Agreement on the Conservation of Albatrosses and Petrels

Fourth Meeting of Seabird Bycatch Working Group

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Project 2009-04 Progress Report - Responding to the evolution of Peru's artisanal longline fleet: characterizing fleet mechanization and introducing weighted swivels

Pro Delphinus

PROJECT REPORT 2009 TO THE ADVISORY COMMITTEE

Project Title: Responding to the evolution of Peru's artisanal longline fleet: characterizing fleet mechanization and introducing weighted swivels

Project initiated by: Pro Delphinus

Project Manager: Joanna Alfaro-Shigueto & Jeffrey C. Mangel

Summary of project activities (max 300 words)

- Assessment of longline fleet characteristics and mechanization in the ports of Callao, Chimbote, and Pucusana.
- Distribution of weighted swivels to longline fishermen in the ports of Salaverry and Chimbote.
- Continued monitoring by onboard observers of seabird interactions with the driftnet fleet of Salaverry
- Continued monitoring by onboard observers of waved albatross abundance and distribution.

Project outcomes (detailed by objective) (max 300 words)

In early 2010 we conducted site visits in the ports of Chimbote, Callao and Pucusana and requested information from local contacts in those locations regarding longline vessels that had begun to mechanize their fishing operations beyond the methods typically employed by other vessels. The search turned up 7 vessels in the ports of Chimbote (4) and Callao (2) and Pucusana (1). Four of these vessels had one owner, two others were from a relative of this owner and the one remaining belonged to an additional independent owner. Another two vessels are being converted to use mechanized mainline spools, but are not yet operating. Aside from identifying vessels that have transitioned to more mechanized gear we also document the typical steps involved as vessels become more mechanized. This process was detailed in our final report.

From November 2009 to January 2010 we distributed 3750 swivels distributed to 13 vessels in the ports of Salaverry, Chimbote and Ilo. An additional 900 swivels were distributed in July to two vessels, one in Salaverry and one in Chimbote. We have also received requests from an additional 2 owners and operators for 3 vessels in Salaverry that had heard from another boat about the weighted swivels. One boat owner from Chimbote who had received swivels also contacted us to request more. Follow-up communications with those who received weighted swivels were also part of the project and they were apparently well received.

From April 2009 to February 2010, 30 driftnet fishing trips (176 sets) were monitored from the port of Salaverry for seabird interactions and waved albatross abundance and distribution. No WAAL were observed bycaught during the study period. However, one
Project Title: Responding to the evolution of Peru's artisanal longline fleet: characterizing fleet mechanization and introducing weighted swivels incident of a banded waved albatross entangled in a surface driftnet from Salaverry and released alive was reported to

PD staff and the information forwarded to the banding agency. Detailed information on waved albatross abundance, distribution and behaviour around fishing vessels can be found in our final report to ACAP.

Were the funds spent in accordance with the original budget? (max 100 words)

The project's original proposed budget was modified at the request of ACAP to include Fishtek safeleads to the purchase of weighted swivels. Funds were spent in accordance with this revised budget.

Were there any unforeseen difficulties with the project? (max 300 words)

We think it is worth noting that follow-up communications with fishermen who were provided weighted swivels (and with those contacted regarding gear mechanization) was exceedingly difficult. These owners, captains and crew are constantly moving between ports and/or at sea. They also regularly change contact telephone numbers. As a result, it is often extremely hard to contact a fisherman or owner after an initial meeting, and if a person can be contacted they are frequently too busy to talk. Trying to coordinate follow-up site visits or face to face follow-up interviews is even more challenging. This was an important lesson learned through the project and something we (and any other similar project working with a highly mobile, unregulated fleet) will certainly take into account in designing and implementing future projects.

Have you identified any questions or issues that need to be addressed further? (max 300 words)

The purpose of this project was to identify gear trends in Peru's longline fishery and the pilot introduction of weighted swivels to that same fleet. Both of these topics will require continued monitoring. In the case of fleet mechanization we believe it will be important to continue to monitor the introduction of line pullers and mainline spools, but also to begin monitoring fishing operations by these vessels using onboard observers. Work introducing weighted swivels will also require additional years of effort and we are continuing with those efforts with our current project with ACAP.

RESPONDING TO THE EVOLUTION OF PERU'S ARTISANAL LONGLINE FLEET: CHARACTERIZING FLEET MECHANIZATION AND INTRODUCING WEIGHTED SWIVELS

Final Report to the Agreement on the Conservation of Albatrosses and Petrels

October 2010

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EXECUTIVE SUMMARY

Peru's artisanal longline fishery is a dynamic fleet which is constantly changing where and how it fishes. One aspect of that change is through gear mechanization. This project visited three of Peru's leading longline ports to document this process. We identified 7 active mechanized vessels and an additional 2 under construction. This report summarizes these findings and documents the mechanization process and what increased mechanization may mean in terms of seabird interactions. We also report on a trial introduction of weighted swivels in the ports of Salaverry, Chimbote and Ilo. Finally we provide an update of ongoing WAAL abundance and distribution counts.

1. INTRODUCTION

This project addressed the potential impacts caused by the use of new technologies - such as mechanized winches – being introduced into the Peruvian artisanal longline fleet, and how this transition might impact the waved albatross (WAAL) and other threatened albatross and petrel species. As there are increasing numbers of Peruvian longliners (formerly based primarily on manual labor) now moving toward the use of mechanized gear and midwater fishing, this study sought to document this process at its early stages. By so doing we will be better able to promote at the outset the adoption of seabird safe fishing techniques and gear (i.e., use of sufficient weight, side setting, etc.). Gear characterization focused on the ports of Chimbote, Callao and Pucusana which historically have been first adopters of new gear design and in which some mechanized boats are already operating. Characterization was through port visits to examine the vessels and through information from skippers documenting their fishing activity.

Based upon our ongoing research on the WAAL and Peru's artisanal fisheries it has also become clear that the WAAL (and other seabird species) follows fishing vessels and dives for bait during the setting of longline gear. Also, vessels in this fleet use separate weights and swivels, with the weight positioned well away from the baited hook, thus increasing sink times and putting seabirds at greater risk of hooking or entanglement. As a means of improving gear design and, as a result, increasing sink rates, we began introducing the use of 45g and 60g weighted swivels to longline vessels. It is hoped that use of weighted swivels will increase sink rates of baited hooks, thus reducing bait loss and the risk of hooking seabirds. Weighted swivels will also reduce the work load on fishing crews (by not having to work with weights and swivels separately), and, given their durability, should, in the long run, reduce gear costs and preparation time.

The ports of Salaverry and Chimbote were chosen to initiate this project given the overlap of the fishery with the WAAL and other seabird species, the strong history of work and participation Pro Delphinus has in the community, and the results of discussions with longline fishermen there that indicate they are open to trying weighted swivels.

Given the characteristics of Peru's artisanal longline fishery – highly diffuse with little enforcement – introduction of weighted swivels to the fleet is likely one of the simplest and most rapidly effective and durable methods possible toward reducing seabird interactions. Moreover, as some vessels in this fleet already use weights, introduction of 60g weighted swivels can be promoted as a means to improve fishing efficiency and would not require imposition solely to promote seabird bycatch mitigation, thus maximizing the likelihood of the long-term adoption of weighted swivels. Given the mechanizations we have and are documenting, and in consultation with ACAP we are also introducing Fishtek Safeleads to the fleet which, like weighted swivels, can help reduce seabird interactions and also offer a substantial safety enhancement to vessels using monofilament branchlines.

2. PROJECT OBJECTIVES

The ultimate purpose of the project is to improve the conservation status of the WAAL and other albatross and petrel species by reducing the impacts of Peruvian artisanal fisheries. The long term outcomes of the project include (1) an improved understanding of the

fisheries operating in the at-sea distribution of the waved albatross and (2) introduction of a gear technology that can both enhance fishing efficiency and reduce longline bycatch of albatrosses and petrels. This work will also implement recommendations set forth in ACAP's Action Plan for the Waved Albatross.

Specific project objectives included:

- Characterization of artisanal longline fleet mechanization at the ports of Chimbote, Callao and Pucusana and the potential impacts this may have on seabird interactions.
- Introduction of 45g and 60g weighted swivels to longline fishermen in the port of Salaverry as a means to increase branchline sink rates and reduce crew labor.

3. RESULTS & DISCUSSION

3.1 Fleet mechanization

In early 2010 we conducted site visits in the ports of Chimbote, Callao and Pucusana and requested information from local contacts in those locations regarding longline vessels that had begun to mechanize their fishing operations beyond the methods typically employed by other vessels (Fig. 1). The search turned up 7 vessels in the ports of Chimbote (4) and Callao (2) and Pucusana (1). Four of these vessels had one owner, two others were from a relative of this owner and the one remaining belonged to an additional independent owner. Another two vessels are being converted to use mechanized mainline spools, but are not yet operating. The results of this search also suggest that there is a multi-stage mechanization process occurring in the fleet which can be summarized as follows:

3.1.1 A typical Peru longline vessel: Is a displacement hull of timber construction of about 10-15M in length and propelled by a diesel engine. The vessel has 8-10 crew and fish are cleaned and stored on ice for 10 or more days at sea. Boat style and existing machinery make it relatively straightforward to accommodate further mechanization such as of hydraulically driven fishing equipment. Relatively slow (5-8 knot) speed is offset by long sea voyage duration capabilities of quite sea-worthy vessels (i.e. not particularly weather dependent for operation).

3.1.2 Summary of longline vessel mechanization stages: There remains a large degree of variation in the fleet regarding the use of lead weights. In any given port there may be some vessels operating with weights and others without. There may be several reasons why such vessels do not weight their lines. These reasons include the extra cost, the belief that unweighted and therefore shallower set hooks catch fish better (dolphin fish in particular), and the issue of extra line weight being much more difficult in manual hauling. Typically, manual vessels have uniform gear deck layout that is advantageous for bird avoidance, especially hook setting occurring at or forward of mid-ship starboard side of vessels. It is even better if lines are weighted with the typically chosen 45-60gm tied-on lead sinkers at approximately 1 fathom from the hook. Without such weight and with small hooks (no. 4 or 5), after baiting with cut-up pieces, the sink rate on these shallow lines is very slow and the gear sets very shallow. It may even be right near the sea surface throughout its entire time in the water depending on current/tide strength.

The first step of mechanization is installation of a vertically mounted hydraulic capstan or pulley block winch to haul in the mainline. Winches are placed at the forward-most starboard corner of existing mainline storage baskets and so the same setting route (and hauling) of the line is maintained. Presumably because the mechanized line recovery is faster, vessels now find that to prevent branchlines twisting around the mainline during the haul, weights have to be added to branchlines. So, this initial step of mechanization can therefore improve bird (and perhaps turtle) mitigation. The faster sink rate (for birds), deeper set (for turtles) with hooks still being deployed off the side of vessels. We note that at this stage, branchline weights are tied into the branchline with a quick release loose slip-knot and attached to the mainline by the same method. There seems to be no inclination to, along with installations of the hydraulic winches, to start to use branchline clips or fixed swivel style leads at this stage.

Vessels that have then progressed to the next stage, that of installing a typical monofilament mainline hydraulic drum or spool seem to be selecting placement of this so as to set off the vessels stern despite there being sufficient space that would allow for side-setting. Little effort/thought is going into ways of improving deck space utilization by care in selecting best spool position. Branchline leads are being retained as twisting is still being encountered and branchline clips are now used (mainline floats too are clipped as the usual fixed all-along of the traditional rope mainline is now incompatible with the spooling of the monofilament mainline. Because of this, a deeper set or more pronounced catenary is likely which will much improve avoidance of birds and turtles. At least a proportion of hooks between line floats have a greater chance to sink uninterrupted and remain at greater depth. Running a shallow-setting line directly off the boat by not using a line shooter is creating greater bird catch opportunities as tension astern delays sinking and will even be sufficient to tow the line and have baited hooks at or near the surface 100m or more astern. The question remains whether in a shallow target set fishery as this is, will line-shooters ever be added? Interestingly, so far, there appears to be no incentive for reducing crew numbers by any stages of mechanization. Owners and captains of the vessels using spools identified in this study indicated that they still used the same number of crew as before. It was apparent that there were more important social factors at play in this regard that offset any cost saving from reducing crew numbers.

The installation of the mainline spools represented a significant investment to these boat owners. The owners and operators we spoke with indicated the changeover cost approximately $20,000-30,000 (US). The main mechanical components used were imported (Lindgren-Pitman), not locally made. One owner indicated his intention to converting over another vessel in the near future and was open to receiving advice on optimal placement of the spool.

The crew of mechanized vessels we were able to locate indicated that they typically set at least 2500 hooks. This is more about 500 to 1000 more than the non-mechanized vessels. The mechanized vessels had 18-20 metric tons of capacity. Their setting speed was approximately 5-6 knots, and fishing trip lasted for about 16-18 days. Bait used is frozen mackerel or giant squid. Investment for a trip (fuel, food, bait and ice) is about $5,000 (US). In a good trip they can catch up to 15mt of fish. One crewperson with whom we spoke also commented that small cetaceans seem to entangle more often with this gear.

3.1.3 Optimum mechanization to avoid bycatch requires:

1. Vessels preferentially using lead swivels fixed into gear
2. When a spool is added, ensure it is positioned so that side-setting of line can occur
3. Preferably move away from fixed-float mainlines to clip-on buoys with adequate buoy line length that will allow the shallowest (nearest) hooks to be deeper. This may be unattractive for manual haul vessels but viable for mainline winch plus spool boat installations.

3.1.4 Recommendations:

1. A comprehensive review of Peruvian longline vessels to determine numbers that fall into the different levels of mechanization and placement of all fishing equipment.
2. Extra effort to document more accurately the prevalence of branchline weights particularly among un-mechanized artisanal vessels.

3.2 Weighted swivels distribution

From November 2009 to January 2010 we distributed 3750 swivels distributed to 13 vessels in the ports of Salaverry, Chimbote and Ilo (Fig. 1). An additional 900 swivels were distributed in July to two vessels, one in Salaverry and one in Chimbote. When providing the weighted swivels to the vessels we described the purpose of the project and suggested that placement of the swivels be as near the hook as possible to maximize sink rates.

We have also received requests from an additional 2 owners and operators for 3 vessels in Salaverry that had heard from another boat about the weighted swivels. One boat owner from Chimbote who had received swivels also contacted us to request more.

Follow-up interviews with those owners and crew whose vessels received the weighted swivels indicated that their experience was positive. And those respondents also indicated that they noted a difference in how their gear behaved when using the weighted swivels. Respondents noted that they were placing the weighted swivels within a meter of the hook – which was encouraging and was as we had recommended.

We also think it is worth noting that follow-up communications with these fishermen (and with those contacted regarding gear mechanization) was exceedingly difficult. These owners, captains and crew are constantly moving between ports and/or at sea. They also regularly change contact telephone numbers. As a result, it is often extremely hard to contact a fisherman or owner after an initial meeting, and if a person can be contacted they are frequently too busy to talk. Trying to coordinate follow-up site visits or face to face follow-up interviews is even more challenging. This was an important lesson learned through the project and something we (and any other similar project working with a highly mobile, unregulated fleet) will certainly take into account in designing and implementing future projects.

In addition to the 45g and 60g weighted swivels we also have 1500 safeleads from FishTek which we acquired and transported to Peru in May and August 2010. These have not yet been distributed because appropriate vessels that use monofilament branchlines have not been identified. However, the summer fishing season (December-March) should provide a good opportunity to introduce these to the fleet.

3.3 Continued onboard observer monitoring of waved albatross at-sea abundance, behavior and fishery interactions.

We were unable to facilitate observer trips aboard any of the identified mechanized longline vessels but have continued the onboard observer monitoring in the port of Salaverry. The methodology for this work was described in our 2008-2009 final report to ACAP, this section (and the accompanying updated tables and figures) serves as an update of the ongoing onboard observer work in Salaverry. From April 2009 to February 2010, 30 surface gillnet fishing trips (176 sets) were monitored (Fig 2a) from the port of Salaverry. Vessels used surface drift gillnets. No WAAL were observed bycaught during the study period. However, one incident of a banded waved albatross entangled in a surface driftnet from Salaverry and released alive was reported to PD staff and the information forwarded to the banding agency (female banded as adult from La Espanola, Galapagos Islands).

3.3.1 Set and Haul counts: WAAL in the vicinity of the vessel were counted at the completion of the set and haul for 120 fishing sets. WAAL were observed during 54% of sets and 79% of hauls. Over the entire data set WAAL were approximately three times as abundant during the haul as during the setting of gear (Table 1, Fig 3a,b). We also noted a pattern of changing abundance which was lowest in the summer (Jan-Mar) and 5-10x higher in the spring months (Oct-Dec) depending upon whether the set or haul counts are used. The number of WAAL present during both the set and haul increased. The largest number of WAAL reported around the vessel during the set and haul were 57 and 91, respectively.

Table 1. WAAL counts (mean±sd) at the completion of gillnet setting and hauling by season. Seasons were defined as: Jan-Mar=Summer, Apr-Jun=Fall, Jul-Sep=Winter, Oct-Dec=Spring.

	SUMMER	**FALL**	**WINTER**	**SPRING**
SET	0.9±1.2 (max: 3, n=17)	1.3±2.5 (max: 13, n=67)	2.7±4.4 (max: 18, n=34)	11.2±13.9 (max: 57, n=58)
HAUL	5.7±8.4 (max: 35, n=17)	5.0±8.1 (max: 41, n=67)	11.6±17.0 (max: 78, n=34)	28.7±28.6 (max: 91, n=55)

3.3.2 Net Interactions: WAAL were observed sitting on the water near the net on 90% of observed sets. During 40% of cases WAAL were seen approaching within 5m of the net. And in 35% of cases there was apparent contact of the WAAL with the net. However, WAAL obtaining food from the net was only observed during 0.7% of observed instances. Similar to the set and haul counts, numbers of WAAL around the vessel were highest during the spring and considerably lower the remainder of the year (Table 2).

We also monitored the number of WAAL in the vicinity of the boat during catch processing (cleaning fish and discarding offal). Over the entire study period there were an average of 15.8±22.7 (max: 91, n=142) WAAL counted near the vessel during fish processing (Table 2).

Table 2. WAAL behavior and proximity to surface gillnets and during offal discards (mean±sd).

	SUMMER	FALL	WINTER	SPRING
All WAAL counted	20.6±29.0 (max: 124, n=142)	8.0±10.9 (max: 54, n=49)	14.3±18.4 (max: 78, n=34)	46.2±38.3 (max: 124, n=42)
Total within 5m of net	0±0 (max: NA, n=17)	1.4±2.7 (max: 13, n=49)	3.1±6.0 (max: 28, n=34)	4.9±6.4 (max: 23, n=42)
Net contact	0±0 (max: NA, n=17)	0.9±2.4 (max: 13, n=49)	1.8±3.7 (max: 17, n=34)	3.5±5.3 (max: 19, n=42)
Count during catch processing	6.2±8.3 (max: 35, n=17)	6.4±9.2 (max: 41, n=49)	11.4±17.1 (max: 78, n=34)	34.3±30.0 (max: 91, n=42)

3.3.3 Transect counts: Over the entire study period WAAL were observed during 66% of 10 minute transect counts. The number observed was stable throughout the study (Fig 2b). The average number of WAAL counted per 10 minute count is presented for 100km^2 grid cells in Figure 4.

Table 3. Average numbers of WAAL counted during 10 minute transect counts while the vessel was traveling to or from port or between fishing sets.

	SUMMER	FALL	WINTER	SPRING
WAAL Count	3.3±6.5 (max: 35, n=47)	1.7±1.7 (max: 9, n=92)	1.7±1.8 (max: 9, n=89)	1.6±2.0 (max: 11, n=139)

This more complete seasonal dataset now makes it possible to relate this siting and behavioral information with what is known about the nesting cycle at the Galapagos breeding colony. Breeding season occurs annually from April-December with egg laying occurring primarily between mid-April and late June. Egg laying is followed by a two month incubation period. Thus the pattern we observed in WAAL counted at the set and haul (peaking in Oct-Dec) could be related to the foraging of the adults after their departure from the colony at the end of the breeding season. Similarly, the high transect counts observed in the summer months coincides with the time frame when the breeding colonies are empty and all WAAL are at sea.

Figure 1. Map showing the ports visited to check for fleet mechanization and to which weighted swivels were distributed.

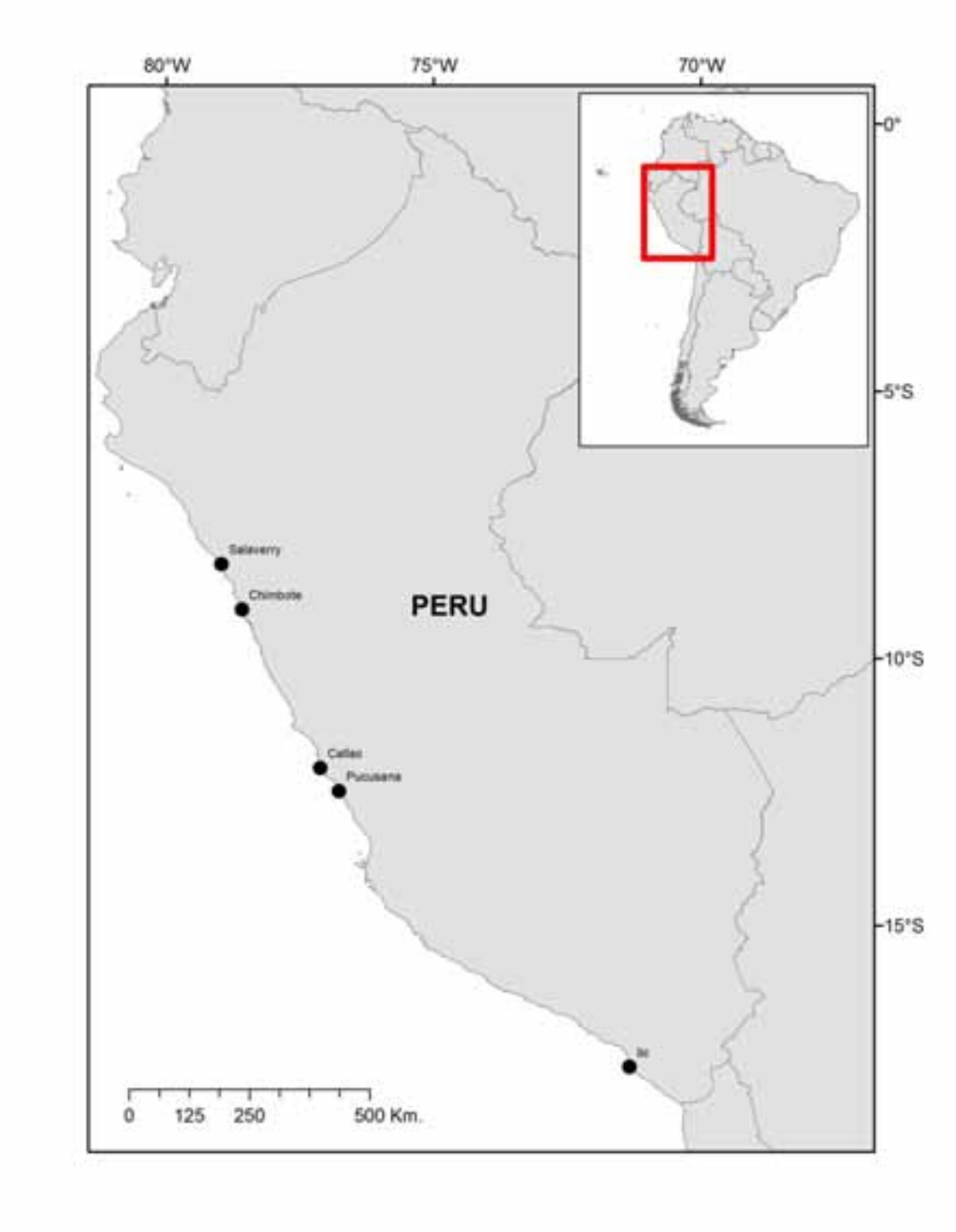


Figure 2. Locations of fishing sets monitored during the study (a) and start locations of 10 minute WAAL transect counts (b).

(3) (b)

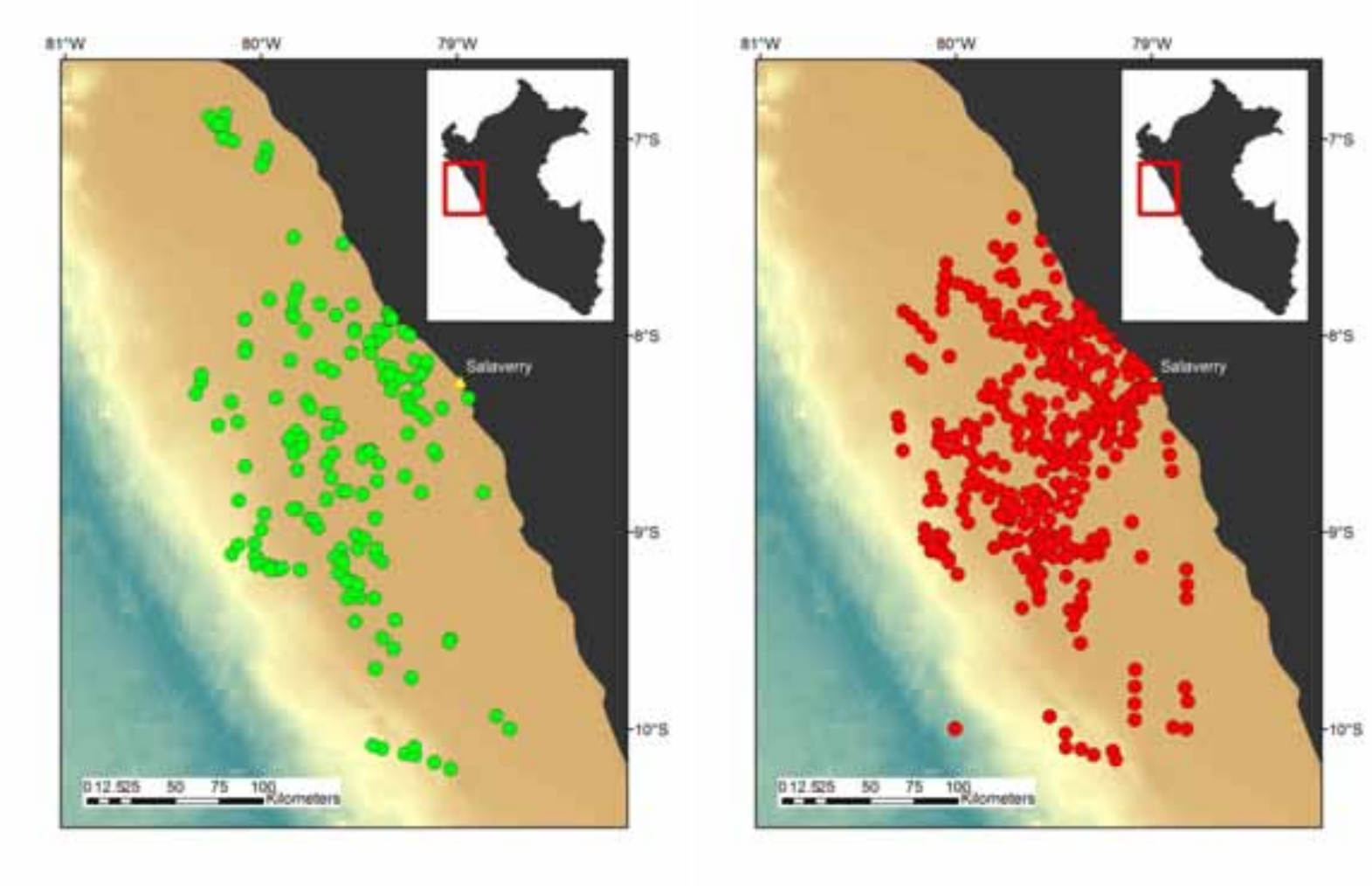


Figure 3. Kernel plots showing the distribution and relative abundance of WAAL counted at the completion of net setting (a) and hauling (b). WAAL were approximately 3 times more abundant during hauling.

(3) (b)

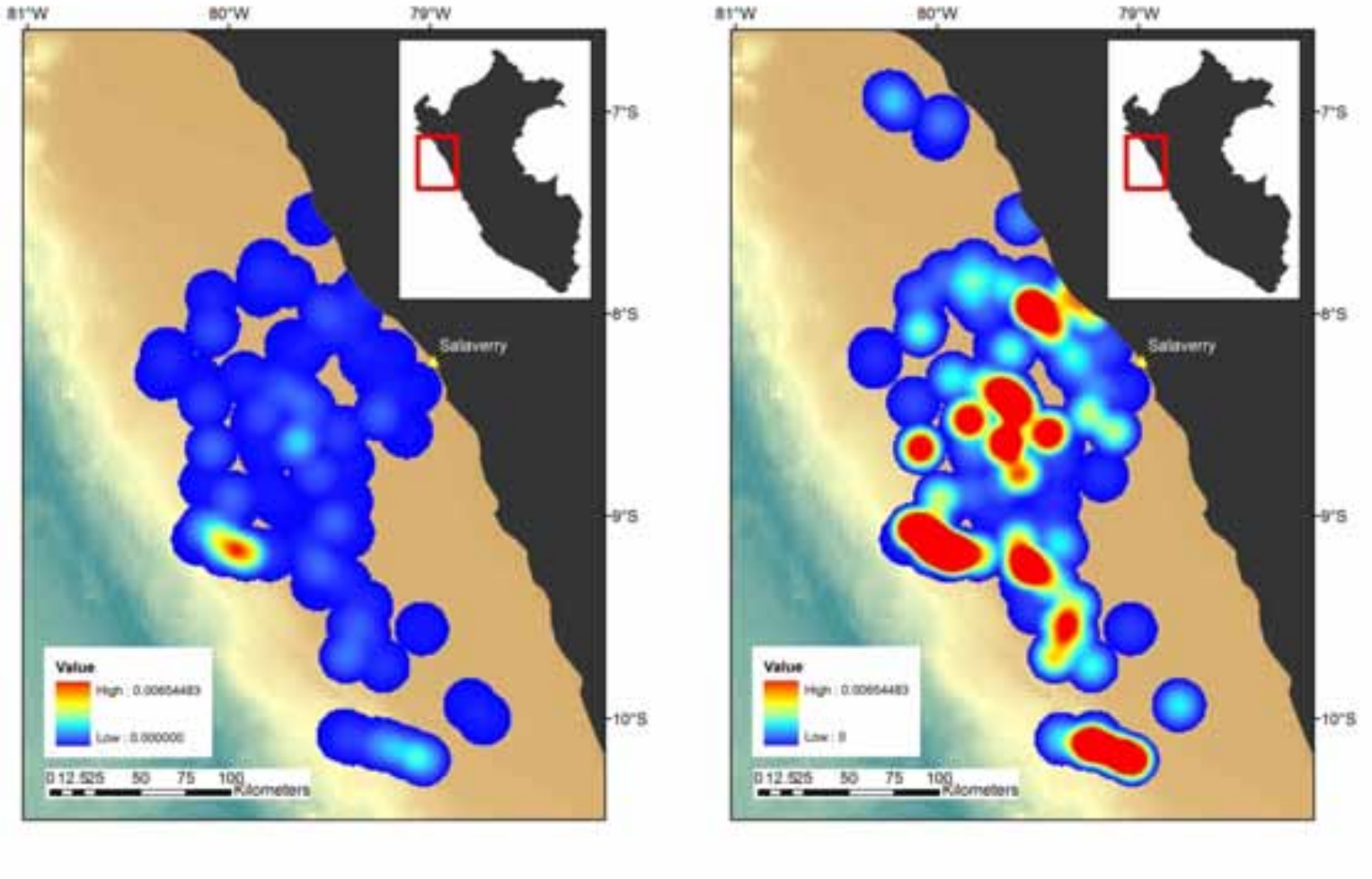
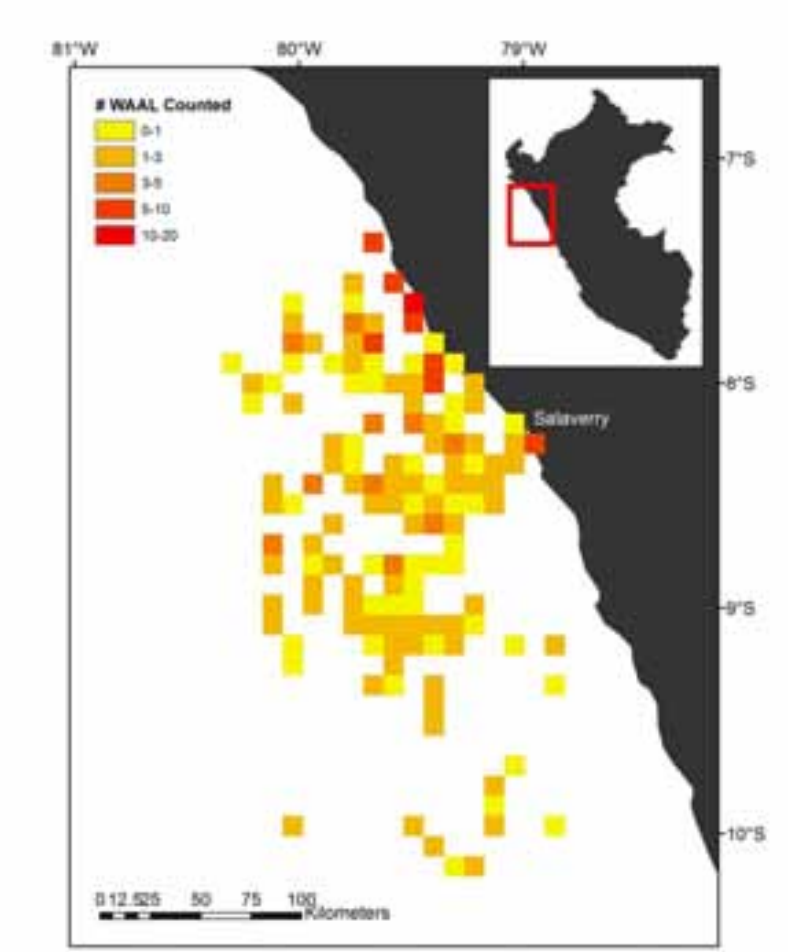


Figure 4. Average number of WAAL counted per 10 minute transect per 100km^2 grid cell.



APPENDIX 1: PROJECT PHOTOS

An example of a mainline puller and guide from a longline vessel in the port of Ancon.

A mainline spool installed on a longline Vessel in the port of Chimbote.

A branchline bundle from the Chimbote vessel.

Here you see the branchline material, monofilament leader and separate weights and swivels.

Longline vessel in Chimbote that had installed a mainline spool forward of the cabin in the dark area visible in the photo.

Looking down at the mainline spool on a Chimbote longline vessel. The spool is obscured by other materials to help prevent theft.

Discussing WAAL with fishermen in Chimbote.

A vessel from the port of Callao showing the placement of their spool.

Another vessel from Callao showing the spool placed in the stern.