

**PELAGIC FISHERIES PROJECT REPORT
KOMODO NATIONAL PARK & SURROUNDING WATERS**

January 2000

*Developing a Fishery for Large Coastal Pelagic Fish
as an Alternative Livelihood for Local Fishing Communities
in and around Komodo National Park*

Coastal and Marine Program
The Nature Conservancy
Indonesia Program

and

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1. Title of the Project

Combating destructive fishing practices in and around Komodo National Park.

Module: alternative livelihood strategies.

Sub-module: pelagic fisheries development.

2. Project Site

Fishing villages near Komodo National Park, Nusa Tenggara Timur province, located between the major islands of Sumbawa and Flores, near the town of Labuan Bajo.

3. Objectives of the Project

The Pelagic Fisheries Development Project aimed to introduce an alternative livelihood to the communities in and around Komodo National Park (KNP), in an effort to steer them away from using destructive fishing methods. The three main opportunities for alternative livelihood development for local coastal communities, as described in the 25-year management plan for KNP, are in the fields of a). pelagic fisheries, b). eco-tourism, and c). mariculture. The development of eco-tourism and mariculture in and around KNP are being covered in separate projects, in cooperation with expert partners. The presently described project specifically aimed to develop a fishery for large coastal pelagic fish was expected to result in income levels competitive to other non-destructive small-scale fisheries in coastal areas, and well above the poverty line of US\$1 per person per day. An important secondary objective of this project was to serve as a vehicle for carriers of the conservation message in awareness and constituency building programs. The project was to build close working relationships with communities in the conservation area, and to win the trust of the key players within those communities.

4. Outline of the Project

A Long Term Management Plan and Development of Alternative Livelihoods

Since 1996, a long-term management plan is being developed for the marine component of Komodo National Park. This management plan consists of several modules, which are presently being implemented in the area (e.g. routine patrolling and enforcement program, community awareness and participatory planning program, alternative livelihood development program, and marine environmental monitoring and research program). The alternative livelihood development program has recently been implemented with the first sub-module, the pelagic fisheries development project. A pilot study and assessment on the feasibility of the development of pelagic fisheries in the Komodo area was carried out in September and October 1996. This pilot study, which was carried out by an expert consultant, concluded that there are very good opportunities for the development of a fishery for large coastal pelagic species and especially for Spanish mackerel (*Scomberomorus commerson*) fishery. The pilot study specifically mentioned:

- a) Positive indications for both catch rates and biological potential,
- b) Established fish traders in Indonesia are willing to purchase Spanish mackerel at prices which are likely to encourage fishermen to enter the fishery,
- c) Because the market is for high quality products, relatively small amounts of the fish could result in adequate revenue to the fishermen,



Pulau Mesa, one of the villages that participated in the pelagic fisheries project.

- d) The gear required for Spanish mackerel fishing is quite simple and inexpensive,
- e) The vessels presently operated by local villagers are suitable for the type of fishing required,
- f) The targeted pelagic resource is far more resilient than reef fish resources, which are vulnerable to local over-exploitation (due to limited migration), and
- g) Examples in other areas have shown promising results with former dynamite fishermen successfully converting to pelagic fisheries (i.e. Makassar, Sape).

Characteristics of the Target Groups

The main target group for the project consisted of those fishermen that were formerly engaged in destructive fishing practices (i.e. fishing methods that destroy habitat and/or deplete resources). During 1995-1997, the fishery with hookah compressors has destroyed more coral reefs and depleted more demersal resources in the KNP area than any other fishing practices. Fishermen broke down and turned over the corals and left behind fields of dead rubbles. Over-fishing for live reef fish such as grouper and Napoleon wrasse, with hook and line and other common gear types, is also a serious threat. Hookah compressors (also used by dynamite fishermen) will be banned from the National Park because of their destructive impact. The most important groups using hookah gear in KNP are mainly fishermen from Mesa Island (just north of KNP). Other fishermen groups targeting live reef fish are from Seraya Island and Labuan Bajo. The fishermen groups from Mesa, Seraya and Labuan Bajo were, therefore, chosen as the main target groups for the development project.

Constraints to Development of Pelagic Fisheries in the Komodo Area

Only very few fishermen inside the Park or from the northern Islands and Flores coastline (Mesa, Seraya, Labuan Bajo) were involved in fisheries for larger pelagic fish until 1997, although a variety of pelagic species, with relatively high prices on remote markets, were abundant in and around the KNP area.

The reason why only very few fishermen from the Komodo area were interested in pelagic



The project also aimed to improve post-harvest practices, so to increase the value of fish that cannot be marketed as a fresh product.

fisheries was that they:

- a) earned very attractive incomes by exploiting the demersal resources inside KNP, especially in the cyanide fishery for live reef fish,
- b) were not prosecuted for illegal fishing practices and were not even forced to fish outside the Park's boundaries,
- c) were insufficiently skilled in the fishery for large coastal pelagic species, and
- d) lacked the skills and resources to build and use pelagic fish aggregating devices (FADs).

Pelagic FADs are rafts anchored in deep water, which for some reason attract pelagic fish. Fishermen in many other areas in Indonesia already used traditional FADs (built with local materials) very successfully for many years, and the technique could easily be transferred. Successful pelagic fisheries for Spanish mackerel and tuna had already been established before 1997, among reef-fishing coastal communities in areas like South Sulawesi, Maluku and East Sumbawa. A pelagic fisheries training program, including the installation of FADs, marketing and logistical support of local fishing groups, in combination with an effective protection and enforcement program in KNP, was therefore expected to result eventually in more local fishermen entering the fishery for large pelagic species in Komodo area.

It was clear from the beginning of the project that few incentives existed for cyanide fishermen to change their practice as long as real protection and enforcement were not implemented in KNP. Apart from the obvious need for protection and enforcement inside the Park, fishermen needed to be taught the practices of the fishery for large pelagic species and they needed to be provided with basic materials and a stipend during the training period. They also needed to be taught how to build and maintain FADs. Last but not least, post-harvest practices needed to be improved to achieve production of quality products for distant markets. Basic marketing strategies had to be implemented to establish a profitable trade.

Implementation of Project Activities

The pelagic fisheries project has been working together with local fish traders, fishermen and expert contractors, to enhance the establishment of the fisheries. Fishing techniques, post



Installation of a Fish Aggregating Device, using a local boat and locally available materials. The boat is specially rigged to transport the anchors of the FAD.

harvest practices, fish processing techniques and marketing of large coastal pelagic fish (mainly Spanish mackerel, wahoo, barracuda and trevallies) have been developed. In order to increase the number of fishing locations, to hold migrating true pelagics (mainly dolphinfish, yellowfin, skipjack and eastern little tuna) in the area and to increase overall catch rates, FADs were deployed in offshore areas. Six deep-water (1,000 – 1,200 m) and five shallow-water (70 – 100 m) FADs have been deployed in the area north of the Park. An additional of 7 reserve FADs was budgeted to replace loss due to weather, normal wear and theft. These reserve FADs will assure continuation of this project for at least one year, by which time the economic viability has to be proven and the fishermen groups – or their business partner(s) – should be able to replace FADs out of their business profits.

The project included a three-month training program for fishermen and for women from fishing communities. Participants in the training program and their moneylenders (local traders) have signed an agreement to refrain from destructive fishing practices in the future. The training program was essential to the project since it created the momentum that was needed for successful development of the fishery. Whereas YPAN and TNC were responsible for the overall project coordination, expert contractors from the fishery sector carried out the training program. Fishermen from different areas in Indonesia have been hired to teach a variety of skills which are needed in this fishery (from Sumatra: construction of traditional FADs and skipjack/tuna fishing; from Flores: live and dead bait still-fishing; from Sulawesi: artificial bait trolling; from Sape: natural bait trolling).

An initial number of 40 local boats have been equipped with insulated ice boxes and basic gears to catch large pelagic species. Around 2/3 of the project participants are still presently involved in the pelagic fishery, mostly on a part-time basis. Demersal fishery is still very important although this is also shifting to areas outside the Park. The number of the pelagic fishing boats increased when price for Spanish mackerel increased and is expected to increase further when protection and enforcement escalates inside the National Park. Many fishermen have enjoyed

the benefit of the fishery for large coastal pelagic species (especially mackerel), in comparison to other legal and non-destructive fisheries.

The training program for fishing communities also contained a post-harvest component, covering a variety of techniques from fish handling on the boats to fish processing on shore. Although a large portion of the catch is destined for sale as a fresh chilled product, there is also considerable potential for the production of various kinds of processed fish. Examples are traditionally steamed tuna (*ikan pindang*), fish ball, dried fish, and various kinds of preserved fish (*dendeng, abon*). The project has trained several groups in local fishing communities, including many women, to prepare these products. The project also supplied some of the basic tools. By introducing these 'new' value-added products, the fishermen now have a better chance of increasing their income in the pelagic fishery.

5. Measures of Success and Monitoring of Project Results

Important measures of success for this project is whether or not a number of project participants continues to practice destructive fishery in Komodo National Park, after project implementation, compared to the number of fishermen that converted their fishing behavior. With data from the monitoring program on resource utilization patterns, the Park Management will be able to draw final conclusions on fishing behavior in target communities, after resource use data over the year 2000 have been analyzed. These data will be analyzed in early 2001. A more general measure will be the number of encounters with compressor fishermen of different origins in a series of years (1997-2000). At the moment of implementation, when restrictions are positively enforced, record is being taken to find out whether hookah fishermen and other demersal fishermen in the Park boundary are able to escape into established alternatives.

A second measure of success will be the average income derived from pelagic fisheries after one or two years, compared to incomes from destructive fisheries. It should be clear though, that incomes from legal pelagic fisheries will always be below those from illegal fishing in a pristine Park, and strong enforcement will always be needed to protect the Park's resources. Success of the pelagic fisheries development project should not only be measured by the behavior of the project participants but also by the "spin-off" of the project in terms of developments in the fisheries in the wider target communities. The project is considered successful when a viable pelagic fishery has developed with larger numbers of fishing vessels involved and resulted in incomes that are competitive to other types of legal small-scale fisheries.

Another important measure of success is the general attitude of the target group (communities in and around KNP) towards marine conservation in Komodo National Park, and towards the initiatives by the TNC/YPAN Komodo Field Office. If trust can be built that initiatives are being implemented, which eventually will benefit all inhabitants of the coastal zone in the area, a major goal would have been achieved and the scope for implementation of co-management of the area would have also been greatly improved.

Most of the information to gauge the success of the program can be collected by the patrolling and resource utilization monitoring team, within their routine program and without any additional investments in monitoring of fishing behavior. A detailed report on the effectiveness of protection and enforcement also has to be added to this information, to be able to judge the pressure on fishermen to look for alternative activities. It will not be useful to implement a "Catch-per-Unit Effort" monitoring program since the widespread and large pelagic stocks



A deepwater fish aggregating device (FAD). The coconut leaves help the fishermen to locate the FAD.



Underwater, below a FAD, where large and small pelagic fish aggregate.

which are targeted in this fishery are hardly affected by the small number of fishing boats in the Komodo area. A community monitoring and evaluation program should be implemented by trained community workers, to collect detailed information, towards the end of 1999 and in early 2000, by means of interviews and direct observations in the target communities. Key issues are trends between 1997 and 2000 in the following parameters:

- a) number of compressors in use by the target group,
- b) main fishing activities by the general target groups (wider than just project participants),
- c) general attitude towards marine conservation in Komodo,
- d) general attitude towards YPAN/TNC initiatives in Komodo, and
- e) general awareness and understanding of marine conservation issues.

6. Project Progress until November 1999

Fish Aggregating Devices (FAD's) and FAD fishing

In total, 5 shallow water FADs (ca. 100 m depth) and 6 deepwater FADs (ca. 1000 m depth) were constructed and installed. The first FAD of this batch was installed on April 27, 1999, the last one on May 15, 1999. The design of the FADs and the method of deployment were adapted several times as experience with this technique and with local conditions was gained. The installation of FADs can be executed by local fishermen using locally available boats, without needing special equipment. After the first batch was installed, the project team decided to postpone the installation of other FADs and keep them as spares for future replacement of

damaged units. Several FADs were vandalized, of which some could be repaired whereas others had to be replaced. Fortunately, such incidents became infrequent toward late 1999. Currently, the impression is that the deepwater FADs perform much better than the shallow-water FADs and no more shallow water FADs are being placed or replaced.

In total, 40 boats signed up for the fish-capture training program. A variety of pelagic hand-line fishing gear has been distributed among the participants. Both offshore FAD fishing and inshore mackerel fishing has been practiced extensively. Especially the inshore mackerel fishing has been successful, mostly because of the rapidly increasing prices for fresh mackerel. Fishermen from Mesa and Labuan Bajo were mostly involved in mackerel fishing. Fishermen from Mesa did not successfully pick up the fishing at the FADs. However, the FADs are presently successfully practised by fishermen from Seraya, and to some extent by fishermen from Labuan Bajo. Seraya fishermen have successfully caught large yellowfin tuna and a good number of dolphin fish. These species unfortunately still fetch relatively low prices with only Rp 4,500 or less than US\$1 per kilogram of fresh yellowfin tuna. Large fish of 35-100 kilograms do make trips to the FADs attractive for the Seraya fishermen. These low prices do not give cost-benefit to fishermen communities living further away.

The expected arrival of a commercial tuna trading company in Labuan Bajo is likely to result in increased prices for fresh tuna in the near future. A fishermen's cooperative is being organized at Seraya island to work with the tuna trading company and meetings with this company were in progress in November 1999. The take-over of the FAD project by the tuna trading company is anticipated. Disappointing catches at the FADs in the beginning of the training period jeopardized this part of the program in early 1999. The low catch rates were caused by an initial lack of skills, and an El Nino related phenomenon, which especially affects the spatial distribution pattern of pelagic fish stocks by alteration of migration patterns. Monitoring results showed that fish catches in Komodo decreased by 50% between 1997 (El Nino) and 1998 (La Nina), and have remained low in 1999.

Training in Post-Harvest Techniques

A large number of small ice boxes has been installed on local fishing boats, and three large ice boxes were transported to their destinations in Pulau Mesa, Pulau Seraya Besar, and Labuan Bajo. Because of the shortage of fish, the large land-based ice boxes have not been used to their full capacity so far. The availability of ice is rapidly improving since late 1999 with large boats bringing in 40-kg blocks in good quantities from Lombok. The ice is crushed in Labuan Bajo and used by the small boats to keep freshly caught fish chilled immediately from the catch onwards. Project trainers have worked intensively with the local fishers to explain the importance of high quality for high-priced fish, and the techniques required to maintain this high quality.

The post-harvest and fish-processing training team has completed its curriculum in October 1999. The participants were groups of 25 women on Pulau Mesa and Pulau Seraya, ranging in age from 17 to 37 years old. A handout has been prepared and distributed among the participants. Post-harvest techniques that were included in the training program were: *pengasinan* (dried salted fish), *pindang* (salt boiled fish), *ikan kayu* (*katsuobushi*), *dendeng* (fish jerky), and *abon* (shredded fish jerky). Also two seaweed-processing techniques were taught to the participants. Presently, it is felt that *abon* offers the best prospects for local fish processing. *Abon* has a long shelf live, and the profit margin is promising. A supermarket chain has also showed interest to carry the product.

Marketing and Socio-Economics in the Mackerel Fisheries

The marketing prospects for Spanish mackerel and other large coastal pelagic species were investigated for fresh and processed fish in Java, Bali and Sumbawa. A full report lists all major fish buyers, and market opportunities. Meetings with potential buyers in Bali and in other places, with TNC staff explaining the opportunities rising from the pelagic fisheries development project, resulted in an increasing number of buyers of fresh large pelagic fish (mainly Spanish mackerel) starting businesses in Labuan Bajo since late 1997. This in turn resulted in an increase of the price for mackerel from Rp 2,500 to more than Rp 15,000 per kg in less than 3 years, and the establishment of a small market for fresh tuna and other pelagic fish, with a price of Rp 4,500 per kg. Tuna had no market, and low-priced, in the Komodo area at the start of the pelagic fisheries project.

Before the monetary crisis in 1997, when the pelagic fisheries project was first designed, a group of five skilled fishermen working from a small motorized local boat with hookah compressors and cyanide, could make around Rp 175,000 (net income for crew members) in a single day of work. With about 20 working days per month the net income for the crew was about Rp 3,500,000, resulting in an income of around Rp 700,000 per crew per month. In early 1997 (US\$1 = Rp 2,800) this compared to about US\$250 per crew per month. The boat owner, that is usually not a crew member in this fishery, would make in excess of US\$400 net income per hookah-boat per month. This income is calculated after deduction of expenses for fuel, food and cyanide, which are paid by the boat owner. After the monetary crisis, the income for the crew did not increase much in terms of Rupiah (but decreased in terms of US\$). The boat owner received much higher prices (in Rupiah) for the fish (which is exported and sold in US\$ to Hong Kong) resulting an increased income for him (both in terms of Rp and in terms of US\$). Incentives for cyanide fishing for boat owners, therefore, increased after the monetary crisis in 1997. Incentives for crew members remain roughly the same.

In early 1997, the same group of five fishermen (with the right skills, boat, gear and fish aggregating devices (FAD's)) could catch a maximum of 5 Spanish mackerels per day, with a total weight of 50 kg (or fewer mackerel but plenty bycatch). At the early 1997 price levels (around Rp 2,800 or US\$1 per kg for mackerel in Labuan Bajo), the mackerel plus by-catch would fetch only Rp 140,000 (of which expenses and owner share still had to be deducted by the boat owner). This left a total net daily income for the crew of not more than Rp 85,000 resulting in an income per crew member per month of some Rp 340,000 (or US\$120) or about half of what was earned in the cyanide fisheries. The income for the boat owner was also much lower in the mackerel fishery than in the cyanide fishery for live reef fish. Economic incentives were, therefore, clearly in favor of working with compressors and cyanide in early 1997 and increased for boat owners after the crisis when the price for pelagic fish had not yet increased.

At the end of 1999, after the pelagic fishery training program and the distribution of ice-boxes, and after the establishment of a mackerel fishery and of marketing infrastructure (including the arrival of several fresh fish buyers in Labuan Bajo), the price of Spanish mackerel over 7 kg has increased to between Rp 15,000 and Rp 18,000 per kg (or US\$2 to US\$2.50 per kg). Even in terms of US\$ this is an increase in price of more than 100% for fresh mackerel since early 1997. Average catch rates were around two mackerel totaling 20 kg per day in a boat with three crew members. This resulted in a total catch value of around Rp 300,000 with around Rp 100,000 to take home for the crew, Rp 100,000 for expenses (relatively high in the pelagic fishery), and around Rp 100,000 for the owner. The potential income for crew-members on a 3-crew



Spanish mackerel, the main target of the pelagic fisheries project, fetches a good price as a fresh product. Larger fish (over 7 kg) are exported, the smaller ones are for the local market.

mackerel boat, doing 20 day trips per month, was therefore close to Rp 700,000 per month or close to what was being earned by crew members fishing with hookah compressors and cyanide in the live reef fish fishery. Income of crew-members in this live reef fish fishery had gone up only slightly (in terms of Rupiah) since 1997. The income of the boat owners in the live reef fish trade had gone up considerably between 1997 and 1999 (in terms of Rupiah).

A 5-crew compressor boat with cyanide divers easily earned Rp 3,000,000 net income per month for the boat owner in late 1999. The same boat with 3 (skilled!) mackerel fishers would not earn more than Rp 2,000,000 per month for that boat owner. This large difference, combined with the lack of enforcement or other disincentives against compressor fishing with cyanide in the Park, made the major boat owner from Pulau Mesa, Haji Idris, decide to keep his boats working in the live reef fish fishery with compressors and cyanide. Even though the individual fishermen (crew-members) were willing to shift to the mackerel fishery, they could not decide to do so since they do not own the boats and all have large debts to the boat owner. Only if a strong anti-cyanide and anti-compressor enforcement program is implemented in the Park, and if large sections of the Park's waters are closed for demersal fisheries, and only if local compressor fishermen can become independent of their present "bosses", can these fishermen be expected to shift full time to pelagic fisheries and other fisheries outside the Park's borders. A clear zoning system with strict regulations, combined with a strong enforcement program is still needed to stop the destructive fisheries, to persuade fishermen to work outside Park boundaries.

Changes in Fishing Behavior

Some 25 out of 40 boats participating in the training program are presently still engaged in the pelagic fisheries, at least on a part-time basis. An unknown but considerable number of boats

joined the mackerel fishing as soon as prices reached levels above Rp 15,000 per kg. In November 1999, 1/3 of the project participants was again active in the compressor fishery for live reef fish and lobsters inside the National Park. These 15 boats were all owned by a local boss, and none of the fishermen had more than a use right for these boats. All fishermen involved had large debts to the boss and had no say in where and how they would be deployed. These boats, almost all of the compressor-boats who joined the training program in March, out of a total of 40 participant boats, returned to full-time cyanide fishing for live reef fish and lobsters because:

- a) this is what the boss (Haji Idris) decided they had to do and they had no choice,
- b) the boss could make more money from a compressor boat than from a mackerel boat,
- c) there was still no effective enforcement against compressor and cyanide fishing in the Park,
- d) pelagic catch rates remained low among several unskilled fishermen, despite training,
- e) the price of tuna remained low as long as no specialized buyers arrived in Labuan Bajo, and
- f) income of some fishermen remained below what they earned in the compressor fishing.

7. Conservation Linkages: Perceived Effects of the Project

The most direct beneficial aspect of this project was to steer some of the local fisher folk away from destructive fishing practices such as blasting, cyanide spraying and reef gleaning, and engage them in more environmental-friendly methods. The number of fishing boats engaged in pelagic fishing, at least part time is at least 2/3 of the project participants (some 25 out of 40 boats) and a large number of "spin-off" boats entered the mackerel fishery after the prices started rising. This has improved the sustainability of the coastal fisheries in general and it will also enable the Komodo National Park Authorities to better protect the marine resources and decrease the tremendous fishing pressure on the coral reefs. Secondly, this project has been a very important vehicle for awareness campaigns and constituency building programs. The project gave community workers a subject to enter into discussions and the training programs established important footholds in various communities.

An important step was taken by the signing of agreements between project implementers and project participants, stating that participants would refrain from any future involvement in destructive fishing practices in Komodo National Park. The pelagic fishery project initiated the development of a potential alternative economic activity and local communities have been trained and prepared to enter this alternative livelihood program. The basic materials for change of practices have been supplied and important partnerships between fishermen and traders in pelagic fish have been established. These circumstances have helped to create an environment where the implementation of regulations like a "hookah-ban" are more likely to succeed, especially by bringing on board some of the key stakeholders which control the activities of the fishermen.

8. Estimated Cost for the Entire Project

The total project cost until November 1999 was US\$158,000 (one hundred and fifty eight thousand US dollars), of which US\$83,000 (eighty three thousand US dollars) was donated to YPAN through a Japanese GAGP grant for FAD building and installation, ice boxes, basic fishing gear and fish processing materials. The remaining US\$75,000 (seventy five thousand US dollars) was funded by Packard, Keidanren, the Perkins Foundation and Unesco and was used to contract the experts and trainers to implement the development and training programs. Parts of these funds were also used to pay per diem for participants in the training programs.

9. Breakdown of Goods and Services Purchased by YPAN from the GAGP funds

- building materials 7 deep water FADs (@ US\$1,600)	\$
	11,200
- building materials 15 shallow water FADs (@ US\$600)	\$ 9,000
- echo-sounder for FAD installation and surveys	\$ 2,300
- labor for FAD building in Labuan Bajo	\$ 3,000
- installation costs for 22 FADs at sea	\$ 4,000
- FAD maintenance (materials & labor) and guarding for 1 year	\$
	6,000
- 30 units insulated ice boxes for fishing boats (@ \$333)	\$ 10,000
- 3 units insulated ice boxes for land storage (@ \$1,300)	\$ 3,900
- 40 sets of basic fishing gear (@ \$400)	\$
	16,000
- materials for fish drying racks and other fish processing tools	\$
	7,000
- transport of all materials from JKT to Labuan Bajo	\$ 2,300
- contingencies	\$ 8,300

TOTAL YPAN/GAGP Pelagic Fisheries	\$ 83,000

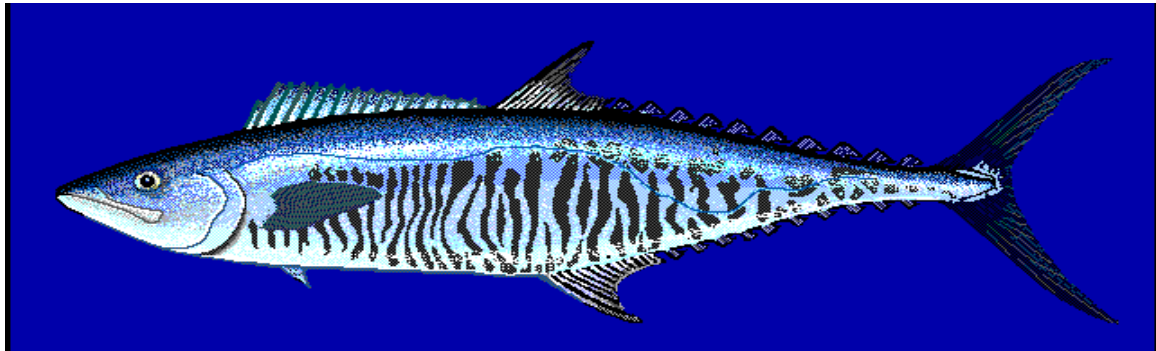
Breakdown of goods and services bought by CMP Pelagic Fisheries from funds by the Packard Foundation, Keidanren, Perkins Foundation and Unesco

project leader for 7 months	\$ 5,600
trainer, FAD/tuna fishing, (*2) months @ \$400	4,000
trainer, post harvest techniques, 5 months	2,000
trainer, marketing, 2.5 months	1,000
Sub-Total Trainers	\$ 7,000
assistant (* 1) tuna trolling @ \$275	1,375
assistant (* 1) FAD / tuna fishing 5 months	1,375
assistants (* 2) fish processing 5 months	2,175
assistant (* 1) hand-lining tenggiri 5 months Bajo	1,000
assistant (* 2) tenggiri rapala trolling UP 5 months	2,000
assistant (* 2) tenggiri bait trolling Sape 5 months	1,375
Sub-Total Assistant Trainers	\$ 9,300
local workers * 10 @ \$55 per month	\$ 2,750
per diem boats: 40 boats * 2 months * 25 days * \$15	\$ 30,000
total board and lodging (during travel)	\$ 7,500
travel project leader 3 * return ticket air fare	
travel trainers 5 months: 2 * return ticket by Pelni	
travel trainers 2.5 months: 1 * return ticket Pelni	
travel assistants 5 outside Flores: 2 * return by sea	
Sub-Total Travel (mostly contractors)	\$ 7,500
Reporting, communication	\$ 5,350

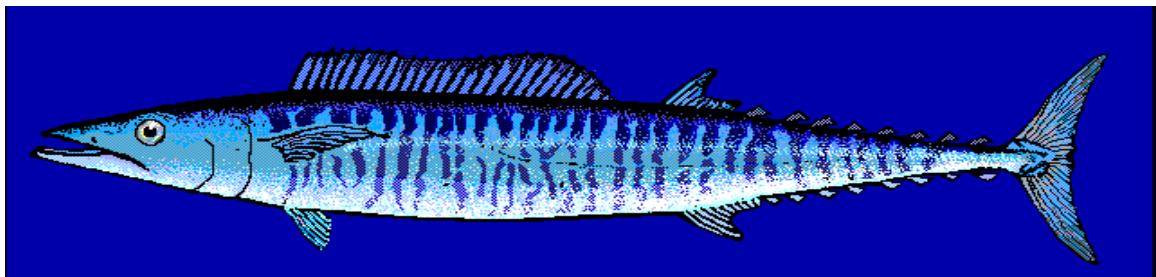
TOTAL CMP Pelagic Fisheries	\$ 75,000

GRAND TOTAL TNC/YPAN PROJECT PELAGIC FISHERIES **\$158,000**

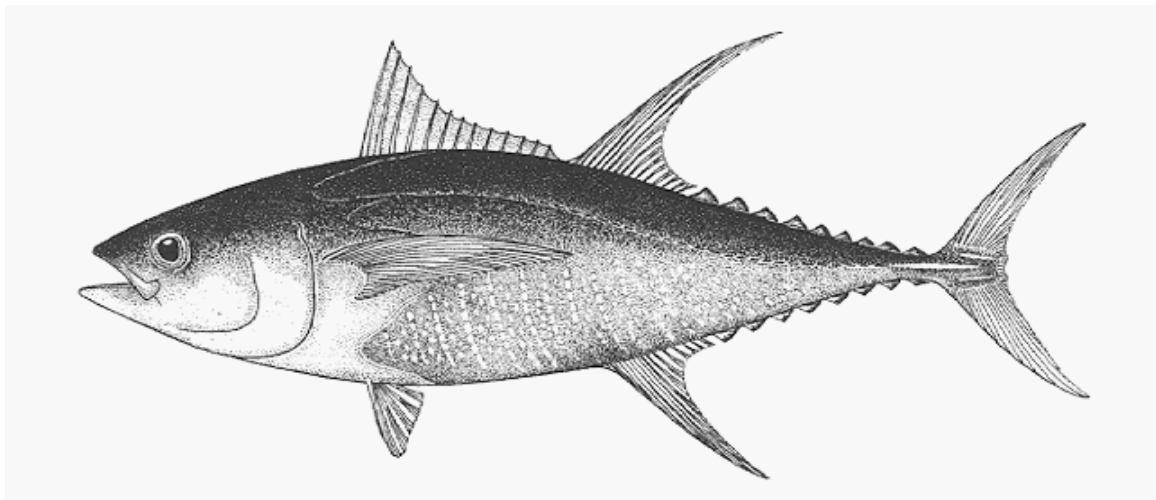
10. Species that are targeted for by the pelagic fisheries project



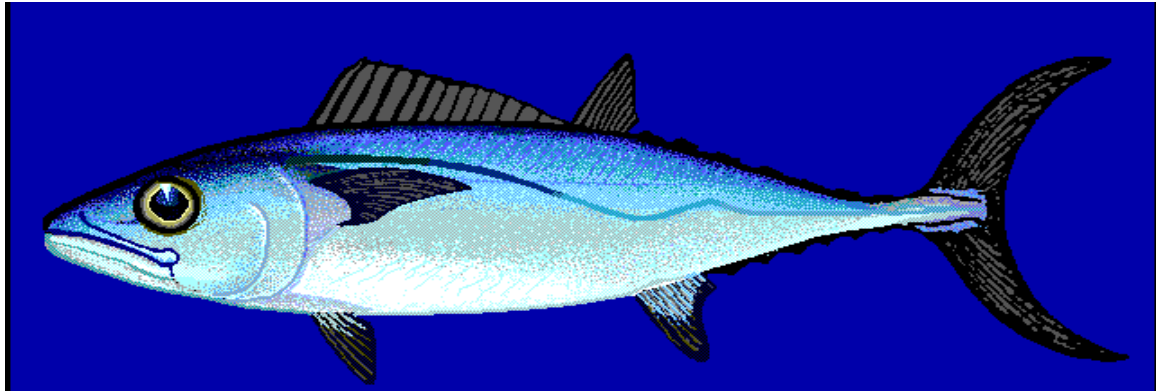
Scomberomorus commerson - Spanish mackerel – tenggiri



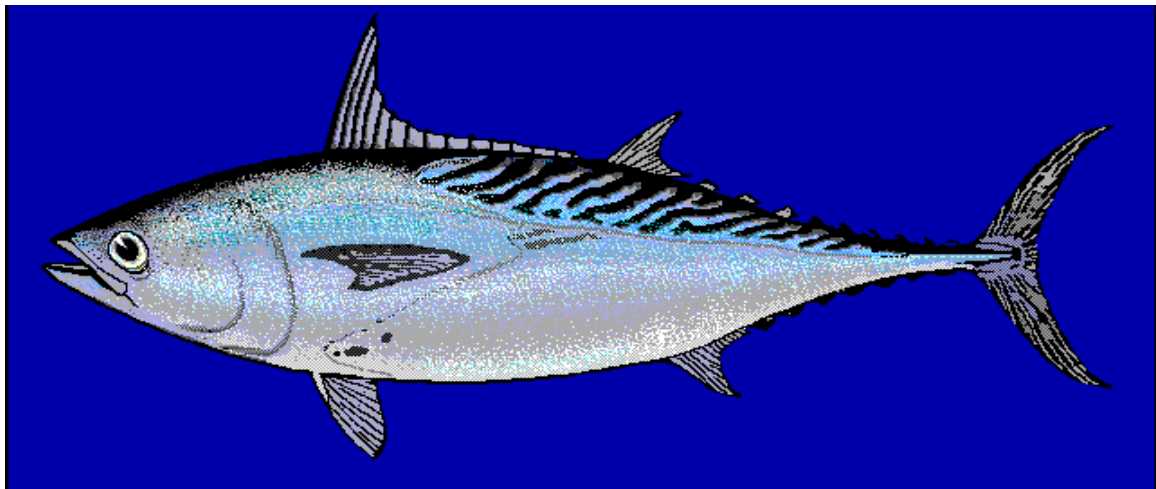
Acanthocybium solandri- wahoo - tenggiri tikus



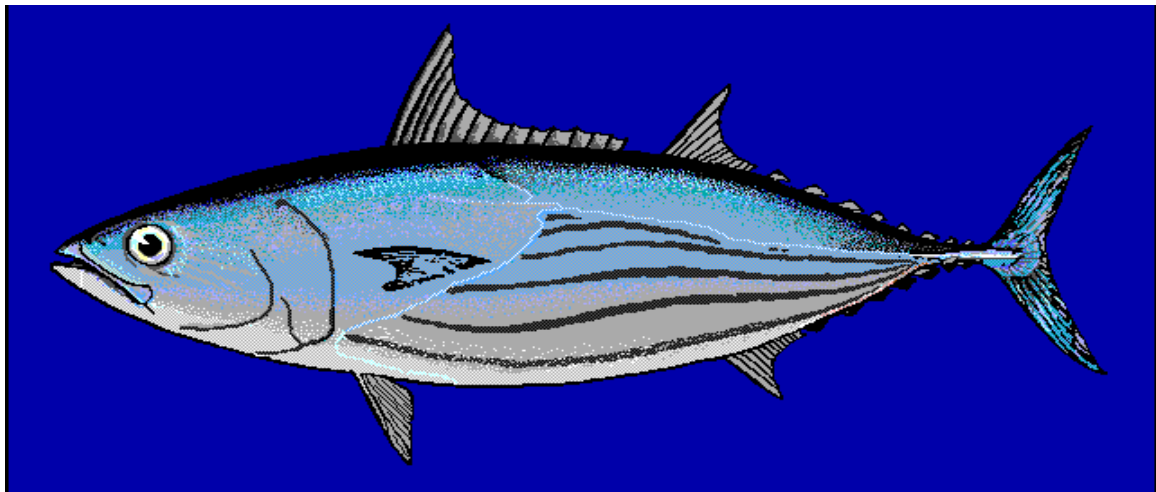
Thunus albacares - yellowfin tuna - tuna bengkunis



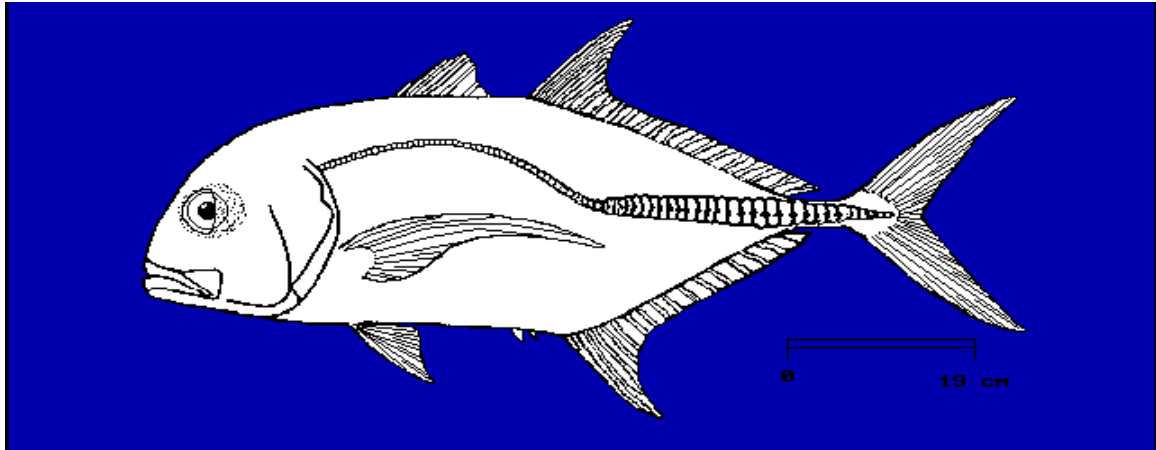
Gymnosarda unicolor - dogtooth tuna - tuna gigi ancing



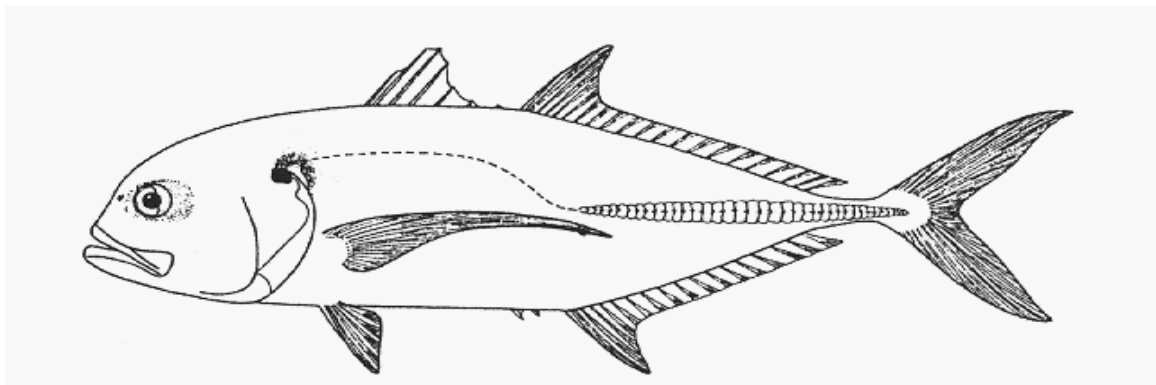
Euthunnus affinis - Eastern little tuna - tongkol



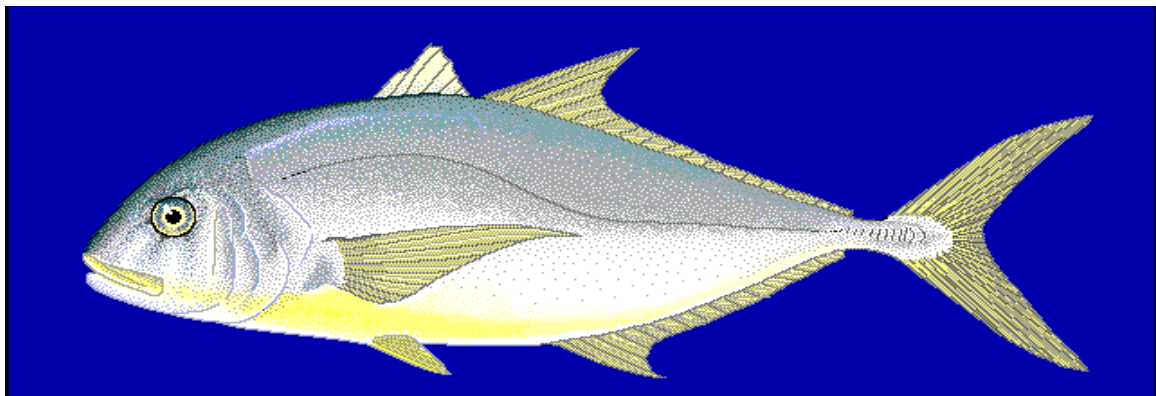
Katsuwonis pelamis - skipjack tuna - cakalang



Caranx ignobilis - giant trevally - bengkolo hitam (cakal Balim)



Caranx tille - Tille trevally - bengkolo putih



Gnathanodon speciosus - golden trevally - bengkolo kuning