

# Bycatch Communication Network NEWSLETTER

Issue 11 Nov-Dec 2008

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It is both my great professional and personal pleasure to announce that the BCNN has been funded for a further year by [Cefas](#) (the Centre for Environmental, Fisheries and Aquaculture Science) in the UK, an internationally renowned aquatic science research and consultancy centre.

With sincere thanks to Dr. Andy Revill of Cefas who initiated the funding and forwarded the following:

“The Centre for Environmental, Fisheries and Aquaculture Science (CEFAS) is a government agency of DEFRA (Department for Environment, Food and Rural Affairs) based in Lowestoft, UK. The centre supports this publication because it increases awareness of recent developments of bycatch mitigation technologies being developed around the globe. Such developments often have the potential for transfer and application to other regions, including those of interest to the UK.

We have pledged to provide funding to support this publication for the next 12 months and encourage other organisations that may also benefit from this newsletter to provide direct support to ensure a more stable future for this increasingly useful communication and information network”.

In addition, Lee Benaka of NOAA (the National Oceanic and Atmospheric Association, USA) has committed to upload each new issue onto the NOAA Fisheries “[What’s New](#)” bycatch website. This is a valuable opportunity to assist in expanding the Newsletter’s potential audience and subscriber base.

On a personal note, I would like to thank those of you who forwarded support for continuation of the Newsletter and congratulations on the recently secured funding from Cefas. I appreciate feedback of any kind, and am heartened to see that the Newsletter is read with interest and continues to be of value.

The second article in this issue “Triumph over Apathy” is a follow-up from the article (p.5 of the Aug/Sept issue) “Malaysia’s First Turtle Rescue and Resuscitation Workshop”. This good news story illustrates how the simple transfer of knowledge, and techniques through demonstration can instigate change in the attitudes and actions of those at the “coal face” of the bycatch issue.

Sincerely,

Emma Bradshaw - Editor



This issue of the BCN Newsletter is generously funded by Cefas (The Centre for Environment, Fisheries and Aquaculture Science), UK.

*Disclaimer: The opinions expressed in this publication are not necessarily endorsed by Cefas or the BCN (Bycatch Communication Network).*

# Pacific Islands Forum Fisheries Agency (FFA) Action Plan for Sea Turtle Bycatch Mitigation

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Presented at the Western and Central Pacific Fisheries Commission Scientific Committee Fourth Regular Session, 11-22 August, 2008, Port Moresby, Papua New Guinea.

## Abstract

Sea turtle populations have been reduced as a result of a range of human-induced activities, with fishing being one of the causes. The Western and Central Pacific Fisheries Commission (WCPFC) agreed on Resolution 2005-04 to mitigate the impact of fishing for highly migratory fish species on sea turtles. Pacific Islands Forum Fisheries Agency (FFA) Members (PIM) are committed to the conservation of sea turtles due to their cultural and social significance and their recognition of sea turtles as a species of high conservation value. FFA PIMs in the absence of specific research on the use and application of sea turtle mitigation gear, including circle hooks, in waters of their respective Exclusive Economic Zones, have in WCPFC fora, supported a flexible approach to sea turtle bycatch mitigation. In March 2008, FFA members participated in a workshop which developed an Action Plan for Sea Turtle Bycatch Mitigation. This paper provides information on the FFA Action Plan for Sea Turtle Bycatch Mitigation including strategies and activities relating to sea turtle bycatch mitigation for which FFA Members will be endeavouring to implement during the life of the Action Plan.

## Introduction

Sea turtles are of traditional and cultural importance throughout the Pacific Islands. Sea turtle populations have been reduced as a result of human-induced activities with fishing being one of the causes. Sea turtles are caught in small-scale coastal fisheries, but industrial tuna fisheries, especially long lining, take turtles incidentally while targeting other species.

Industrial tuna fishing is not the main cause of turtle mortality, with some estimates that industrial tuna fishing is responsible for about 10% of mortality of adult turtles, but this is not known with any certainty. However the principles of responsible marine resource use, the precautionary principle, and an ecosystem approach to fisheries management require that fisheries managers and fishers attempt to reduce fishery-induced bycatch of endangered and sensitive species, including sea turtles. In 2005, the Food and Agriculture Organization of the United Nations (FAO) produced Guidelines to Reduce Sea Turtle Mortality in Fishing Operations (the Guidelines), and these were subsequently endorsed by the FAO Committee on Fisheries (COFI).

In 2005, the WCPFC agreed on Resolution 2005-04 which encourages Commission Members, Cooperating Non-Members and Participating Territories (CCMs) to: implement the FAO Guidelines; report information on turtle interactions to the Commission; and enhance implementation of turtle mitigation measures that are already in place. The resolution also encourages CCMs to implement specific turtle bycatch measures in regard to purse seine and longline fishing operations. As concerns purse seine fishing, these include: avoiding encirclement of sea turtles during purse seine sets, and efforts to safely release those that are captured; cease net hauling if turtles are entangled in the net, until the turtle can be disentangled and released; and monitoring or redesigning of FADs (fish aggregating devices) to minimise entanglement of turtles in FAD appendages. As regards longline fishing, they include: research trials of appropriate size circle hooks (which have been shown to catch fewer turtles); and a

requirement by longline vessels flagged in CCMs to carry and where necessary, use de-hookers, line-cutters, scoop nets and other equipment that will assist in the prompt release of incidentally caught sea turtles. The resolution also encourages CCMs to undertake research and trials of circle hooks in recreational and artisanal fisheries.

Like other Commission resolutions, Resolution 2005-04 is not binding on CCMs. Some CCMs have been actively promoting the need to introduce a binding Conservation and Management Measure (CMM) to mitigate the impact of fishing for highly migratory fish species on sea turtles. FFA members are committed to the conservation of sea turtles due to their cultural and social significance and their recognition of sea turtles as a species of high conservation value. A number of international agreements have been made and national measures taken to conserve turtle nesting beaches and all FFA PIMs have legislation regulating the taking of sea turtles in small-scale coastal fisheries. At least three have, or are preparing, national sea turtle management or recovery plans. Some members in some fishing licensing conditions have reference to the need to release incidentally captured turtles.

FFA PIM in the absence of specific research on the use and application of sea turtle bycatch mitigation gear, such as circle hooks, in waters of their respective Exclusive Economic Zones, have in WCPFC fora, supported a flexible approach to sea turtle by-catch mitigation. FFA members are also aware of the possibility of future regulatory action from the USA and other developed international markets, which may prevent the export of fisheries product to such markets, unless exporting countries have in place sea turtle bycatch mitigation measures that are considered satisfactory by the importing country.

## FFA Workshop on Sea Turtle Mitigation

In view of the above considerations, FFA convened a Workshop on Sea Turtle Mitigation, which was held in Nadi from 11-12 March 2008. The objective of the workshop was to:

- ❑ Consider monitoring and research activities needed to allow FFA PIMs to assess the scale and scope of sea turtle/fishing gear interactions in their fisheries, and determine the extent to which sea turtle bycatch is a problem;
- ❑ Determine possible sea turtle bycatch mitigation measures that could be adopted by FFA PIM, including, but not limited to the use of circle hooks;
- ❑ Discuss possible funding and implementation mechanisms for the activities proposed; and
- ❑ Identify issues related to sea turtle bycatch mitigation of relevance to the WCPFC.

The workshop was attended by representatives of 11 FFA PIM (Fiji, Kiribati, Marshall Islands, Nauru, Niue, Palau, Samoa, Solomon Islands, Tokelau, Tuvalu, Vanuatu, as well as representatives of Australia, several regional organisations: [FFA](#), [SPC](#) (Secretariat of the Pacific Community), [SPREP](#) (South Pacific Regional Environment Programme), [USP-IMR](#) (University of the South Pacific – Institute of Marine Resources) one NGO (WWF) and resource people with sea turtle bycatch mitigation expertise. Presentations and background information related to sea turtle bycatch mitigation were presented during the course of the workshop. It is intended to place workshop presentations, a list of reference materials provided to workshop participants and a list of workshop participants on the FFA website in the future.

The workshop resulted in the development of a draft Action Plan for Sea Turtle Bycatch Mitigation (the Action Plan) which proposes three strategies (data collection and monitoring, research and investigations, and mitigation measures) and a range of specific activities within each category that need to be conducted.

The draft Action Plan was circulated to all workshop participants and other FFA members who were unable to participate in the workshop via e-mail on 3 April 2008, and comments were requested by the following week. No comments were received opposing the format or content of the draft Action Plan including that relating to the FFA Secretariat suggested prioritisation of activities or cost estimates. The FFA has commenced discussions with regional organisations regarding implementation of prioritised components of the finalised Action Plan (following) over the next 12 months.

## Objective

To reduce the impacts of fishing for highly migratory fish species by FFA members and in FFA member country waters on sea turtles.

## Scope

The Plan covers a range of collaborative activities to be carried out by Pacific Island Forum Fishery Agency members, relevant Pacific Island regional organisations, research agencies, and other concerned parties.

In developing the plan, a number of generalised issues and constraints have been taken into account as follows:

The limited capacity of FFA fishery and other agencies to absorb the additional workload of dealing with sea turtle/tuna fishery interaction issues, and the limited resources available to support this:

- Currently, data and information on turtle/ tuna fishery interactions is very uncertain. The extent of the problem in the WCPO and world wide is not well known or understood;
- There will always be a trade-off in FFA PIMs between the desire to protect sea turtles and the need for fishery revenue, employment and food production;
- No detailed risk assessment has been carried out. The costs and benefits of turtle bycatch mitigation action versus no action (such as compliance with domestic import requirements of another country) have not been determined;
- Dealing with sea turtle/tuna fishery interaction issues may have little impact if other anthropogenic threats to sea turtles are not also addressed; and
- Funding for sea turtle related activities will be limited. If funding is available, it might have more impact if spent on other turtle conservation measures (such as protecting nesting beaches) rather than on turtle-fishery interaction issues.

The Plan has been formulated with these constraints and issues in mind. The time frame of the Plan is three years in the first instance: from 1 July 2008 to 30 June 2011.

## Strategies

The objective of the Plan will be achieved through three strategies, which are listed below along with major issues pertaining to them:

1. Undertake collection and monitoring of fishery data to improve our understanding of the nature, scope and scale of sea turtle/tuna fishery interactions in order to develop appropriate responses:

- There is a need for improved observer coverage throughout fishery area - some countries have large well-established observer programmes, others not yet;
  - Collection of sea turtle-related data may not always have a sufficiently high profile, and needs to be raised;
  - There should be more analysis and utilisation of existing data, and a plan to use future data that may be gathered by observers;
  - The quality and nature of observer data are sometimes insufficient, particularly in regard to species identification and size information;
  - Fishing vessel log sheet data on sea turtle interactions is poor or non-existent; and
  - Artisanal/subsistence interactions are likely to be significant.
2. Conduct research and investigations to obtain information that cannot be acquired through monitoring, and test possible mitigation measures:
- The rarity of sea turtle interactions can be an impediment to research and fishing gear trials;
  - Circle hook trials in FFA PIMs should focus on the effects on target species and catch value rather than on their effectiveness on sea turtle interaction (which is already known);
  - The cost of carrying out gear/mitigation trials at sea can be high, and may be coupled with difficulty in achieving statistical reliability;
  - Circle hook trials can be carried out through 'hook-swap' programmes (substituting standard hooks with circle hooks on commercial fishing vessels) as well as through dedicated research cruises;
  - Fleets and techniques evolve – today's solution may be obsolete tomorrow;
  - Poor capacity of observers/fishers to carry out tagging;
  - Domestic fleets should be prioritised for 'hook swap' programmes;
  - Hook styles should be well monitored and documented. Samples should be taken of gear styles already in use;
  - Full account should be taken of other recent research on sea turtles, and the knowledge of fishermen, crew and observers;
  - There is a need for better observer coverage and better fishing log book recording of turtle fishery interactions; and
  - Uncertainty over sea turtle stock structure makes it difficult to properly assess the impact of turtle fishery interactions on turtle populations.
3. Introduce mitigation measures to encourage/require fishers to take steps to reduce (a) turtle fishery interactions and (b) mortality rates resulting from such interactions:
- Turtle bycatch mitigation measures should not transfer the problem to other sensitive species (such as sharks);
  - Mitigation measures need to be acceptable to fishers (reduction in turtle interactions without negatively affecting catches and profitability);
  - Distribution of turtle bycatch mitigation equipment (line-cutters, de-hookers, etc.) can have positive impacts and generate goodwill in and towards the fishing industry;

- ❑ All mitigation activities need to be backed up by fisher training and education;
- ❑ Mitigation programmes need to be ongoing due to fleet and personnel turnover, one-off activities will not have a sustained impact; and
- ❑ Domestic vessels are probably easier to target than foreign fleets, and enforcement of turtle bycatch mitigation regulations will be easier.

## Activities

A number of activities under each of these three strategies are outlined in the attached PDF “FFA Turtle Bycatch Activities”. It is recognised that the three strategies are inter-linked, and that some activities straddle more than one strategy.

## Funding

Initial support for priority elements of the Plan will be provided by FFA using dedicated funds provided by [AusAID](#) and other donors for this purpose. Where appropriate, specific activities may be submitted for funding by the WCPFC Special Requirements Fund or other assistance provided by the WCPFC and/or developed Commission members or developed Co-operating non-members. Other donor funding and in-kind support and expertise will also be sought during the process of implementing the Plan.

## Coordination and Implementation

Implementation of the Plan will be by national governments, FFA, regional organisations and other concerned parties (including NGOs) as appropriate. Coordination of Plan implementation and overall monitoring will be undertaken by FFA.

## Acknowledgements

The authors would like to acknowledge the contribution of all presenters and participants in the Sea Turtle Bycatch Mitigation Workshop and other FFA members in the development of the FFA Action Plan for Sea Turtle Bycatch Mitigation. AusAID provided funding to the FFA to conduct the workshop and initial support to implement selected components of the Action Plan.

For more information contact Darren Cameron at: [darren.cameron@ffa.int](mailto:darren.cameron@ffa.int).

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# Triumph Over Apathy

River Foo, Terengganu Turtle Conservation, WWF-Malaysia.

One of the biggest challenges facing conservationists is engaging local communities to adopt environment-friendly practices. Most people who rely on natural resources for their income and survival are not concerned with saving endangered species; their first priority is to secure their livelihood. When people are used to exploiting as much as they can rather than conserving, trying to affect a behavioural change can sometimes be very difficult for conservationists to achieve.

Such is the case with sea turtle bycatch. An ongoing threat to turtle conservation, incidental capture of sea turtles in fishing gear is a significant cause of turtle mortality in Terengganu,

Malaysia. Studies have shown that one of the major reasons for this bycatch is the use of illegal fishing gear by local fishermen. These fishermen fail to recognise the threat they pose to the very same resource upon which they depend.

However, if the word of fisherman Pak Ali (name changed upon request) is anything to go by, community outreach programs by WWF-Malaysia are proving to have an impact. Sixty one year old Pak Ali, has been fishing in Terengganu for as long as he can remember and he related how he saved a sea turtle thanks to the training he received during a recent turtle rescue workshop (see page 5, issue 10 of the BCNN).

While fishing, Pak Ali encountered a female green turtle entangled in an illegal ray net (*pukat pari*) and he immediately knew that he had to save it from drowning. Recalling his training, he wasted no time in drawing his knife and cutting away the fishing net. Minutes later, he was able to watch the turtle swim free. A devout Muslim, Pak Ali felt that his act was all the more significant for having taken place in the holy month of Ramadhan.

Pak Ali attributes his successful action to the 'Turtle Rescue, Resuscitation and Release' workshop organised in April this year by WWF-Malaysia, the Department of Fisheries, and community-based organisation Persatuan Khazanah Rakyat Ma' Daerah (MEKAR). His story illustrates the importance of community outreach and awareness work, and the effectiveness of such training initiatives.

Pak Ali firmly believes that better enforcement is needed to stop the use of illegal fishing gear. He also hopes that such workshops can be organised in the future to raise awareness and educate the local fishing community. Pak Ali has seen many turtles die in fishing gear over the years, but for the first time, an initiative such as this workshop has given him the knowledge and skills to address the issue of turtle bycatch on a local scale.

For more information contact: River Foo at: [rfoo@wwf.org.my](mailto:rfoo@wwf.org.my).

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## The Smart Hook - Effective Bycatch Mitigation for Longline Fisheries

Hans Jusseit, Director, Ahi Enterprises Pty Ltd., Australia.

Former Tuna fisherman and industry chief executive Hans Jusseit has invented a system which ensures that up to one million seabirds and turtles cannot be hooked when long line fishing for tuna.

"With over two billion hooks being set a year, I really wanted to see a solution to the devastating impact that the fishing industry is having on seabirds and turtles. I suggest 700,000 to 800,000 seabirds and more than 250,000 turtles could be saved a year," Hans said.

His solution is the Smart Hook. The baited hook is protected by a shield, which is held in place with a biodegradable pin.

The pin dissolves once the hook is below the feeding depth of seabirds (25 metres) and turtles (100 metres). Once the pin dissolves, the shield is released and the baited hook is ready for fishing. The shield and the pin are both made of a metal alloy which dissolves leaving no contaminants.



*The Smart Hook. Courtesy of ABC 'New Inventors'.*

The Smart Hook has been victorious this year in the Australian Broadcasting Corporation's (ABC) 'New Inventors' program (click [here](#) to view the video). Hans' next steps are to attract investors to mass produce the Smart Hook and set up collaborative working partnerships with government, industry and conservation groups to help with commercialisation.

Hans worked as a tuna fishing boat owner/operator for 10 years, and a fishing industry representative in Australia and overseas for 20 years. He recently retired as CEO of the

East Coast Tuna Boats Association. Those business skills encouraged him to dive head-first into the Smart Hook invention.

"I had some time to look at the issues outside the box, and I realised that all the talk was about distracting sea birds from the bait, these ideas were just bandaid measures".

"I knew that the answer to the problem had to be simple – we just needed to prevent them from being hooked in the first place".

"Fishermen are not out there to catch birds, turtles and other species. They don't want to. It's heartfelt stuff. I recognised that people were responsible for this devastation, and I realised that I was at the point where I could tap into all the skills I've learnt during my career to put something back into the world."

Tuna, fine instrument skills, developed as a scientific instrument maker, and a strong interest in the environment converged to build his new career.

Hans' keen interest in the marine environment stems from both his work for the University of Queensland on a Heron Island marine research station, where he became an avid scuba diver, and his commercial fishing career.

Hans said he couldn't stop thinking about the impact that fishing was having on seabirds and turtles.

"Even when I was representing the tuna industry in meetings around the world, it was difficult for me to understand that we were having such an impact," Hans said.

"I didn't realise that it was the cumulative effect that was having such an impact".

"The last thing any fisherman wants to do is to catch a seabird or turtle when they're fishing for tuna".

"The first thing the tuna industry said to me when they saw my Smart Hook was 'this is the thing we've been looking for – when can we have it?'".



*The Smart Hook can also be used in conjunction with lures. Courtesy of Robin Davies - WWF.*

Hans engaged a metallurgist at the Queensland University of Technology to help pin down the exact alloy to use – they explored polymers, plastics and metals.

Hans said it took a \$AUD 120,000 Commercialising Emerging Technologies (COMET) grant from AusIndustry to help him turn his working prototype into a product ready for full-scale manufacture.

“Without the assistance of COMET funding, this project would not have seen the light of day,” Hans said.

“It would have been extremely difficult to attract investors so we could undertake this research and development. We’ve produced something that the industry has been crying out for – we’ve found the solution to a devastating global problem.”

Hans made his grant work for him. The grant paid for patents and market research.

COMET provides a business adviser to help identify priorities. The adviser helped Hans develop a business plan, focus on management skills and develop an intellectual property strategy.

Hans said the business plan was proving useful when approaching banks and potential investors. “The management skills have also helped me when I’m approaching other businesses for collaborative work”.

“It gives these businesses confidence that I have set up my business in a well-documented, structured way,” Hans said.

To his intellectual property strategy, Hans said the business adviser had given him ‘phenomenal advice’. “He helped me work out the most cost-effective way of lodging patents. Without this advice, it would have been a very tough road. The business adviser saved me a lot of money,” Hans said. The grant helped him commission market research which helped inform his business plan and intellectual property strategy.

For further information contact Hans Jusseit at: [ahienterprises@optusnet.com.au](mailto:ahienterprises@optusnet.com.au).

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## Southern Seabird Solutions - Under the Microscope

Shelly Biswell, Southern Seabird Solutions, New Zealand

Participants at the recent Southern Seabird Solutions Trust review workshop heard from John Croxall, Chair, BirdLife International Global Seabird Programme; Carlos Moreno, Universidad Austral de Chile; and Marco Favero, who is an Argentinian seabird ecologist and Chair of the Agreement on the Conservation of Albatrosses and Petrels Advisory Committee, to learn about seabird bycatch problems and solutions in fisheries outside New Zealand.

When seabird expert Carlos Moreno of Chile spoke about his country’s progress in reducing seabird bycatch– a fact that can be verified through high observer coverage – he had the attention of everyone in the room. After all, it was only five years ago that a Chilean skipper came to visit New Zealand to learn firsthand what Kiwis were doing to address the issue.

“It’s great to see Chile’s effort to reduce seabird bycatch, particularly since we share many birds” as Carlos said during his presentation. “You breed them, but we feed them!” Deepwater Group Chief Executive Officer George Clement responded. “The seabird bycatch issue is truly a ‘think global, but act local’ issue – we’ve got to be responsive to the issue in our own fisheries, but also aware that international cooperation is necessary if we’re going to solve this problem.” In turn, Andrew Bond, Industry Liaison Manager, Sanford Ltd said, “Here in New Zealand we’ve made a lot of good strides in terms of seabird bycatch through codes of practice, raising the profile of the issue, trialling and implementing successful mitigation measures, stakeholders working more collaboratively, and, yes, through regulation. But there still appears to be a problem in some fisheries and there are still too many fisheries that we don’t know enough about. From where I stand, it feels like we need to continue to clean up our own backyard, the job is not yet finished.”

There was also a technical side to the workshop. Carlos discussed the *Cachaloteras* which he developed with fishermen to stop whales from taking the catch from longlines in the Chilean toothfish fishery – as an added bonus the device also eliminates seabird bycatch.



*The Antarctic Chieftain’s Kiwi Longline Setting Tunnel. Courtesy of Skipper John Bennett.*

Hans Jusseit of Australia, an ex-tuna longline fisherman turned inventor, showcased his Smart Hook System which should be on the market in mid-2009 (see previous article). John Bennett, skipper of New Zealand’s *Antarctic Chieftain*, discussed the Kiwi Longline Setting Tunnel. The tunnel was part of an overall retrofit on the demersal longline vessel which allows baited hooks to be released closer to the water’s surface. Normally the hooks are deployed over the side of the vessel, but with the setting tunnel, the hooks are set internally until right at the

water’s surface making them less visible to sea birds. The tunnel also reduces the sound of the hooks being deployed, another effective measure in reducing the attraction of baited hooks to seabirds.

The next step for the Trust’s management committee is to harness the ideas from the workshop and turn them into workable solutions.

The Southern Seabird Solutions Trust is supported financially by the Department of Conservation, and the fishing industry through the New Zealand Seafood Industry Council and the Deepwater Group Ltd. The Trust is also supported by WWF-New Zealand. Funding for projects of the Trust comes from a variety of sources, both within and outside New Zealand, and includes financial contributions from supporters, grants, sponsorship and services in kind.

Once completed, the review workshop report will be available at [www.southernseabirds.org](http://www.southernseabirds.org). For more information contact Shelly Biswell at: [Shelly@biswell.net](mailto:Shelly@biswell.net).

**Table 1: Data Collection and Monitoring Activities**

	Activity	Implementing Party	Cost Estimate (USD)	Priority* (H, M, L)
1.1	Prioritise observer data on turtle-fishery interactions through development of specialised competency-based training modules and observer debriefing procedures.	FFA/ SPC with support from SPREP and FFA members.	\$0 (absorbed into ongoing activities).	H
1.2	Use available turtle-related funding to carry out sea turtle by-catch mitigation-related training of observers. Specific observer workshops could be piggy-backed onto general observer training and workshops.	FFA with support from SPC and SPREP.	\$50,000+/workshop (excludes salaries of trainers).	H
1.3	Produce a guide to hook and other longline gear types for observers (waterproof card style) to assist in improving observer data.	FFA initiation with support/ carriage by SPC.	\$25,000.	H
1.4	Use available sea turtle-related funding to purchase and provide necessary equipment (de-hookers, line cutters etc. as well as cameras, safety gear and other items) for observers in association with sea turtle-mitigation training activities.	FFA supported by SPC through training activities.	\$50,000 initial exercise.	H
1.5	Expand FFA observer programme to assist FFA member longline fleet in meeting required observer coverage obligations.	FFA to initiate with support from FFA members.	Unknown.	M
1.6	Update 2001 SPREP/ SPC analysis of observer data on turtles and provide timely/ annual analysis of data. Analysis to be presented to WCPFC Scientific Committee.	FFA initiation for SPC OFP to undertake in collaboration with SPREP.	\$25,000+ (includes developing appropriate statistical techniques and undertaking analyses).	H
1.7	National studies to extract information on turtle-fishery interactions from historical and recent observer reports, forms, diaries and improved debriefing processes (Could be carried out by fisheries officers or national consultants).	FFA members with FFA/ SPC support as requested.	\$0 - \$15,000+ (if consultants used).	H
1.8	Improve longline vessel log sheet recording interactions with turtles and other species of concern (sea birds, sharks), especially in area north of 20°N and west of 150°E and improved descriptions of fishing gears used. (Linked to Data Collection and Monitoring Activities – see 1.2)	FFA members (bilateral arrangements) with FFA/ SPC support as requested.	? – requires additional observer capacity.	M
1.9	Data Collection Committee (DCC) to consider revising log sheets to improve Species of Special Interest (SSI) reporting.	DCC (includes SPC, FFA and FFA members).	\$0 (absorbed into ongoing activities).	M

Activity		Implementing Party	Cost Estimate (USD)	Priority* (H, M, L)
1.10	Obtain and use informal information and data from fishing vessel skippers and crew (including descriptions of fishing gears used) to better understand incidences of sea turtle interactions. Information should be collected by fisheries officers, port samplers, observers and others, and collated and reported annually to the WCPFC.	FFA members with FFA/ SPC support as requested.	\$0 (absorbed into ongoing activities).	M

\* H = High, M = Medium, L = Low.

**Table 2: Research Activities and Investigations**

Activity		Implementing Party	Cost Estimate (USD)	Priority* (H, M, L)
2.1	Document technical details (particularly hook type and size, bait type, line specifications etc.) of current Pacific Island longline fishing operations.	FFA initiation with support/ carriage by SPC and support by FFA members.	\$50,000 (?).	H
2.2	Coordinated hook-exchange programmes in longline fishing operations (circle hooks to replace other hook types) and associated collection of catch information to trial circle hooks. Activity could be associated with bait trials and/ or distribution of demonstration hooks to further encourage voluntary adoption.	FFA initiation supported by SPC and consultants as required with carriage by FFA members.	\$70,000 initial exercise.	H
2.3	Dedicated quantitative at-sea circle hook trials to assess effect of circle hooks on catch rates of target species.	FFA members wishing to undertake such trials to specifically request initial consideration of such research and seek support from FFA/ SPC / and WCPFC. Such exercises will require substantive dedicated funding from WCPFC and / or developed Commission members or Co-operating Non-members.	Unknown but probably very expensive (in excess of \$200K for even basic quantitative study).	M
2.4	Encourage development and trial of innovative sea turtle mitigation equipment and technology through pilot testing and awareness activities. (SPC Fisheries Newsletter, SPC/ FFA websites, publicity for Smart Gear competition, etc.).	SPC with support from FFA.	Initial \$30,000 for pilot testing of innovative sea turtle mitigation equipment and technology. (Awareness raising absorbed into ongoing activities).	M
2.5	Include DNA sampling and turtle tagging in observer training and equipment supply activities under 1.1 & 1.2	FFA initiation with support by SPC/ SPREP and USP-IMR.	Unknown but probably low (covered by other parts of Action Plan).	M
2.6	Establish a programme of sea turtle DNA sampling by fishery observers, to assist in Pacific Island sea turtle population identification.	FFA initiation/ with support/ carriage by SPC/ SPREP/ USP-IMR and FFA members.	Unknown.	M
2.7	Coordinate analysis of DNA samples taken by observers, to assist in Pacific Island sea turtle population identification.	SPREP/ USP-IMR/ partner research agencies.	Unknown.	M

Activity		Implementing Party	Cost Estimate (USD)	Priority* (H, M, L)
2.8	Expand existing SPREP flipper tagging, and if possible satellite tagging of turtles, through the observer programmes.	FFA initiation with support/ carriage by SPREP/ SPC/ USP-IMR and FFA members.	Unknown.	M
2.9	Coordinate tag recapture data and satellite tag tracking data (if applicable), enter data into TREDs database, with regular reporting back to FFA PIMs, regional agencies, WCPFC and fishing industry.	SPREP supported by SPC and USP-IMR, with input and support by FFA members and FFA as requested.	Unknown but probably low (absorbed into ongoing activities).	M
2.10	Source and analyse any commercial fisheries log sheet data describing sea turtle interactions (linked to Data Collection and Monitoring Activities– see 1.6 above).	FFA initiation with carriage by SPREP and SPC.	Unknown.	M
2.11	Examine coastal fishery statistics and research reports for information on turtle-fishery interactions in artisanal and subsistence fisheries. Information could be reviewed by fisheries officers or national consultants and should be reported annually to the WCPFC.	FFA members supported by SPREP /SPC with support by FFA as requested.	\$0 - \$15,000+ (if consultants used).	M

\* H = High, M = Medium, L = Low.

**Table 3: Mitigation Measures and Activities**

	Activity	Implementing Party	Cost Estimate (USD)	Priority *(H,M, L)
3.1	Incorporate requirements for sea turtle by-catch mitigation (e.g. carriage and use of release equipment) in foreign and domestic licence arrangements.	FFA members supported by FFA.	Unknown but probably low.	H
3.2	Delivery of initial training of trainers (TOT) course for fisheries/ maritime training institutions is required for delivery of sea turtle by-catch mitigation awareness and training programmes to fishers, especially in longline fisheries. After TOT course delivery the development of ongoing funding mechanisms (government funds, grants, fisher levies, etc.) will be needed to support national fisheries/ maritime training institutions to deliver sea turtle by-catch mitigation awareness and training programmes to fishers.	FFA initiation with carriage by SPC and SPREP. After delivery of TOT course, carriage by FFA members.	\$50,000 for initial TOT course (including syllabus development and materials) for 12-14 participants.	H
3.3	Back up national delivery of turtle by-catch mitigation awareness and training programmes to fishers (see 3.2 above) with release equipment supply and ongoing (long-term) support (linked to Data Collection and Monitoring Activities – See 1.4). Again, this long-term support will require development of ongoing funding mechanisms (government funds, grants, fisher levies, etc.).	FFA initiation with SPC/ SPREP carriage/ support.	Unknown but initial \$50,000 investment in release equipment considered reasonable.	H
3.4	Demonstrate circle hooks via hook exchange programmes in countries with predominantly domestic fleets (linked to Research activities – see 2.2 above).	FFA initiation supported by SPC and consultants as required with carriage by FFA members.	\$70,000 initial exercise.	H
3.5	Licensing and access agreements to require conduct of protected species workshops / sea turtle by-catch mitigation awareness and training programmes, with mandatory participation by fishermen (linked to 3.2 above).	FFA members supported by FFA and SPC.	Unknown but probably low.	H
3.6	Utilise observer programmes as a conduit for information on uptake and problems with existing and new turtle by-catch mitigation measures and techniques.	FFA members supported by FFA and SPC.	Unknown but probably low.	M
3.7	Create ownership and encourage voluntary participation in turtle by-catch mitigation activities by involving fishers in research activities, especially tangible and easily communicated activities such as tagging, and ensuring that research results are fed back to them.	SPC/ SPREP/ USP-IMR with FFA support with carriage by FFA members.	Unknown but probably low.	M

\* H = High, M = Medium, L = Low.