Deepwater snapper:
Towards improved stock assessments and management

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Background

1. Deepwater snapper are an important fisheries resource in many Pacific Island Countries and Territories (PICTs). Observations of localised depletions in some PICTs have raised concerns about the sustainability of current fishing rates. However, quantitative assessments of deepwater snapper stocks in the Pacific region have been limited by the lack of adequate biological and fisheries data.

2. At the last 3 Heads of Fisheries (HoF) meetings, members have directed SPC to provide more assistance to PICTs with stock assessment and management of deepwater snappers. Specifically, at the 2011 HoF7 meeting, members endorsed efforts by SPC to seek funding for a deepwater snapper project aimed at building capacity in snapper fishery management.

3. This paper summarises progress on SPC's deepwater snapper activities.

Project funding

4. Since the HoF7 meeting, SPC has obtained funding for deepwater snapper projects from AusAID, the French Pacific Fund (FPF) and The French Development Agency (AFD) (L'Agence Française de Développement). The funding from AusAID provides support for deepwater snapper management to those countries who requested assistance for deepwater snapper in their existing SPC Joint Country Strategy (JCS), which included Tonga, Samoa, Vanuatu and the Marshall Islands. The funding from the FPF and the AFP provides specific support to New Caledonia.

Deepwater snapper workshop, July 2011

5. In July 2011, a meeting was held at SPC to develop a work plan to support deepwater snapper management in the region and identify priority information and training needs. The meeting was attended by representatives from 12 PICTs where deepwater snapper fisheries are of particular interest. The agreed outcomes from the workshop included a framework and work plan for SPC's deepwater snapper activities.

Deepwater snapper work plan

6. The overall objective is to improve the stock assessments for deepwater snapper in PICTs to allow sustainable development of the fisheries, while developing national capacity to undertake this kind of work.

7. The work plan will initially focus on Tonga, Samoa, Vanuatu and Marshall Islands (AusAID funding) in line with priorities identified in SPC Joint Country Strategies. Complementary work will be done in New Caledonia (FPF and AFD funding).

8. The work plan focuses on 4 priority work areas:

- Fisheries data collection systems
- Improving biological knowledge
- Fisheries assessment and management
- Capacity development

Fisheries Data Collection Systems

9. Recent experiences to assess the status of tuna and shallow inshore coastal species clearly demonstrate substantial benefits of adopting a standardised approach to fisheries data collection across the Pacific region. These include:

- facilitating the development and maintenance of a common database system in each PICT, which minimises development and maintenance costs;
- providing consistency in how and what data are collected and analysed;
- facilitating comparisons of fisheries among PICTs; and
- allowing data fields to be categorised and prioritised depending on their intended use.

10. Activities to be completed to support fisheries data collection systems for deepwater snapper include:

- Support the development of fisheries monitoring programs in-country (logsheets and port sampling), which will be in line with existing monitoring activities for artisanal fisheries
- Develop deepwater snapper fisheries data forms that allow multiple levels of data to be recorded depending on individual PICT capabilities and capacities, whilst maintaining the integrity of the data reported. Utilise existing data forms where feasible (e.g. New Caledonia logbook for Lifou, artisanal data form, Tonga's deepwater snapper logsheets) to maintain familiarity in data reporting and to maximise the likelihood of accurate data being reported.
- Modify the existing artisanal fisheries database (TUF-ART) to allow the entry, storage and management of deepwater snapper fisheries data.

Improving biological knowledge

11. Estimates of biological parameters, such as growth and mortality rates, are fundamental to the understanding of a species population dynamics and for predicting responses of populations to fishing. Surprisingly little biological knowledge exists for deepwater snapper, especially in the Pacific region.

12. Activities to be completed to improve biological knowledge of deepwater snapper include:

- Fisheries independent surveys to collect biological samples from lightly exploited populations.
- Fisheries dependent sampling, via port sampling, in New Caledonia, Vanuatu, Samoa and Tonga and observers in Tonga.
- Estimate longevity, growth rates, maturity schedules and spawning seasons for key species and compare between PICTs.
- Examine genetic stock structure to identify management units for deepwater snapper in each PICT.
- Develop method(s) to distinguish between 2 different, but visually similar, species (*Etelis carbunculus* and *E. marshi*) that were thought to be a single species until recently.

Fisheries assessment and management

13. The lack of available data for deepwater fish species in many PICTs has prevented the development of traditional stock assessments for these species. A substantial effort, including the collection of fine scale catch and effort data, over a long period (>10 years) would be required to support the development of robust stock assessments. The cost of such data collection would most likely exceed the value of deepwater fisheries in most PICTs. Therefore, it is unlikely that traditional stock assessments will be developed for deepwater snapper fisheries in the foreseeable future.

14. Furthermore, the estimation of Maximum Sustainable Yield (MSY), a common management reference point used in stock assessments, may not be the most suitable reference point for deepwater snapper fisheries for several reasons, including:

    • estimates of MSY are usually very uncertain with a large error. Therefore, the relative fishing mortality required to achieve MSY is also very uncertain;
    • the estimation of MSY assumes that the environment does not vary. That is, it ignores natural variation in population size and also the size, age, reproductive stage of individuals;
    • MSY can vary in time (e.g. year to year) so there is a need to estimate MSY on a regular basis, which can be costly; and
    • perhaps most importantly, fishing at MSY levels may actually produce undesirable effects for deepwater snapper fisheries. For example, while catches at MSY may remain sustainable, it is possible that catch rates would decline to levels that are not economically viable.

15. Therefore, there is a need to develop alternative management reference points for deepwater snapper. Our approach is to develop a set of indicators (e.g. fish size, catch rates etc.) that are relatively easy to monitor, but provide a proxy for stock status and/or a measure of fishery performance.

16. In addition, we propose the development of a management framework akin to Management Procedures (MP) for the integration of these indicators into the management process. MPs are formal specifications of the management actions that will be taken when indicators reach certain threshold reference points.

17. Activities to be completed to improve fisheries assessment and management of deepwater snapper include:

    • Characterise the deepwater snapper fisheries in each PICT to identify trends and critical data limitations.
    • Develop species distribution models and provide maps of potential habitat for the major target species.
    • Develop biological and fishery indicators and reference points suitable for application within the MP framework.
    • Develop plausible management actions (e.g. harvest control rules) that can be implemented within each PICT in response to reference points.

Capacity development

18. SPC will provide opportunities for Pacific Island fisheries graduates to complete post-graduate studies to enhance capacity for deepwater snapper management and assessment in their home country.

19. Where appropriate, Pacific Island fisheries officers will also participate in long-term attachments to SPC to focus on developing data collection and assessment systems for application in their home country.

Progress to date

20. Completed 2 fisheries-independent scientific cruises in the EEZs of Fiji, Samoa, Wallis & Futuna, and Tonga. Fine-scale catch and effort data was collected from remote, lightly exploited populations which will provide useful baseline information for future assessments. Biological samples were collected from 970 individuals from 16 species.

21. Implemented and supported fisheries-dependent biological sampling in Tonga and New Caledonia.

22. Awarded scholarships to a Fisheries Officer from Samoa (Ueta Faasili) and Vanuatu (Jeremie Kaltavara) to support the completion of a Masters degree at the University of Wollongong and the University of Tasmania, respectively.

23. Provided ongoing support and long-term attachment at SPC for PhD student from Tonga (Hau Halafihi).

24. Developed criteria to distinguish between *Etelis carbunculus* and *E. marshi* in the field.

Recommendations

25. Heads of Fisheries are invited to:

- Note the progress that has been made with activities in SPC's deepwater snapper work plan.
- Note that SPC will be providing in-country support to establish fisheries data collection programs and port sampling activities for the collection of biological samples, but acknowledge that success of the project will be dependent on support from Fisheries Departments for these data collection programs.
- Give consideration to the need for funding beyond the life of this project (2015) for maintaining data collection programs and port sampling activities to support the monitoring and management of deepwater snapper fisheries.