

Technical Advice and Assistance for Peruvian Fishermen on Avoiding Seabird Bycatch

Report of a Trip to Peru to Assess Opportunities for Collaboration Between IMARPE and Southern Seabird Solutions (Peru and New Zealand)

Introduction

Peru's fishing fleet is made up of both small artisanal and large industrial vessels. The small vessel fleet is made up of around 9,667 vessels of which 1,601 are longliners. The remainder are a mix of gill netters, trawlers and shellfish dive vessels. The industrial fleet (storage capacity from 30 to around 900 cubic meters) comprises 1,353 vessels of which 1,258 (93%) are purse seiners, 75 are trawlers and 26 are toothfish vessels.

Results of a portside questionnaire conducted by Pro Delphinus (Joanna Alfaro and Jeff Mangel) in 2003 and 2004 found that at least 10 albatross and petrel species are caught (including the rare Chatham albatross from New Zealand, and the waved albatross from the Galapagos). Fishermen were asked how many seabirds they caught in a year, and from this it was estimated that between 1533 and 4292 seabirds are caught annually. A separate survey conducted by IMARPE (Instituto del Mar del Peru) suggests that fishermen in the north catch between 0.74 – 1.75 seabirds per 1000 hooks (Jancke et al. 2001). These are some of the highest catch rates recorded in any fishery and are of real concern.

The President of the Board of IMARPE, Admiral Hugo Arevalo and the Executive Director of IMARPE, Mr Godofredo Cañote have attended the last two annual meetings of the Southern Seabird Solutions Trust in New Zealand. Their commitment to find solutions to the emerging seabird issue in Peru and their interest in working collaboratively with the Southern Seabird Solutions Trust to achieve this was formalised in a written arrangement in October 2005.

The work being undertaken by IMARPE and Pro Delphinus is an important first step in assessing the magnitude of the problem, and beginning the task of raising awareness amongst fishermen. The next step will be to identify and introduce some practical actions that fishermen can start taking to avoid catching seabirds.

To this end, IMARPE invited a New Zealander with practical fishing experience to Peru to undertake a preliminary visit. His task was to become familiar with the fishing operations, understand the constraints and opportunities that exist in Peruvian fishing operations, recommend next steps in addressing the problem and identify ways Southern Seabird Solutions and IMARPE could work together. The trip achieved a number of other outcomes, particularly in raising awareness of the seabird issue within the fishing

industry, government and amongst IMARPE staff, and also in making early contact with fishing industry representatives from other South American countries who were in Peru at the time of the visit.

New Zealand fisherman Dave Kellian was selected to undertake the trip. Dave has fished in New Zealand, Australia and South Africa, using both demersal and pelagic fishing gear. Dave is dedicated to reducing seabird captures and has committed a significant amount of personal time and money to developing new solutions, including his underwater setting bait capsule. Dave has worked as an advisory officer in New Zealand with three different fisheries and during this time, influenced the attitudes and behaviours of many fishermen. He has also developed bird streamer lines (tori lines) that are able to be used by smaller vessels setting at lower setting speeds. Eduardo Villouta, in his role as South American liaison officer for Southern Seabird Solutions accompanied Dave during the first week to attend several workshops held to coincide with the trip.

Objectives of Project

1. To commence scoping out the types of mitigation measures that will suit the different fleets that interact with seabirds in Peru.
1. To help raise awareness of the impact of fishing on seabird populations amongst fishermen, and fishing organisations in Peru
2. To ensure the key influencers in the Peruvian fisheries (fishermen, fishing industry representatives, fisheries observers and trainers) are aware of the range of fishing practices and techniques available that reduce seabird capture
3. Where possible to ensure the design specifications and appropriate use of each fishing practice or technique are well understood by the key influencers
4. Based on the experiences during his visit, recommend future initiatives that will help support the work of IMARPE and Pro Delphinus.

Trip Outline

Dave Kellian spent three weeks in Peru between 7th – 21st February 2005. Eduardo Villouta, the Southern Seabird Solutions Trust's South American Liaison Officer was sponsored by the NZ Department of Conservation to participate in the first week of events arranged for the NZ visit.

Lima and Pucusana

Dave and Eduardo spent the first week in Lima, meeting with IMARPE staff, participating in workshops with different organisations, and meeting with fishing industry representatives and fishermen at the port in nearby Pucusana.

IMARPE arranged two workshops – the first was attended by IMARPE scientific staff to brief them on the seabird issue as this was new to many of them. The second workshop was with fishing industry members from the national federation representing artisanal fishermen (Federación de Integación y Unificación de los Pescadores Artesanales del Perú). The purpose of this workshop was to begin a dialogue with the federation about the seabird issue and ensure they were aware of Dave’s visit and the expertise he had to offer. In both cases, Admiral Arevalo welcomed participants, Mr Cañote provided an introduction, biologist Elisa Goya, Top Predator Research Unit of IMARPE outlined the problem of seabird bycatch in Peru, Eduardo Villouta described the Southern Seabird Solutions Trust and Department of Conservation’s involvement in seabird conservation, and Dave Kellian talked about the techniques that are being used or under development to reduce seabird captures. Dave showed the Spanish version of the Southern Seabird Solutions video “Fishing the Seabird Smart Way” and answered questions. During the workshop with fishing industry representatives, Mr Ramón Agama, Secretary General of the Federation and a fisherman himself, spoke about fishing in Peru and some of the responses that fishermen had made to avoid catching seabirds.

The Ministry of External Relations arranged a third workshop following the same format, and invited Ministry staff, officials from the Ministry of Production (responsible for fisheries issues), the Environment National Council (CONAM) and Non-Government Groups Pro Delphinus, GEA Peru, MundoAzul and APECO (Asociación Peruana para la Conservación de la Naturaleza – Peruvian Association for the Conservation of Nature).

All of the workshops included question time which allowed for useful discussion and sharing of views.

Mr Cañote, Eduardo and Dave met with fishermen in a fourth more informal workshop at the port in Pucusana.

Fishing trip – Lima to Ilo

Eduardo left Peru at the end of the first week, and Dave embarked on a fishing vessel for a trip to the southern port of Ilo. Francis van Oodt from IMARPE made the trip with him to act as an interpreter, and in fact stayed with Dave for the remainder of his time in Peru. The sea trip gave Dave the opportunity to talk with the skipper in his own environment, to familiarise himself with the fishing operation and also observe seabird activity around their vessel and other vessels they encountered. The trip lasted five days. In Ilo, Dave held two meetings during his short visit – one with the local IMARPE staff and the other with a group of fishermen. In both cases he briefed them on the project and the seabird issue and answered questions and engaged in a discussion. Dave also accompanied the Pro Delphinus staff member stationed in Ilo around the port and met and talked

informally with a number of fishermen. In addition he made brief visits to several smaller nearby ports and sought out chandleries to see what fishing gear was available to Peruvian fishermen.

Paita

After a night in Lima, Dave, Joanna Alfaro, Jeff Mangel (both of Pro Delphinus) and Francis travelled to the northern town of Paita, one of the biggest ports in the north of Peru. There the team held a meeting with IMARPE's Coastal Laboratory Director and staff, met with fishing association representatives and spent time with a WWF gear technologist who works with Pro Delphinus. They were accommodated for a night at the Centro de Entrenamiento Pesquero - Paita (Fishermen's Training Centre - Paita), where 28 fishermen from seven South American countries were in residence for a two month fishing course. Dave and the team met with the Academic Director of the Centre as well as the course trainer and made a seabird bycatch presentation to the fishermen. They left educational material for future courses. The Director mentioned he would welcome any further environmental material to add into their courses. While in Paita, Dave visited the small vessel port where a number of longliners fish from, and talked with skippers and crew about the seabird issue and their experiences of the problem.

Lima

On return to Lima, Dave visited Callao Port, which is the most important port in Peru, to meet and discuss the seabird issue with fishermen and with the fishermen's association representatives. Finally, he debriefed IMARPE's Top Predator Research Unit staff on his observations and recommendations, farewelled his generous hosts and returned to New Zealand.

Findings

Reaching Peruvian Fishermen on Seabird Issues

According to the last national artisanal fleet assessment carried out by IMARPE in 2005, of the 1601 longliners operating in Peru, 1330 fish offshore in waters where they are likely to encounter albatrosses and petrels. These more offshore longline fishermen are targeting mahi mahi (perico) and shark (tiburones – mako, diamante and azul).

There are 20 main ports, 20 medium sized ports and 142 small ports spread along the Peruvian coastline. Peru has 289 local fishermen's associations, which are linked to the National Federation.

IMARPE has Coastal Laboratories in each of the key ports and IMARPE staff work closely with the fishermen, collecting landing data and other information when fishermen return to port.

IMARPE staff work closely with the coast guard and port authorities who also maintain contact with fishermen. Any fishing vessel leaving port is required to have embarkation papers cleared although compliance with this is not high. However, opportunities to

require fishermen to report their compliance with any future mandatory seabird mitigation measures as part of this paperwork could be investigated.

Peru has an industry magazine but only a small percentage of fishermen have access to it.

Based on this information, it seems that the most effective way to reach fishermen on seabird issues at this time is to use the approach adopted by Pro Delphinus and IMARPE – that is to have a presence in the ports and to work directly with fishermen. Because of the large number of ports and Peru's long coastline, any future support and advice Southern Seabird Solutions can give should be done in collaboration with IMARPE and Pro Delphinus. It will also be important to work with the local associations as these are made up of fishermen facing the issue at sea.

Ongoing communication with the national body representing artisanal fishermen remains important.

The Longline Fishing Operation – Opportunities and Constraints on Seabird Mitigation Measures

The mahi mahi fishing season occurs from September to March, and the shark fishing season extends over the remainder of the year. Most longliners fish for both types of fish, and change their fishing gear over between seasons. Some longliners also switch to nets or other methods after the mahi mahi season. Longline vessels are small, typically 8 to 14m with average carrying capacity of around 7 tonnes. They carry 4-5 crew members. The sea conditions along Peru are relatively calm, so that despite their small size, the vessels can fish a long way from shore (typically 30-40 miles and up to 200-250 miles).

A typical mahi mahi fishing operation involves setting up to 20 miles of fishing line (up to 1500 hooks at 3-4 knots). The fishing line is stored on the deck in a contained area and during setting it is pulled out of the pile with the forward movement of the boat and feeds out of its own accord. Tangles are frequent and vessels are often stopping and backing up during setting. This along with the small size of the boats, slow setting speed, lack of wind and lack of high attachment points make use of a tori line problematic on many vessels. Vessels in the north are slightly bigger, so there may be more opportunity there.

The fishing line is generally 5mm floating polypropylene rope. This is designed to stay on the surface. This means that seabirds are likely to be caught during the fishing period rather than just during setting (or hauling) as is the case in most fisheries. Fishermen reported that mahi mahi jump out of the water when they get caught, which is likely to attract seabirds to the fishing line and exacerbate the problem.

Floats (quartered purseine floats) are attached directly to the fishing line every 15m. A hook hangs beneath each float on 4m of braided synthetic 3mm rope and 1.5m of monofilament. Some vessels use a small lead sinker (25 gms) near the hook (12/0 J hook). Another hook hangs mid way between the floats. The maximum depth a hook reaches

under water is 5.5m, well within the diving depth of many petrel species. In most cases, currents, tidal influences and fish on the line will bring the hook closer to the surface than this depth.

Shark fishing gear is similar to mahi mahi with three exceptions; the branchlines are longer (around 10m), the terminal end of the branchline is 0.5m of 3mm wire, and a larger hook (16/0 J hook and bigger) is used. These three differences are likely to mean that the baited hooks sink quicker and are at a deeper depth during the fishing operation than mahi mahi hooks, presumably resulting in less catches of seabirds. This would need to be verified however.

It is noteworthy in both the shark and mahi mahi fisheries that weights are almost always used in the south where there doesn't appear to be a seabird problem, but in the north where the problem exists, only half of the fishermen use them. When asked why they were used, fishermen in the south said it was to keep the hooks down during tidal currents and keep seabirds away from baited hooks. Fishermen reported that tidal currents were a greater problem in the south, so this may explain the difference.

Pieces of squid are used to bait hooks. Squid (including the jumbo squid) are very numerous at night and easily caught on a jig. Night setting (even though it is preferred because the best mahi mahi catches occur after dawn) is not possible because of the total loss of fish and bait to squid. This means night setting as a seabird avoidance measure is not available in areas where squid are abundant. Fishermen reported to Dave that a change in the ocean around 1997 possibly associated with El Niño had resulted in increased squid numbers.

Fish are gutted as they are caught and offal released overboard. A normal days fishing reaps 400-500 kilo of mahi mahi. Most mahi mahi trips are 8 – 10 days. Shark trips tend to be longer and can last up to 20 days.

Fishing gear sold in chandleries is currently very limited with only standard fishing gear sold. Lead weights currently used in the longline fishery are stocked primarily for the gill net fishery.

The two mitigation measures that are likely to have the greatest impact on seabird bycatch in Peru are:

1. Line weighting to sink baited hooks quickly and hold lines down during the fishing period. Line weighting is already practiced in Peru, so is a known practice to fishermen. Research on the appropriate weight to achieve the greatest reduction without affecting fish catches is needed.
2. Use of fish oil as a deterrent to seabirds following vessels during setting. This method has been trialled in New Zealand and found to be very effective at keeping petrels away from the back of vessels. Fish oil is dripped into the water and forms a thin layer that seems to stop petrels from landing. Albatrosses seem

less effected by the oil in trials undertaken to date. Peru has abundant supplies of fish oil, in the form of anchovy oil. Dave brought two containers of anchovy oil back to New Zealand to include in a planned trial. Fish oil works best in relatively calm waters, and as this is the predominant sea condition in Peru, it has real promise. Fish oil will not reduce captures of seabirds during the period when the line is fishing however.

3. Other changes to fishing gear and fishing practices, such as longer branchlines when fishing for mahi mahi, and holding offal and used baits on board until steaming could be investigated. The introduction of non floating fishing line could make a significant difference to seabird bycatch but would mean fishermen would no longer be able to haul the line by hand and would need to purchase a 'halador' (winch). The receptiveness of fishermen to the above mentioned gear changes would need to be gauged.

Seabird Bycatch in Peru

Introduction

As mentioned in the introduction, IMARPE and Pro Delphinus have both interviewed fishermen in ports to obtain a first assessment of seabird bycatch in Peru. IMARPE interviewed fishermen in five ports in northern Peru in 1999 and this information suggests that between 0.74 and 1.75 seabirds/1000 hooks are caught in shark and mahi mahi fisheries. This includes 42% albatrosses, 13% petrels and shearwaters, 22% boobies, 18% pelicans and 4% gulls and other species. Fishermen reported to IMARPE that 89% of the time seabirds are caught during the set, 3.6% during the soak period and 7.1% during the haul.

Albatross and petrel species known by IMARPE to have been caught in Peruvian longline fisheries are:

Waved albatross from the Galapagos Islands
Bullers albatross from New Zealand
Chatham albatross from New Zealand
Salvin's albatross from New Zealand
Black petrel from New Zealand
Westland black petrel from New Zealand
Northern giant petrels possibly from Australia
White-chinned petrels (no band returns so provenance unknown)

Pro Delphinus staff has undertaken a similar questionnaire of fishermen in 39 ports along the entire coast and fishermen reported between 0.2 – 0.61 seabirds/1000 hooks. This is lower than the IMARPE figures, which may reflect differences in bycatch rates between the north and south of Peru. Both IMARPE and Pro Delphinus are continuing in their

efforts to obtain reliable assessments and take positive steps towards reducing the bycatch rates.

According to fishermen, historically the seabird problem in the south was comparable to the north, but since the El Niño event, there have been major changes in abundance and distribution of marine life including seabirds. Seabirds are no longer a problem in the south; Miguel Cuentas, the fisherman Dave went to sea with, recalled last catching a seabird in 1987. As they steamed south, Dave looked for seabirds around fishing vessels they passed that were setting and hauling gear and the skipper talked to other fishermen on the radio about seabirds around their vessels. Dave did not observe any seabirds following vessels and only observed small numbers (around ten albatrosses and the same number of petrels (mainly waved albatrosses, white chinned petrels and some storm petrels) over a whole day's steaming. His observations backed up what fishermen were saying for this time of year. Fishermen said that seabirds were slightly more abundant in winter in the south, and only showed an interest in vessels when they were discharging shark livers. Miguel commented that Chatham albatrosses appear in winter, but that they do not aggressively feed around vessels.

It appears that the situation is different in the north, particularly in the winter. Fishermen approached in Paita reported catching 5-7 petrels per set when it is bad, and an albatross per trip. Fishermen mentioned they suspected petrels were getting caught during both the set and the fishing period. Dave recommended that information on the status of the seabirds caught (dead/alive/injured) and the extent of soaking of the feathers could help throw some light on the percentage of birds getting caught while the line is fishing in the water.

IMARPE have been collecting at sea seabird distribution data since 1998, during their twice yearly research cruises for anchovy assessments. IMARPE have undertaken some analysis of this information and plan to carry out more.

Pro Delphinus have 8 observers collecting seabird and other information from vessels and are now receiving seabird carcasses. Pro Delphinus is planning on deploying more observers, depending on fund availability, and IMARPE are also in the process of training 5 observers. This will greatly enhance the knowledge of seabird bycatch in Peru. Collection of similar data by both parties and pooling of data for analysis will increase the usefulness of the information.

Attitude of Peruvian Fishermen towards Catching Seabirds

Dave observed that fishermen who had had contact with Pro Delphinus staff over the last few years were aware of the seabird and turtle issue and prepared to discuss it in an open and receptive way. Artisanal fishing industry representatives in Lima showed a willingness to engage with others to address the issue although the degree to which this would be transferred to fishermen would need to be tested. The representatives said they were hoping for leadership from IMARPE on the seabird issue.

Next Steps

During his visit, Dave suggested a number of ideas to take the issue forward in Peru. These are summarised here:

1. It would be useful for IMARPE and Pro Delphinus observers to undertake “bottle tests” to determine how quickly baited hooks are sinking. This involves tying an empty bottle attached to a known length of string to the part of the fishing line that needs to be observed sinking (in this case the baited hook). Once the baited hook reaches the depth of the string’s length, the bottle upends on top of the water. This is timed, so for instance it would be possible to determine how long a baited hook takes to sink 4 metres.
2. As an extension of point 1, observers or a researcher could use the bottle test to assess different weighting regimes to determine the optimum weight to advise fishermen to use to prevent seabirds taking bait and to maintain or improve fish catch. As part of this, the length of the branchlines could be altered to find an optimal branchline length and weight for seabirds and fishing.
3. During their sea trips, observers could collect data on the use of current offal management methods which could be more widely promoted – i.e. holding used baits on board until the end of haul, and carrying out offal dumps rather than a continual trail of offal
4. It would be useful to know why more fishermen in the south use weighted lines that in the north and attitudes of fishermen about using weights.
5. A useful means of keeping seabirds away from close behind the vessel could be a pole with a plastic bottle or equivalent on the end. Unlike a tori line, this would be out of the water, and unlikely to tangle with the fishing line. However, it will only work for a short distance beyond the boat.
6. Dave will send some samples of tori lines to Peru that have been used in NZ.
7. Artificial baits could be tested for effectiveness in catching mahi mahi and shark. If this was successful, it has the potential to solve the seabird problem.
8. Anchovy oil offers promise as a measure to reduce capture of seabirds while the line is being set. Trials will be carried out in NZ but would need to be replicated in Peru. It would be worth investigating ways to make the oil available at reduced cost for fishermen.
9. Ongoing collection of seabird data through IMARPE’s twice yearly at sea surveys would be useful, particularly to assess seasonal or geographic difference in seabird composition and abundance. Also, analysis of the eight year data set see if there have been any changes in composition and abundance would be worthwhile. Observers may be able to continue at sea seabird counts.

10. Observers could also attempt to determine what percentage of seabirds are caught on the set compared to the fishing period. This could be done by counting the numbers caught during the set, and comparing this to numbers bought on board at the end of the set. Also the status of seabirds bought on board may provide some information – for instance any that are alive, or whose feathers are not totally water logged are more likely to have been caught during the fishing period.
11. It will be useful to compare seabird bycatch in the shark and mahi mahi fisheries. The shark fishery may have a lower likelihood of catching seabirds because of the longer branchlines and wire section at the terminal end of the branchline. Seasonal and geographic comparisons in seabird catch rates could also be undertaken.
12. It is apparent that IMARPE and Pro Delphinus work well together currently, and have similar goals. It would be ideal if IMARPE and Pro Delphinus used a standardised seabird bycatch data form.
13. It may be worth investigating the legal powers of port authorities in regard to authorising vessels to go fishing. This could provide a reporting and compliance mechanism if mandatory measures are applied in the future.
14. Peruvian fishermen (and fishermen the world over) are most willing to discuss issues such as seabird bycatch in an open and receptive way at the wharf or on the water. Where ever possible this approach should be incorporated into education and awareness programmes.

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The trip would not have eventuated without the dedicated efforts of Mr Godofredo Cañote, Executive Director of IMARPE, to whom we are deeply indebted. Admiral Hugo Arevalo, Director of IMARPE promoted the association with Southern Seabird Solutions during his visit to New Zealand in 2004.

The itinerary and much of the “behind the scenes” organisation was undertaken by Elisa Goya of IMARPE. The mix of activities arranged for his visit allowed Dave to meet a wide range of people and obtain an excellent overview of longline fishing and measures that could be introduced or refined to avoid catching seabirds in Peru. Francis Van Oordt, IMARPE, accompanied Dave during the three weeks and acted as a translator and companion. IMARPE staff in the Lima office and Coastal Laboratories were generous with their time and knowledge.

Joanna Alfaro and Jeff Mangel were of great assistance to Dave, and accompanied him to the north of Peru as well as providing accommodation and support from one of their staff in Ilo. They helped arrange Dave's trip aboard the longline vessel Emmanuel, with skipper Miguel Cuentas, and other logistical support.

Miguel Cuentas kindly carried Dave on board his vessel and shared his experience and knowledge of seabirds and fishing in Peru. Mr Ramón Agama, other members of fishing organisations and numerous fishermen gave their time and knowledge to assist in this project.

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This report was prepared by Janice Molloy from Dave Kellian's verbal account. It was corrected by Francis Van Oordt, Elisa Goya, Joanna Alfaro and Jeff Mangel.

Thank you to everyone involved.

Reference

Jancke, J., E. Goya, A. Guillén 2001. Seabird by-catch in small-scale longline fisheries in northern Peru. *Waterbirds* 24 (1) 137-141.