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CCM'S REPORT ON CMM 2010-04 (PACIFIC BLUEFIN TUNA)

WCPFC-NC8-2012 /DP-05

Philippines



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August 30, 2012

Prof. Glenn Hurry
Executive Director, WCPFC
Kaselehlie Street, P. O. Box 2356,
Kolonia, Pohnpei 96941,
Federated States of Micronesia.

Subject: Philippine Report on implementation of CMM 2010-04

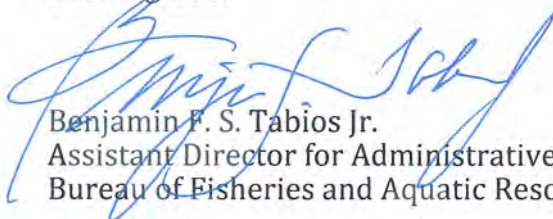
Dear Prof. Hurry,

I hope that all is well with you today.

The Philippines did not have catches of Pacific Bluefin Tuna last year and even for the years prior to 2010. However, Dr. Antonio D. Lewis conducted a study of the occurrence of Pacific Bluefin tuna for waters within Philippine jurisdiction. Am sending to you a copy of the documents covering this subject matter for your reference. Not having catches, the Philippines had no basis to come up with any Fisheries Administrative Order which is our version of a Conservation and Management Measure for the regulation of the catch of PBF Tuna in accordance with the provisions of paragraphs 2 & 3 of CMM 2010-04.

However, our research vessel, the MV DA-BFAR continuously monitors our waters for any signs of larvae of PBF even as we cover this monitoring as part of our National Stock Assessment Program.

Best regards.



Benjamin F. S. Tabios Jr.
Assistant Director for Administrative Services
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AN INITIAL PROPOSAL FOR THE STUDY OF NORTHERN BLUEFIN TUNA (*Thunnus orientalis*) IN PHILIPPINE WATERS By Dr. Antonio Lewis



BACKGROUND

Northern bluefin tuna, a highly valued species prized on sashimi markets and under study for commercial cage culture, is widely distributed in the North Pacific Ocean. Significant catches are taken on both sides of the North Pacific, by longline as adults, and as juveniles in southern Japan/Okinawa. Spawning adults (average weight in excess of 150 kgs) have been taken by longline in an area largely lying within Philippine waters from April-June (15° – 25° S, 122° – 130° E - Sun and Yang, 1983), whilst larvae are more widely distributed from southern Japan to the northern Philippines. Bluefin represents both a management responsibility and an opportunity for the Philippines, the former associated with the location of the only spawning area throughout the range of the species lying within its waters, and the latter with the reported occurrence of juvenile bluefin in the waters of northern and eastern Luzon providing potential recruits to a cage culture industry in its waters.

The proposal attempts to address both issues through separate initiatives, and is outlined here for consideration and RP/BFAR support.

PROPOSED ACTIVITIES

1. Survey and capture of juvenile bluefin

Phase 1

With anecdotal reports¹ of juvenile bluefin tuna being regularly caught in Isabela and Aurora provinces in north eastern Luzon, it is proposed that this be initially confirmed by a road-based survey of markets in the area during the early summer months, combined with fishermen interviews and possible short confirmatory sea trips should bluefin presence be confirmed. One week in early May (9-15th) is suggested, to take in Isabela ports of Aparri, Santa Ana and the eastern coast of the province accessible from Ilagan in the south and Santa Ana in the north; if time permits and if road access has improved, a second trip to Aurora ports through Baler (Dinalunga, Casiguran, Dilasag) would also be useful. A robust four wheel drive vehicle would be required to undertake this survey of the remote area generally not well connected by primary/secondary roads.

¹ Market sightings in Baler markets some years ago (Ganaden, pers.com); regular capture claimed in eastern Isabela (Enrile fide Natividad)

Phase 2

Should phase one confirm the occurrence of bluefin in the area, particularly in the form of surface schools of fish susceptible to capture by purse seine vessels², survey cruises to the area by either commercial purse seine or ring net vessels, or the MV DA-BFAR should be encouraged.

Phase 3 (subsequent)

Development of techniques for the routine capture and transport of live juvenile bluefin; selection of suitable grow-out areas adjacent to capture areas, noting that this area is very typhoon-susceptible.

2. Ocean-going research to define the nature and extent of the spawning area

Subject to the availability of funding and suitable vessels, several research cruises to more precisely locate the spawning area, thought the capture of spawning adults, oceanographic sampling to characterise the features of the area, and larval sampling. It is suggested that Japanese research agencies might be interested in this possibility and willing to provide funding support through the Govt of Japan. This could well involve direct support for the operations of the MV DA-BFAR, in conjunction with Japanese vessels. A series of transect surveys at an appropriate time (possibly April – June) would probably be required, and several months of research time.

3. Funding support

The initial phase of the work will involve minimal funding, only provision of a suitable vehicle and time and expertise contributed by interested parties. If successful, this would trigger interest in subsequent phases, for which funding support may need to be attracted.

The oceangoing research should be the subject of an official approach to the Govt of Japan as soon as possible. Details of this proposal could be developed in consultation with relevant Japanese research agencies.

² Incidental captures of small bluefin in northern Luzon have been reported (Frabelle Fishing Corporation) but details are currently lacking

PHILIPPINES BLUEFIN IDENTIFICATION SHEET



VERY SMALL FISH (20-30 cm)
Blue and black;
Solid vertical bands of varying width across body in live fish

SMALL FISH (1- 5 kgs)
Vertical bands across body, some dotted; horizontal rows of dots lowdown between anal and tail



MEDIUM SIZE FISH (5 – 20 kgs)
First dorsal fin yellow or bluish; second reddish-brown; the anal fin and finlets dusky yellow, edged with black; median caudal keel grey or black.
Short pectoral fins, not reaching end of 1st dorsal
Lower sides and belly silvery white with colorless transverse lines alternated with rows of colorless dots.
Horizontal rows of dots towards tail.
High gillraker count, modest swim bladder



VERY LARGE FISH (150 –300 kgs)
Back very dark metallic blue; sides with pink tinge.
Second dorsal fin higher than first, brown or red;
Finlets yellow with black margins
Pectoral fin short; does not reach end of first dorsal
Lateral rows of dots may still be visible towards tail but few transverse lines on body
Body tapers sharply behind second dorsal
High gillraker count, large swim bladder

SIMILAR SPECIES



LONGTAIL TUNA

Narrow elongate body, blue-black on top
Lower sides silvery white with colourless elongate oval spots arranged in horizontally oriented rows behind anal fin.
Dorsal, pectoral and pelvic fins blackish; tips of the second dorsal and anal fins washed with yellow; anal fin silvery; dorsal and anal finlets yellow with grayish margins; caudal fin blackish, with streaks of yellow green.
No swim bladder



BIGEYE TUNA

Large oval eye, deep body; most fins dull yellow
Longish pectoral fin and widely spaced lines on lower half of body in smaller fish
Light blue midlateral band in live fish.
Caudal fork not notched
Liver lobes equal in size, with striated edges.
Large thick-walled swim bladder in fish > 15 kgs



YELLOWFIN TUNA

Body less deep than bigeye, eye smaller and round.
Color metallic dark blue changing through yellow midlateral band, to silver on the belly.
Anal and second dorsal fins bright yellow; may be very elongated in large fish (reaching well over 20% of length)
Alternating lines and rows of spots on belly in smaller fish
Notched M-shaped caudal fork
Right liver lobe much longer, unstriated
Moderate swim bladder in fish > 15 kgs

PACIFIC BLUEFIN SURVEY OF NORTHERN PHILIPPINES

PHASE 1: 15th – 25th June 2005



Executive Summary

The land-based survey undertaken in northeast Luzon during June 2005 produced circumstantial evidence of the presence of juvenile Pacific bluefin tuna (1-6 kgs in size) in the waters of **Cagayan Province** on a seasonal basis (March-April), but possibly in relatively small numbers and in association with other tuna species. This should be confirmed by a repeat visit at a more appropriate time in 2006, and by the ongoing efforts of regionally-based staff in Cagayan.

The brief survey of **Aurora Province** did not produce any evidence of the regular occurrence of juvenile bluefin, but this possibility should not be discounted, on the basis of previous unconfirmed sightings in the area.

The Aurora survey did however produce evidence of the regular capture of adult Pacific bluefin tuna by handline vessels unloading in Dingalan, reportedly most frequently in June-July; These captures are consistent with the close proximity of the single Pacific spawning ground of the species, and spawning activity in April-June. Again, more information should be gathered by provincial staff on these landings, and efforts to record any landings of juvenile bluefin in the province encouraged.

Given the limitations of the land-based surveys, a seagoing survey of the area (Cagayan, Isabel and Aurora) should be carried out in March-April 2006, for a period of two weeks or more, if at all possible. As well as visual sightings and some fishing activity (trolling, handline and possibly drift gillnet or even purse seine fishing), the survey should include reconnaissance of potentially suitable areas for cage culture of bluefin tuna, especially in eastern Cagayan.

The prevailing water temperatures in this area are, it must be said, higher than those in other areas where successful bluefin culture has been achieved, and higher than the apparent preferred water temperature of larger bluefin. The potential of cage culture of bluefin in Philippines waters remains in the future until the regular presence of juvenile bluefin in commercial quantities and able to captured, can be demonstrated.

A.D. Lewis, June 2005

PACIFIC BLUEFIN SURVEY OF NORTHERN PHILIPPINES PHASE 1 – CAGAYAN (15th – 18th June, 2005)

1. Background

There is a reasonable expectation, based on anecdotal reports of landings of juvenile Pacific bluefin tuna (*Thunnus orientalis*)¹ in northern and eastern Luzon (Ganaden, pers. com. and others), the proximity of this area to seasonal captures of spawning adult bluefin by Taiwanese longliners (Figure 1), and the occurrence of larval bluefin tuna in adjacent waters (Figure 2), that quantities of juvenile Pacific bluefin tuna may regularly occur within northern Philippines waters. The spawning of Pacific bluefin occurs between Japan and the Philippines² in April, May, and June, off southern Honshu in July, and in the Sea of Japan in August. The larvae, postlarvae, and juveniles produced near Philippines and south of Japan are usually transported northward by the Kuroshio Current toward Japan, but given variations in the prevailing currents, may also be transported to Philippine waters. Fish of age 0 about 15 to 60 cm in length are caught in the vicinity of Japan during the summer, fall, and winter of their first year of life, but appear also occur to an unknown extent in northern Luzon. Such occurrences, if in commercial quantity, could potentially support commercial cage culture of the species, which has been successfully developed for the same or related bluefin species elsewhere eg southern Australia, Mexico, Croatia, Spain, Morocco etc.

An initial Phase 1 survey of the area, to check market landings, sound out local fishery knowledge, and possibly undertake some sea surveys, was proposed for the early summer period (March/April). In the event, this was eventually undertaken by land during June 15th – 18th, with the cooperation of BFAR, CEZA³ and industry. The Cagayan coastline between Aparri and Santa Ana was visited during this time, markets and landing points surveyed, fishermen interviewed and data collected by regional BFAR staff during NSAP sampling of the area examined.

This brief report summarizes outcomes of that Phase I survey of Cagayan Province.

2. Tuna fishing activity and available catch records

BAS statistics

The 2002 BAS statistics for the Philippines list the annual catch of oceanic tunas (skipjack and yellowfin/bigeye) in Region 2 as approximately 300 tonnes each by commercial and municipal gears ie 600 tonnes total.

Data for 2003 suggest this had grown rapidly to **1,010t**, with most of this (809t) yellowfin/bigeye tuna. This still represents a very low proportion (< 0.3%) of the total Philippines oceanic tuna landings of 265,000 tonnes.

¹ Pacific bluefin was established as a separate species (*Thunnus orientalis*) by Collette (1997), after previously being regarded as a sub-species of the Atlantic *Thunnus thynnus*.

² Substantially within the Philippines EEZ

³ Cagayan Economic Zone Authority

Figure 1. Distribution of Pacific bluefin larvae, from early plankton surveys.
 From Nishikawa et al., 1985. Note that the eastern Philippines Sea was not covered by these surveys; data from more recent surveys (late 1990s – Itoh et al., 1999 and 2000) will be added to this figure in future.

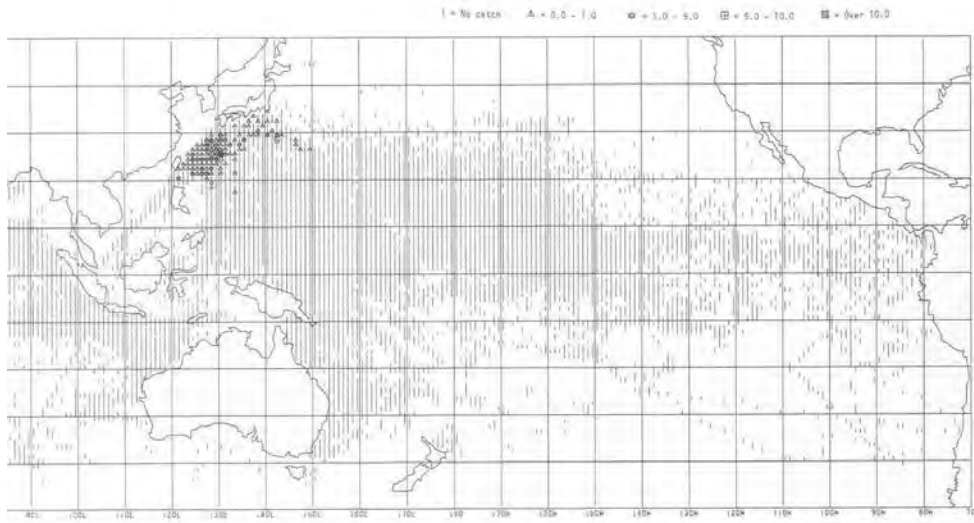


Figure 2. Distribution of spawning adult Pacific bluefin females in Taiwanese longline tuna catches, 1981-1982 (from Sun and Yang, 1983).
 Most females were over 120 kgs in size.

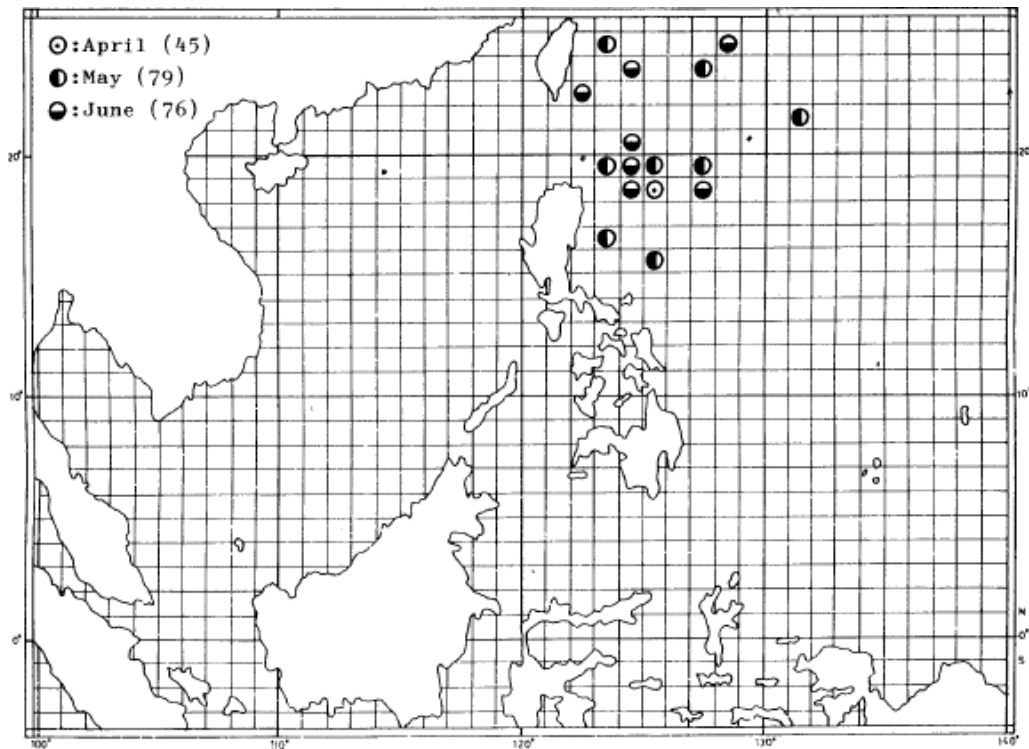


Fig. 5. Distribution of location at which bluefin tuna were caught by the Inshore Tuna Longline Fishery, 1982. The number in parentheses indicates the number of cruises observed.

NSAP (National Stock Assessment Program) data

The final NSAP report for the northern Cagayan coastal area⁴ sampled a catch of tuna and tuna-like species for the two year period from April 1999 to March 2001 of just over **100 tonnes**, of which 25% was *Auxis thazard* (frigate tuna), 23% *Rastrelliger brachysoma* (Indian mackerel), 16% *Auxis rochei* (bullet tuna) and 11% *Katsuwonus pelamis* (skipjack), with 8% *Thunnus* spp. - mostly *albacares* (yellowfin) and *obesus* (bigeye), but with very small quantities of *tonggol* (longtail), *alalunga* (albacore) and *thynnus thynnus* (bluefin). Sampling was carried out by enumerators at 12 landing points (6 municipalities) – 4 municipalities east of the Cagayan River (Aparri, Buguey, Gonzaga and Santa Ana), with commercial and municipal landings, and two west of the River (Sanchez Mira and Claveria), with municipal landings only.

The annual tuna catch sampled varied widely between the two years (68t – 2000, and 32t - 2001) and was around 16% of the total catch sampled. Carangids slightly dominated the fish catch (19%) ahead of the tunas and tuna-like species. Peak production for commercial and municipal fisheries was observed during the March-April-May period. Tuna length frequency data did not seem to be available.

Villarao and Palolan advise that the *Thunnus* species identifications by the enumerators may not be completely accurate, and that an unknown but probably small proportion of the 800 tonnes of the annual “yellowfin” catch recorded for Region 2 (BAS 2003 estimates) could potentially be Pacific bluefin.

The Tuna Fishery

Most fishing activity for all species, including tuna, in Region 2 occurs in the Bubuyan Channel, close to population centers along the north coast, with lesser quantities from Batanes⁵. Juvenile tunas are taken by ring nets fished during daytime, and round haul and purse seine nets fished at night around lights. Drift nets fished at night, and daytime trolling account for most catches of medium sized tunas and other large pelagics. Fishing in the area is however dominated by Danish seine and drift filter nets, the latter for palaeomonid shrimp (“*aramang*”), mostly taken at the mouth of the Cagayan River, the largest river in the Philippines. Pelagic fishing activity may be diverted to aramang fishing when this is more lucrative, notably after the peak fishing period for pelagics in March-April. Tuna fishing occurs in eastern areas of the Bubuyan Channel (east of Buguey) and on northern tip of the east coast. Daytime tuna fishing occurs more frequently during bright moon periods (2nd and 3rd quarter), and night tuna fishing during 1st and 4th quarters.

The east coast is remote, steep-to, and sparsely populated, with the rugged Sierra Madre isolating it from the Cagayan Valley, and Palanan the only settlement of any size; It is reported to be a rich fishing ground for tunas and other pelagics, with fishing vessels from Quezon Province active in the area and deploying payaos near Palanan with the approval of local villagers.

The province of Aurora, formerly in Region 4, was transferred to Region 3 in recent times. Reported bluefin occurrences in that area will be the subject of a separate survey.

⁴ Marine Fish Stock Assessment in Babuyan Channel, April 1999 - March 2002. V.D.Villarao, L.S.Palolan and M.A. Aragon

⁵ Marine Fisheries Stock Assessment in Batanes Waters. 10/1997-9/2002. V.D.Villarao and M.A. Aragon
Catches dominated by flying fish, dolphin fish and needle fish, with tuna and tuna-like species (wahoo, dogtooth tuna etc) just one 1t per year. Production of pelagic species peaks in March-April.

Despite apparently abundant resources, the region generally has very few facilities to support coastal fisheries, and many sales are made to traders/middlemen who transport purchased fish on ice as far afield as Central Luzon and Ilocos. Some high value products eg dried aramang, live glass eels are exported overseas via Manila.

3. Bluefin occurrence / previous records

Although no bluefin were identified during the brief visit (nor were any other *Thunnus* species), largely attributed to the lack of drift netting/trolling during the visit (3rd quarter) and diversion of pelagic activity to amarang fishing, several fishermen interviewed claimed to be familiar with the species, and there is a local name – dumadara (or tangi) – which seems to include both bluefin and longtail tuna. Dumadara typically attracts a higher price locally and from traders (P100/kg) than does yellowfin (tambakol) or bigeye (oriles).

The dumadara season was claimed to peak in March/April (ironically when the original survey was planned), with fish 1-5 kgs generally taken by all the gears, but especially gillnet (and trolling ?). The impression was gained that dumadara occur with other tuna species, rather than as pure schools, and their occurrence is highly seasonal.

It is strongly recommended that Region 2 fisheries staff based at Tuguegarao be encouraged to retrospectively collect as much anecdotal information as possible now that they are familiar with the possible occurrence of bluefin in the area. Some identification guides, with colour pictures, would be useful in this regard.

The information sought might include:

- Confirmation of previous records and more detailed information on identification criteria
- Data on the seasonality of occurrence of “dumadara” and their association with other tuna species
- Catch of dumadara by gear and size composition by gear

Other observations made during the survey were as follows:

> The gear currently in use (ring net, gillnet, trolling) would not be suitable to provide quantities of juvenile bluefin in good condition, even if good quantities could be located.

> There appears to be a good area in the islands (Palau) near Santa Ana / San Vicente for possible location of grow-out cages, with good current flow, deep clean water and shelter from the typhoons which regularly and severely impact this area. Most of this area however lies within an existing naval reserve. The water temperatures in this area would however be higher year-round than those in all other areas where bluefin have been successfully ranches to date. Preferred temperatures for bluefin bigger than 1 kg seem to be in the range 17-23^o C (Bayliff, 1993)

> The waters of the north-east coast of Luzon (Isabel Province) are regarded as very productive for tunas and other pelagics, and should be surveyed by sea. Land access to this area is not generally possible. Some payaos have been deployed near Palanan with the approval of local villagers and are fished by vessels traveling from Quezon Province. There may also be some information from a BFAR vessel survey of the area in 2001/2002.

4. Trip outcomes

The brief trip, outside the main season for tunas (including potentially bluefin), failed to produce any confirmed identification or sightings of Pacific bluefin tuna, but did provide some circumstantial evidence of their occurrence. It appears that Pacific bluefin may occur in the area of eastern Babuyan Channel and the north-east tip of Luzon during the months of March-April, when juveniles of 1-5 kgs, with occasional larger fish, are taken. They attract a higher price from fish buyers, but seem not to be especially abundant and probably occur in mixed aggregations with other tuna species (yellowfin, bigeye and skipjack) in nearshore oceanic areas. It remains a possibility that these fish (dumadara) are longtail tuna, which remains to be confirmed.

5. Proposed future work

1) As noted above, efforts should be made by Region 2 (Tuguegarao) fisheries staff to revisit all available information on possible bluefin occurrences in the area, and see what can be resurrected. Information on all aspects of their possible occurrence in Cagayan waters should be collected in future, especially during the March/April period. Preparation and distribution of identification material would be helpful in this regard.

2) A return visit to the area, combining both land-based and seagoing surveys, should be scheduled for March-April 2006. Details of this survey should be cooperatively developed, a suitable vessel identified and a funding proposal developed.

3) A second element of this Phase 1 survey, to Aurora Province (Baler, Dingalan and Casiguran) should be scheduled for June 2005, but may possibly be too late to encounter juvenile bluefin.

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PACIFIC BLUEFIN SURVEY OF NORTHERN PHILIPPINES PHASE 1 – AURORA (21st – 24th June, 2005)

1. Background

Following the Cagayan survey (15th – 18th June), a second trip, to Aurora Province, was planned, on the basis of previous sightings of Pacific bluefin at Baler (Ganaden, pers. com⁶, and others) and its proximity to the spawning area in north-east Philippines. A land-based survey of the southern part of the province (Baler, Dingalan), utilizing a vehicle provided by the Director, BFAR, and with the assistance of BFAR, NFRDI and BFAR Region 3 staff, was undertaken, using the same approach as employed in Cagayan ie inspection of catch at landing sites, interview of fishermen and processors, and examination previously data collected in the province during NSAP and BFAR sampling.

2. Tuna fishing activity and available catch records

BAS statistics

The 2002 BAS statistics for the Philippines list the annual catch of oceanic tunas (skipjack and yellowfin/bigeye) in Region 3 as approximately **5,171 tonnes**, of which . 1,460t was yellowfin (~ 20%). There is no breakdown available by coastal provinces (Zambales, Bataan, Aurora) but it is assumed that most of this production originates from Zambales. The 2003 BAS figures were similar (**4,946t**). This represents a low proportion (< 3.0%) of the total 2003 Philippines oceanic tuna landings of 265,000 tonnes.

NSAP data

NSAP sampling was carried out in Aurora Province during June 2000 - June 2001, but was discontinued when the Province was transferred from Region 4a to Region 3, but without funding to continue the work. Sampling was carried out in the three main bays of the province – Baler Bay, Casiguran Sound and Dingalan Bay, at a total of seven main landing sites. The report⁷ estimated the production during that 12 month period in the province as around 1,154t, with 53% of production from Baler, 39% from Dingalan and 8% from Casiguran. Handline was the main gear used overall, especially in Dingalan (80% of the catch), but with gillnetting important in Baler and Casiguran, and trawling in Baler Bay. Small numbers of ring nets, or mini ring nets were in operation.

The overall catch was dominated by tunas and tuna-like species (> 40%), with dolphin fish contributing another 18%. Yellowfin and skipjack dominated the tuna catch (80%). There were no records of bluefin in the catch, although it is not likely that enumerators would have distinguished the species. A small quantity of longtail tuna was recorded from Baler Bay.

There appeared to be two production peaks in the province – March/May and August/October, with a less distinct second semester peak in Dingalan Bay.

⁶ Sightings of several fish in Baler Municipal Market in the late 1990s (month of February), approx. 3 kgs in weight

⁷ Untitled draft NSAP report, no authors listed

The Tuna Fishery

Tunas are taken in the Province by various gars, as elsewhere, including handline, drift gillnet, surround nets and trolling. Handline fishing occurs from various sized bancas, with larger tunas (mostly yellowfin) by drift fishing at depth during daytime, and smaller tunas (skipjack, frigate tunas, small yellowfin) by jigging. Drift gillnets are fished mostly at night, but less so during the bright moon periods – the moon was full during the survey visit and very little gillnetting was taking place in Baler. Ring net/round haul netting around night lights also takes small tunas, along with round scads and other pelagics (eg bigeye scad). Trolling for a range of pelagics also occurs. In contrast to Cagayan, handlining was clearly the main fishing method for tunas in Aurora.

Following the calamitous flooding of the province in December 2004, and serious disruption to the main road access to Baler, there seems to have been a trend towards more unloading by bancas in Dingalan, where better road access is available and several buyers operate, to buy and transport fish to Manila. Large yellowfin make up the great majority of the handline catch, with smaller quantities of marlin, dolphin fish, opah and others, including large bluefin (see later). The bancas range as far afield as Polillo in to the south, and into Isabel Province to the north, with 5-6 days the usual trip lengths. Unloadings were observed in Baler (2 vessels) and Dingalan, where 170 fish (average weight 40 kgs, and approx. 7 tonnes total) were unloaded one day, but very few (less than 20 by noon) on the second day.

3. Bluefin occurrence / previous records

No juvenile bluefin were observed during the survey, despite the previous sightings in Baler. Very little drift net fishing was however occurring because of the full moon, neither were any troll landings observed. Fishermen interviewed appeared to have little knowledge of bluefin, and there was no local name for the species, unlike in Cagayan. Local processors and buyers were however not interviewed in Baler during the available time. The decision was taken not to visit Casiguran, given the travel time of at least 5 hours over poor quality roads, and the small tuna landings there relative to Dingalan and Baler.

With the increased landings by handline vessels in Dingalan (vessels from both Baler and Casiguran, as well as local vessels, now unload at Aplaya and Paltic), it was decided to spend more time there.

Whilst no bluefin were observed, it is clear that adult bluefin (150 – 300 kgs in size) are taken from time to time by handliners, with the fishermen and processors giving good descriptions of the species (dark back, pinkish sides, short pectoral fins, very red meat). Sizes in the range 200-300 kgs were described. Bluefin are the only tuna species in the area which could reach that size. A premium price is also paid by the buyers - up to P 200 per kilo in some cases, cf. P 70-90 for large yellowfin. Although bluefin are taken in most months, June/July was mentioned as the main season, close to the end of the spawning season in nearby waters, when adult fish of this size begin to disperse. A fisherman who had taken a 200 kgs fish in early June, close inshore off Baler, was interviewed. Another spoke of many bancas taking 1-2 fish per year. This suggests that a portion of the 700 or so bancas recorded in the province in 200/2001 which actively target large tunas might take some tens of fish throughout the year. This should be more closely monitored and could possibly be reconstructed from buyers' records.

4. Trip outcomes and proposed future work

Although the brief trip was unable to confirm the presence of juvenile bluefin, as reported earlier, the regular capture of adult bluefin by handline gear can be assumed. The level of these captures should be further investigated and documented if possible. Provincial and municipal fisheries staff in Baler, Dingalan and possibly Casiguran should be provided with identification material and encouraged to both record any landings of juvenile bluefin and compile records of the frequency of adult bluefin landings.

With the possible exception of Casiguran Sound (not visited), the open and steep-to coast of Aurora, and the high frequency of typhoons, may not lend itself to potential cage culture of bluefin, which would require sheltered waters with good current flow..

5. Proposed future work

1) As noted above, efforts should be made by Region 3 (Aurora) fisheries staff to revisit all available information on possible bluefin occurrences in the area, and see what can be resurrected. Information on all aspects of their possible occurrence in Aurora waters should be collected in future. Preparation and distribution of identification material would be helpful in this regard.

2) A return visit to the area, combining both land-based and seagoing surveys, should be scheduled for March-April 2006. Details of this survey should be cooperatively developed, a suitable vessel identified and a funding proposal developed.

ACKNOWLEDGMENTS

The assistance of the Regional Director (Region 2), Dr. Jovita Ayson, in providing a support vehicle for the **Cagayan** survey, and the services and advice of regional officers Venchito Villarao and Leo Palolan, was greatly appreciated, as was the notable contribution of CEZA Director Domingo Tagayun and Mr. Richard Sy, SunWarm CEO to the survey.

For the **Aurora** survey, the support of BFAR Region 3 Director, in providing logistical support and the services of Rex Margen was integral to its success, along with assistance provided on the ground by Victoriano San Pedro (Provincial Fisheries Officer, Baler) and Eufemio Domingo (Municipal Fisheries Officer, Dingalan).

From **BFAR Manila**, the enthusiasm and encouragement of Director Sarmiento provided the initial impetus for the surveys and will guide any future work, whilst the release of BFAR officers Homerto Riomas and Efren Hilarion for the Aurora survey, and the indefatigable driver Carlos (Kaloy) proved a great asset.