

An update on non-target, associated and dependent species (NADs)¹

Antony D. Lewis

This paper updates the available information concerning NADs or by-catch species in the WCPO tuna fishery, as presented at SWG 2². It identifies issues likely to arise, and considers future action needed in terms of data collection, analysis and research, particularly if UNIA requirements were to be met.

Background

The review for SWG 2² described the requirements which exist under the UNIA to monitor the catch of NTAD species, commonly called by-catch, in the WCPO tuna fisheries, and to assess the impact of fishing on these species.

Occurrence of NADs in WCPO tuna fisheries

(Information from observer data, summarized in two previous reviews – Bailey et al., 1996; Lawson, 1997)

⇒ *Purse seine fishery* : the estimated overall by-catch rate in the SPC area (1994-1996 observer data) was less than one percent by weight of the total catch - 0.5 percent of the catch for unassociated sets and 0.9 percent for associated sets (but representing a nominal 4,918 t in total). The most important by-catch species were the shark species group and rainbow runner (both >1,000t); other groups of moderate importance were frigate tuna, mackerel scad, ocean triggerfish, mahi mahi and marlin (blue and black). These catch levels are however highly variable, are currently not well estimated, and should be regarded as indicative. Very small numbers of marine mammals were recorded.

(Note that estimated discards of target tuna species were considerably higher, at 24,000t, or 3.5% of the total catch. Thus, by-catch and discards estimated at 4% of the total catch, or 29,000t)

⇒ *Longline fishery*: the overall by-catch rate (SPC area, 1992-1997 observer data) was high, at 42 percent of the total weight (or 57,650t). Sharks accounted for 23 percent of the total catch. Longline by-catch rates seem less variable than those for purse seine. The most important by-catch species was blue shark (23,700t), followed by blue marlin, swordfish, striped marlin, wahoo, sailfish, black marlin, escolar, silky shark, thresher shark and oceanic whitetip shark. The estimated billfish catch (all species) was 17,500t. Again, these figures should be regarded as indicative. Some variation in levels of by-catch and species, by area, also occur.

⇒ *Pole-and-line, handline and troll fisheries*: by-catch levels very low.

⇒ *Driftnet fishery*: by-catch levels high, and well documented, but large-mesh long drift nets no longer in use in the region.

¹ This paper was originally prepared for and presented at the Third Meeting of the Forum Fisheries Committee Species Working Group, Apia, Samoa, 29th April 1999.

² “SWG 2” – refers to the Second Meeting of the Forum Fisheries Committee Working Group

Issues involving NADs

- ◇ because of poor reporting of the **catch** of NAD species by logbook (which realistically is unlikely to improve, even in the long term), and the relatively low observer coverage, the total catch of the range of species can only be estimated, with considerable uncertainty surrounding existing estimates. They do however give an indication of the relative importance of by-catch by fishery, and identify the species involved.
- ◇ the above is equally true of **catch rates** of NAD species **over time** ie information is lacking and they are not well estimated; in addition, the biology and population dynamics of nearly all species are poorly known, such that impacts of fishing on NAD species cannot presently be assessed.
- ◇ As the estimated level of longline by-catch is highest, both in terms of the proportion of the total catch and weight of the catch, ecological concerns would most likely relate to longline by-catch. Historically, longline effort in the Pacific in the Pacific has changed little over the last 20 years, fluctuating between 450 and 600 million hooks (Figure 1). Given some assumptions concerning stability of per-hook impacts over time, any **ecological impacts of longlining on by-catch species** are likely to be of long standing, and may be difficult to detect retrospectively (even if time series catch/effort data were available).
- ◇ Whilst all NADS are specifically covered by various provisions of the UNIA (see SWG 2 NADs paper), there has been some interest in revising the existing **Annex 1** of UNCLOS (List of Highly Migratory Species), to specifically reflect species of direct interest and concern to the WCPO, for inclusion in the MHLC Convention (discussions both in FFC caucus and MHLC 4 plenary). This is likely to be further discussed at the forthcoming SCTB 12.
- ◇ other issues concerning particular NTAD species groups are listed below :-

Sharks

The predominant component of longline by-catch and the most important group overall; sharks are attracting increasing attention because of the volume of the catch and the biological characteristics of many species which render them potentially more vulnerable to over-exploitation eg longevity combined with low natural mortality, the low fecundity of many species. The FAO Consultation is an example of this increasing focus on shark catch.

Whilst sharks are generally robust and often alive at the time of capture by longline, the high value of the fins of many species has made it unlikely that sharks will be routinely released whole and alive. A few species are also retained in some cases for consumption eg mako shark.

Whilst no management arrangements for shark are currently in place in the region, the possibility exists that the precautionary approach may be applied should perceptions of overfishing develop.

In addition to their prominence as tuna longline by-catch, sharks are now taken in target longline fisheries in several countries in the region, predominantly in response to the increasing value of the fins. Several observer trips have been possible on these vessels during 1998, and Figure 2 summarizes the species composition of the catch on these observed trips. The species of shark taken by these vessels are the same as those taken on longline vessels targeting tuna, but at higher catch rates.

Using gear set shallower than normal tuna longline gear, sharks made up 68% of the catch by weight, tunas 10% and billfish 9% (data from 19 sets). By contrast, the observed catch by tuna longliners operating in the same area comprised 71% tuna, 15% sharks, and 4% billfish. Silky and oceanic white-tip shark dominated the catch by the shark longliners (nearly 90% of the catch). Fins of all species and the meat (dressed trunks) of selected species were retained.

In view of the increasing interest and the general dearth of knowledge of their population dynamics, the OFP is devoting increasing effort, as resources allow, to monitoring shark catches, and initiating some biological research.

Billfish

Some billfish, notably swordfish and striped marlin, may be secondary or even primary target species in some longline fisheries. Target swordfish fisheries for example exist in Hawai'i, Chile and more recently, eastern Australia, and most longline fisheries retain varying amounts of billfish for commercial sale, especially striped marlin. Other billfish species eg black marlin, sailfish are more often discarded, and the degree of retention varies greatly amongst fleets. A recent OFP examination of longline billfish catches in the WCPO area (Williams and Bigelow, 1998) outlines some of the real difficulties in obtaining billfish estimates, but suggests that the 1995 catch for the four main species may have been of the order of 25,000t (44% swordfish, 26% blue marlin, 28% striped marlin and only 2% black marlin). Sailfish and spearfish were not included in the estimates. To this can now be added recent information on the Taiwan domestically-based offshore longline fleet, which takes about another 7,000t of billfish (blue marlin 4,850t, swordfish 1,400t, sailfish 300t, black and striped marlin ~ 250t each). The WCPO billfish catch is now estimated as in excess of 32,000t.

Billfish issues may ultimately reduce to

- (a) the sustainability of the harvest, both in targetted fisheries eg swordfish, and secondarily, as continuous incidental catch by a large, widely distributed longline fleet,
- (b) the role of billfish in the oceanic pelagic ecosystem (important top level predator)
- (c) the interaction between longline (and to a lesser extent purse seine) fisheries and the recreational/sport fisheries which may be important to Pacific Island countries, particularly those with sizeable tourism sectors.

Although more is known of the biology and catch of billfish than for most NADs, it is generally still inadequate for either stock assessment or considering the impact of fishing on the stocks. A recent OFP initiative (see elsewhere - item 3.4.1) is currently attempting to address some of the above issues. The forthcoming SCTB12 also has identified billfish stock assessment, within the Billfish and By-catch Research Group, as one of the two priority issues for consideration (along with bigeye assessment).

Other fish species

The array of 40 or more fish species taken as by-catch in purse seine and longline fisheries is diverse, and includes some of considerable commercial value and recreational fishing interest eg wahoo, mahi mahi, opah, or food value eg rainbow runner, pomfret, mackerel scad, amberjack, escolar, whilst many others would seem to have little value in any context, other than components of the ecosystem eg lancet fish, triggerfish. The catch and biology of nearly all these species, with few exceptions eg mahi mahi, wahoo is virtually unknown. The catch of mahi mahi by the Taiwan domestically-based offshore longline fleet of over 6,500t p.a is noted.

Marine reptiles

Small numbers of several turtle species are occasionally taken in purse seine sets, but are usually released alive. Turtles are also caught by longline from time to time, especially near known nesting areas. The catch is not believed to be large (see Lawson, 1997), and many (most?) animals would be released alive; information is gradually being accumulated from observer activity concerning this potentially very sensitive environmental issue.

Marine mammals

There is little evidence that dolphin-associated sets are made by purse seiners in the SPC area. There a few records of pilot whales being encircled during log sets in some areas. Sei whale and whale shark (not a mammal) sets are more common in equatorial areas, but the very large animals are usually released unharmed. Marine mammals may occasionally be entangled in longline gear, but there appear to be few examples of actual hooking by longline gear.

False killer whales and pilot whales, on the other hand, are seen as serious pests, as they systematically strip target tuna from the longlines, but are rarely if ever caught.

Seabirds

Unlike the situation in more temperate areas, catches of seabirds by longline gear are rare in the tropical and sub-tropical areas of the WCPO, mainly because the bird species involved in temperate areas are rare or absent from tropical areas eg albatross, petrels. There are no records of bird catches by purse seiners in the WCPO.

Conclusion

The region is not well placed at present to comply with the stated requirements of the UNIA, in terms of the conservation and management of non-target, associated or dependent species, but some baseline data have been collected and the situation is gradually improving. Observer programmes, coordinated at both national and regional level, will be needed as the most reliable source of both biological information on NADs and monitoring their catch. Scientific research will also be needed to better understand the biology of key by-catch species, the dynamics of oceanic ecosystems and the impact of fishing on NADs. This is no small task, and may not be able to command the highest priority in the short term, given available resources.

References

Bailey, K., P.G.Williams and D.G.Itano (1996) By-catch and discards in western Pacific tuna fisheries: a review of SPC data holdings and literature. OFP Technical Report No. 34.

Lawson, T. (1997) Estimation of by-catch in central and western Pacific tuna fisheries: preliminary results. OFP Internal Report No.33, June 1997.

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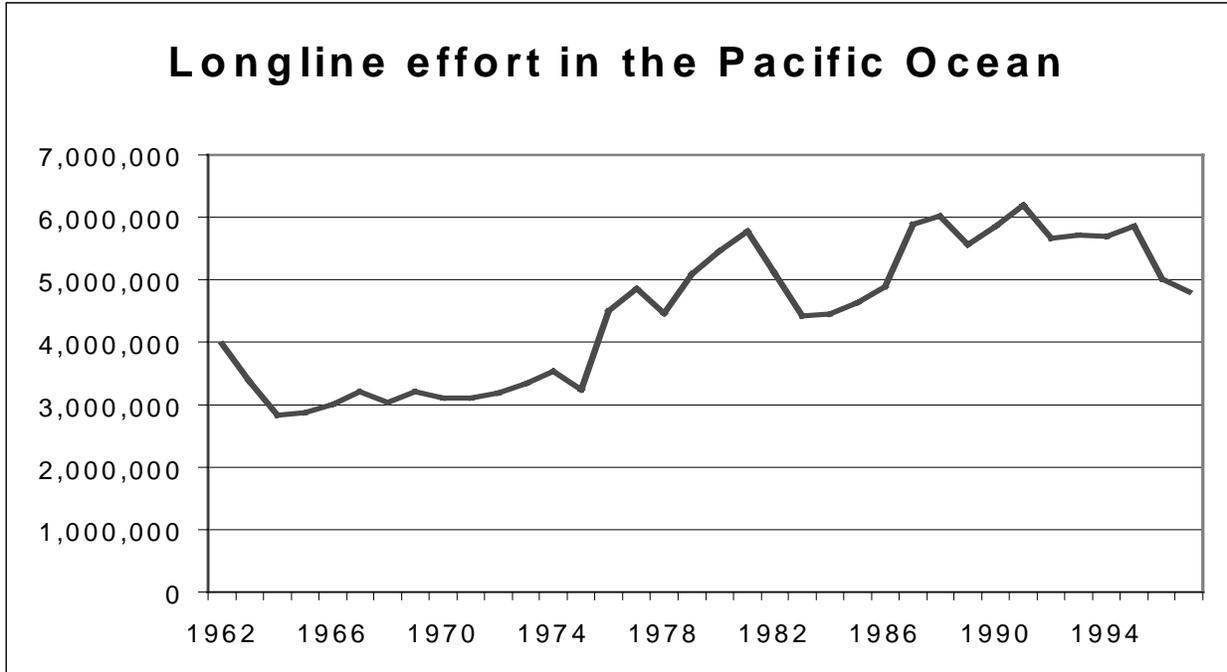
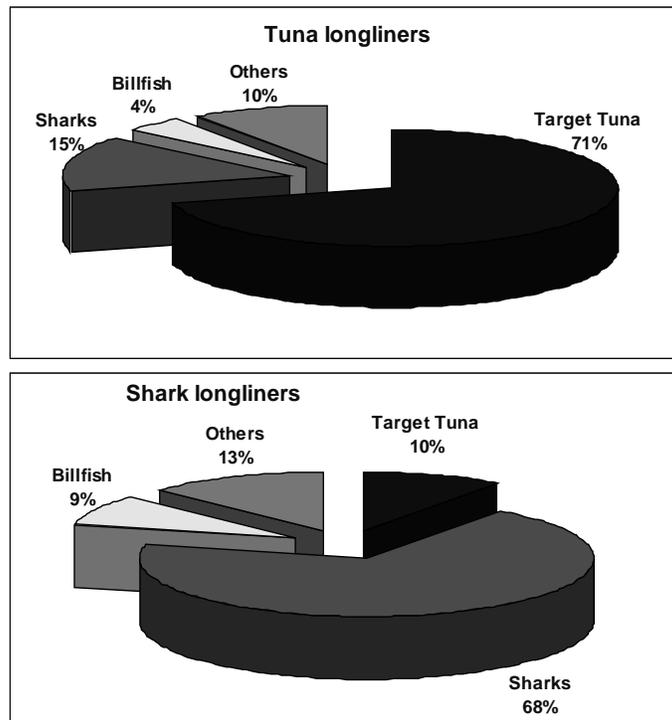


Figure 1. Historical longline effort in the Pacific Ocean (units are 00's of hooks)



**Figure 2. Species composition of the catch on observed trips – Solomon Islands.
Upper panel – tuna longliners; lower panel – shark longliners**