The two primary responsibilities of the TBAP are the compilation, maintenance and analysis of a regional data base on commercial tuna fishing, and the assessment of the stocks supporting these fisheries. One of its primary aims is to provide a scientific information base for the assessment of tuna fisheries resources of the region, upon which regional groupings and individual island countries could base their plans and decisions regarding the development, jointly or individually, of their fisheries resources.

2. In order to better assist countries of the region in planning their fisheries development, the SPC proposed a Regional Tuna Tagging Project to be conducted by the existing TBAP and projected to commence early in 1989. This major project (4.289 million US Dollars) is expressly designed to provide practical answers to the questions raised by fisheries interaction within the region. Specifically, three aspects will be addressed: (a) interaction between artisanal and industrial fisheries operating in coastal waters; (b) interaction between fisheries of all types operating in adjacent EEZs; and (c) interaction between different gear types operating on the same fishing ground. The project was approved as part of the SPC Work Programme at the Twenty-Fifth South Pacific Conference in 1985 in Honiara.

3. The Member Governments of the SPC, which include eight ACP Member States (Fiji, Kiribati, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu and Western Samoa), agreed to the Project as a priority for resources allocation from the EC Pacific Lome III Regional Programme. This decision was taken in the light of the need and importance of developing the marine resources of the member countries of the Pacific region.

4. The major objectives of the tagging project are:

- (a) to estimate interactions between tuna fisheries in areas where several different fisheries operate concurrently;

- (b) to further use the description of tuna movements to predict interactions for projected fishery developments;
- (c) to provide estimates of yellowfin tuna population parameters for selected areas of currently intense fisheries;
- (d) to provide updated estimates of skipjack tuna population parameters for selected areas where fishing has increased since 1980;
- (e) to provide assessments of the potential for further expansion of tuna fishing in the region.

5. These objectives and other aspects of the proposal were reviewed at an *ad hoc* meeting of Fisheries Officers and technical experts in Noumea in March 1988. As a result of this meeting, the Project proposal was redrafted and the final dossier submitted through SPEC to the EC Delegation in Suva. Indicative EC approval was given for the Project at the Pacific ACP-EC Ministerial Meeting held in April 1988, with final approval from Brussels expected in September 1988.

Planning and Implementation of Project

6. The Project will be conducted by the TBAP using staff from the existing SPC establishment, 5 specifically recruited professional scientific officers and a 15-man crew of island fishermen. The TBAP is projected to extend through 1991, and field activities associated with the Project will take place over a period of 18 to 24 months, beginning in early 1989.

7. A tentative timetable for the implementation of the tagging work is given in Table 1. It is difficult to predict precisely a definite schedule because progress depends almost exclusively on fishing conditions. The first step is the location of a suitable vessel and negotiation of a satisfactory charter agreement. With EC assistance, tender documents will be drawn up and the tender advertised in the third quarter of 1988. Informal requests for information from charter sources have been made, and it is expected that the field work could begin and tags released after a period of four to six months from a confirmed commitment of funding. Initial tag returns from some fisheries could be expected within one month of release, and from other fisheries after a lag of six months. Preliminary scientific results, somewhat biased by the absence of long-term migrants, could be derived from analysis of the tag return data received during the first six twelve months after release. Analysis of tag return information is considered a continuing process. As more tags are returned, conclusions based on early returns will be evaluated and calculations revised accordingly. After a period of 24 months from release, very few tags would be expected and a definitive scientific analysis could be concluded. Progress reports will be issued on a timely basis.

Table 1. Tentative timetable.

Milestone	Month
First round of tagging	6
First tags returned	7
Preliminary results	18
Second round of tagging	18
Tagging completed	30
Project termination report	36
Majority of tags returned	54
Final report	60

8. This new tagging study will benefit from the experience of the Skipjack Survey and Assessment Programme, will employ many of the same methods, but will be quite different in purpose and execution. Whereas the previous study was designed to extensively survey skipjack over a wide area, the new study will be conducted intensively on both skipjack and yellowfin in a small number of carefully selected areas where recent changes in fisheries may be expected to have had the greatest impact. Considerable progress has recently been made by TBAP staff in the mathematical analysis of fisheries interaction, and general design of the tagging experiment will be guided by the results of these analyses.

9. Tagging programmes are dependent on the cooperation of fishermen and cannery workers to return recaptured tags. Rewards will be offered and lotteries conducted to provide extra inducements for returning tags. Extra effort will be expended to ensure that tags are recovered at ports of unloading and canneries.

10. Analysis of interaction, using tag return data, requires complete and reliable catch and fishing effort information from the fisheries recapturing tagged tuna. The tagging study will depend extensively on the regional fisheries data base maintained by the SPC.

11. Participation by scientists from countries visited is an important aspect of the Project. Extra accommodation will be provided on the tagging vessel and such participation will be encouraged.

Field Activities

12. The Project has been designed to increase the understanding of tuna movements in the survey areas with a view to formulating a general quantitative description of movement. Tagging will be the method of choice for this purpose. A long-range live-bait pole-and-line commercial tuna fishing boat will be chartered for use as the principal research vessel. Other survey procedures and research activities will be pursued concurrently in order to provide general information on the tuna populations in the regions studied.

13. In order to address the objectives stated above, two different types of tagging activities are envisaged. The principal large-scale interaction to be investigated is that between the DWFN purse seine and longline fisheries for yellowfin. To address this problem, tagging will be carried out in the general area of DWFN purse seine activity and will be the priority activity of the principal research vessel. In undertaking this aspect of the work, it is envisaged that the research vessel could operate at various times out of PNG, Solomon Islands, Kiribati, Marshall Islands, FSM and Palau. However, the areas covered will, in general, be determined by the areas of operation of the DWFN purse seine fleet.

14. In addition to the large-scale interaction question, there are also a number of more local problems that are of concern to Pacific Island countries. Among those to be specifically addressed by this Project include interaction between Solomon Islands purse seine and pole-and-line fisheries, interaction between the Kiribati national industrial fishery and artisanal/subsistence fisheries, interaction between DWFN purse seiners and artisanal/subsistence fisheries in FSM and possibly industrial/artisanal/subsistence interaction in Palau. In these areas, therefore, tagging will be carried out in coastal waters close to the fisheries of concern. Some of this work will be undertaken by the principal research vessel, however, tagging will also be carried out from locally chartered vessels where appropriate.

15. It is planned to release about 20,000 tagged tuna each year for two years. Since skipjack are more commonly caught than yellowfin, extra efforts will be expended to ensure that sufficient yellowfin tuna are tagged. The precise tagging schedule will be governed to a large extent by the need to investigate certain specific phenomena related to the fisheries which may be detected as the programme progresses. The schedule for the second year would be revised in light of the findings from the first. The timing of country visits will be determined in consultation with the relevant Fisheries Departments.

16. In addition to tagging, all observed fish schools will be recorded and identified whenever possible by school type, species composition and estimated school size. The chumming success rate and other characteristics of the school behaviour will also be recorded where possible. Although priority will be given at all times to the tagging operations rather than the taking of commercial catches, the catch rates from each area will be determined and will be used in comparing catches made by commercial vessels operating in the same area at that time.

17. Field activities will be governed by the following guidelines:

- (a) Both yellowfin and skipjack will be tagged, and extra efforts will be made to ensure that as many yellowfin as possible are tagged.
- (b) Numbered yellow dart tags will be applied by the same techniques used in the Skipjack Programme.
- (c) All fish released will be measured in the tagging cradle.
- (d) Three tagging teams will operate on the vessel simultaneously.
- (e) Special provisions will be made for tagging large yellowfin.

- (b) Island states will be able to determine the extent to which distant-water fishing fleets may operate within their EEZs without significantly impeding operations of their national fleets or threatening the livelihood of artisanal fishermen.
- (c) It will be possible to gauge the impact on tuna fisheries of the major changes in fishing practices that have occurred since 1980.
- (d) Estimates of yellowfin tuna population dynamics in the western Pacific will be available for the first time.
- (e) Estimates of skipjack population dynamics will be revised in relation to changes in the fishery.

Non-quantifiable Effects

- (a) Participation in the field operations by fisheries staff of the countries in which the Project operates will afford the opportunity for technology transfer in various aspects of fishing, novel bait fishing techniques, and fisheries research.
- (b) Improve the prospects for conservation and optimal utilisation of South Pacific tuna resources.
- (c) Improve the Commission's ability to undertake economic evaluation of fishery projects as requested by member governments.
- (d) Enhancing of regional co-operation between the regional organisations involved in the development and management of fisheries resources of the region.

CONCLUSIONS

22. The full benefits of this work will depend on the availability of economic data which are beyond the scientific scope of the study. It will be necessary to combine the biological results and conclusions based on analysis of tag return data with information on prices and economic performance of the fishing industry. At present, this information is not available to the SPC as analyses of this type are generally undertaken by the national governments and administrations in the region. Therefore the SPC scientists will work in close collaboration with economic planners from the appropriate bodies, such as the Forum Fisheries Agency, in ensuring that the biological results are relevant to the development needs and that the full benefits of the Project are realized. It is anticipated that, as the biological interpretations are improved as results accumulate, the economic evaluation would also improve.

(f) If exceptionally good catches are anticipated, and if normal operations permit, a number of fish will be double-tagged to reconfirm shedding rates and comparative mortalities.

18. From the tuna which are poled but not tagged and released, the following data will be collected by species:

- (a) length frequency distribution of each school fished;
- (b) length/weight relationship;
- (c) gonad samples from each school for fecundity studies.

19. As operations permit, scientists from other institutions will be encouraged to collaborate in related studies of tuna biology and oceanography. Collaboration could be in the form of actual visits by scientists or through provision of equipment to be operated by SPC staff.

RESULTS

Analysis and Presentation of Results

20. Field activities will be constantly monitored to assist in directing operations and ensuring that Project objectives are being met. All data will be stored and processed in the computing facilities at SPC headquarters in Noumea. Tag return data will be analysed by the staff of the TBAP in order to quantify tuna migration and mortality using mathematical treatments developed by the Programme in recent years. For fisheries operating on the same fishing ground, interaction between fisheries will be directly assessed by analysis of the tags released into one fishery and recaptured by another. For more widely spaced fisheries, interaction will be assessed by the application of statistical models of tuna migration and fishing.

21. The progress of the Project will be reported quarterly in the Regional Tuna Bulletin and also annually to the RTMF. In-country aspects of the Project will be presented as Country Reports. A preliminary Project Report will be prepared upon termination of Project funding and a final Project Report prepared within a further two years (by which time the great majority of tag returns would have been received).

Project Outputs

- (a) Island states will be provided with an additional tool for planning optimum development and management of tuna fisheries.