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SEABIRDS AND FISHERIES IN IATTC AREA: AN UPDATE

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Introduction:

Since 2005, the IATTC has increasingly been addressing seabird-related issues via the following actions and recommendations:

- Resolution C-05-01 on Incidental Mortality of Seabirds (73rd Meeting IATTC, 2005);
- That the Commission coordinate with the Western and Central Pacific Fisheries Commission (WCPFC), and other tuna Regional Fisheries Management Organizations (RFMOs) as appropriate, in its implementation of seabird resolutions and the development of scientific information and reports that support this implementation. This could include practical areas of cooperation on the mitigation of seabird bycatch (7th Meeting of the IATTC's Stock Assessment Working Group (SAWG), 2006);
- The IATTC should develop, in coordination with the other RFMOs, a strategy to mitigate bycatches in the different fisheries involved. The program should include standardization of data collection (whenever possible), discussion of research programs and activities to be undertaken in each, and a mechanism for the timely sharing of results. This item could be included in the agenda of the upcoming Kobe meeting (7th Meeting SAWG, 2006);
- The Stock Assessment Working Group suggest areas where mitigation measures for reducing seabird mortality could be most effectively adopted (*i.e.*, where bird distributions and longline effort overlap), as well as suggest possible mitigation measures in these areas of vulnerability. The Commission should then consider mitigation measures at its June 2007 meeting (6th Meeting of the IATTC's Bycatch Working Group (BWG), 2007); and that
- Seabird bycatch data be collected from all tuna longliners, with consideration given to making the provision of such data mandatory (6th Meeting BWG, 2007).
- From the 8th Meeting of the Stock Assessment Working Group (SAR-8), 2007:
 - ✓ a. Develop a standard format for reporting seabird bycatch information that CPCs are required to provide, in accordance with Resolution C-05-01.
 - ✓ b. Request that publicity materials be developed for fishermen that describe the disposition of bird bands collected on seabirds killed as bycatch, within appropriate IATTC areas, and advise that care should be taken not to offer incentives for these bands, however, as this might cause the intentional killing of the birds.
 - ✓ c. Note that, in addition to direct impacts, there are indirect impacts on seabirds of the fisheries under the purview of IATTC, which are included in the IATTC ecosystem model (IATTC Bulletin 22: 133-218).
 - ✓ d. Continue to examine the effectiveness of measures to reduce seabird interactions with fishing gear. This should include technologies that are under development and technologies currently in use.
- Spain proposed a resolution (G1A) to mitigate the impact on seabirds of fishing for highly-migratory fish stocks. Although there was considerable support for the proposal, ultimately it was not approved. Spain, supported by other delegations, indicated that it intended to pursue a proposal on seabirds in future meetings (Minutes of the 75th Meeting of the IATTC Commission, June 2007).

This report addresses these actions and recommendations and provides updates in the following key areas:

- ✓ Annual estimates of albatross bycatch from the Hawaii pelagic longline fishery, and
- ✓ Laysan albatross studies on Guadalupe Island, Mexico

Summary of Seabird Updates:

- Bycatch of Laysan and black-footed albatross in the Hawaii pelagic longline fishery continues to be relatively low;
- The Hawaii pelagic longline fishery for swordfish (shallow-set) has 100% observer coverage and the fishery for tuna (deep-set) targets 20% observer coverage;
- Seabird bycatch data is collected and reported on annually for both of these U.S. longline fisheries and is made publicly available;
- Multi-faceted and collaborative study of Laysan albatross is underway on Guadalupe Island, Mexico;
- Study topics include:
 - Satellite-tracking to identify geographic distribution;
 - Fisheries bycatch documentation and estimation;
 - Characterization of importance of breeding colonies;
 - Diet studies and at-sea utilization;
 - Land-based protections by reducing predator threats.

Information from other fisheries that overlap with Laysan albatross and experience bycatch may offer options to consider for reducing the potential for bycatch in IATTC fisheries. Biological information about the distribution and foraging patterns of these species may also offer valuable insights into the development of a suite of effective and practicable measures to reduce the likelihood of longline vessels fishing in the IATTC Area from interacting with these seabird species.

Annual estimates of albatross bycatch from the Hawaii pelagic longline fishery and seabird bycatch reduction efforts:

See previous IATTC reports for background information on seabird distribution and seabird bycatch in the IATTC Area (Rivera, 2006; BirdLife International, 2006; IATTC 2006, 2007a-e).

The observed fishing effort in the 1994-2007 Hawaii shallow-set (swordfish) fishery ranged from approximately 43°N to 12°N and 178°W to 127°W (Figure 1) and the deep-set (tuna) fishery effort ranged from approximately 37°N to 3°N and 173°W to 132°W (Figure 2), thus some overlap with the IATTC Area. Fishing effort (millions of hooks per year) has increased since 2000 in the deep-set (tuna) fishery and decreased in the shallow-set (swordfish) fishery (Figure 3). Although the number of hooks in the shallow-set fishery doubled from 2006 to 2007, it still represents a reduction by more than half of the hook effort since 2000.

The predominant seabird species taken in the Hawaii-based pelagic longline fishery are the black-footed albatross (BFAL) (*Phoebastria nigripes*) and Laysan albatross (LAAL) (*P. immutabilis*). The short-tailed albatross (*P. albatrus*) has not been documented taken in this fishery and they are rarely even observed from the Hawaii-based pelagic longline vessels. Observer data indicate two unidentified shearwaters were taken in 2004 and one brown booby in 2005. The estimated level of albatross bycatch has steadily decreased since 1999 and 2000 when over 1000 of each BFAL and LAAL were taken (Figure 4). Historically (e.g. 1999 and 2000), higher levels of seabird bycatch occurred in the swordfish (shallow

sets) fishery than the tuna (deep sets) fishery. During 2004, the Hawaii-based pelagic tuna longline fleet was estimated to have taken 16 BFAL and 10 LAAL and the total take in the Hawaii-based longline swordfish fishery was zero BFAL and one LAAL (NMFS 2005b). During 2005, the total estimated take of albatrosses in the tuna fishery (deep set) was 82 BFAL and 43 LAAL (Table 1) (approximately 0.004 albatross per 1,000 hooks). The total observed take of albatrosses in 2005 in the swordfish fishery (shallow set) was 69 (62 LAAL and 7 BFAL) (approximately 0.04 albatross per 1,000 hooks). Because the swordfish fishery has 100% observer coverage (i.e. all hooks observed), the observed takes represent the total take as well. The total estimated 2006 take for the Hawaii fishery was 73 BFAL and 15 LAAL, decreases for both species from the previous year (Figure 4). A detailed description of the estimation procedures can be found in Appendix 1 of NMFS 2006a.

Fishery observers have been deployed aboard Hawaii longline vessels since 1994, primarily to document protected species interactions, collect fishery-related information, and perform other biological work as requested by the Pacific Island Region Office of NOAA Fisheries. Shallow-setting vessels are required to have 100% observer coverage (NMFS 2004), whereas the deep-set fishery targets to maintain an annual level of at least 20% observer coverage on deep-setting vessels (NMFS 2005a) (see Figure 5). For those tuna trips that occur north of 23°N, the percent of observer coverage for 2000 to 2006 is depicted in Figure 6. NMFS recently began collecting information about whether the bycaught albatross are hooked or entangled by the fishing line (Figure 7) as well as information about probable time of capture (during set/soak or haul) and release condition (alive, injured, dead) (L VanFossen pers comm.). Such information may assist in mitigation efforts to reduce interactions with fishing gear.

Since 2001, the estimated number of seabirds incidentally taken in Hawaii pelagic longline fisheries has dramatically decreased (Figure 4). In 1999 and 2000, more than 2000 albatross per year were incidentally taken in the longline fisheries. In 2001, only 510 albatross were estimated to be taken. This decrease from the previous years was largely due to the curtailment and eventual closure of the swordfish fishery beginning in April 2001. These management actions decreased fishing effort on the swordfish fishing grounds when albatrosses forage in these same areas during the breeding season (late winter through early spring) (Eric Gilman, pers. comm. 2005). The swordfish fishery remained closed throughout 2002 and 2003. During this time period, an estimated 373 albatrosses (116 in 2002 and 257 in 2003) were incidentally caught by the deep-set fishery. In April 2004, the swordfish fishery re-opened under a management program with an annual limit on shallow-sets allowed north of the equator (69 Federal Register 17330). During 2004, 26 albatrosses were estimated to be captured in the combined shallow-set and deep-set components of the Hawaii longline fishery. The low numbers can be attributed to a combination of a decrease in fishing effort with the closure of the swordfish fishery and the effectiveness of seabird deterrence measures. In 2005, with the same seabird deterrents in place and fishing effort very similar to that in past years, 194 albatross were estimated to be captured in the combined shallow-set and deep-set components of the fishery. However, the swordfish fishery (open the entire year) likely had an effect on seabird interaction estimates (i.e., 100 more swordfish trips were conducted in 2005 than in 2004). While the shallow-set fishery was curtailed in 2006 because it reached the loggerhead sea turtle interaction limit, both the total numbers of birds taken and the seabird interaction rate (0.015 seabirds per 1000 hooks) remained low compared to 2001 and earlier.

In June 2001, a suite of seabird avoidance measures became mandatory in the Hawaii longline fishery with the implementation of an emergency rule (66 Federal Register 31561). The final rule for this suite of seabird measures was published in May 2002 (67 Federal Register 34408). Since then, the numbers of seabirds incidentally taken in the Hawaii longline fishery have remained low. New seabird measures effective as of January 18, 2006 (70 Federal Register 75075), appear to be resulting in continued low numbers of seabird interactions. Seabird avoidance requirements for the Hawaii longline fishery are consistent with newly adopted measures for longline vessels in the WCPFC.

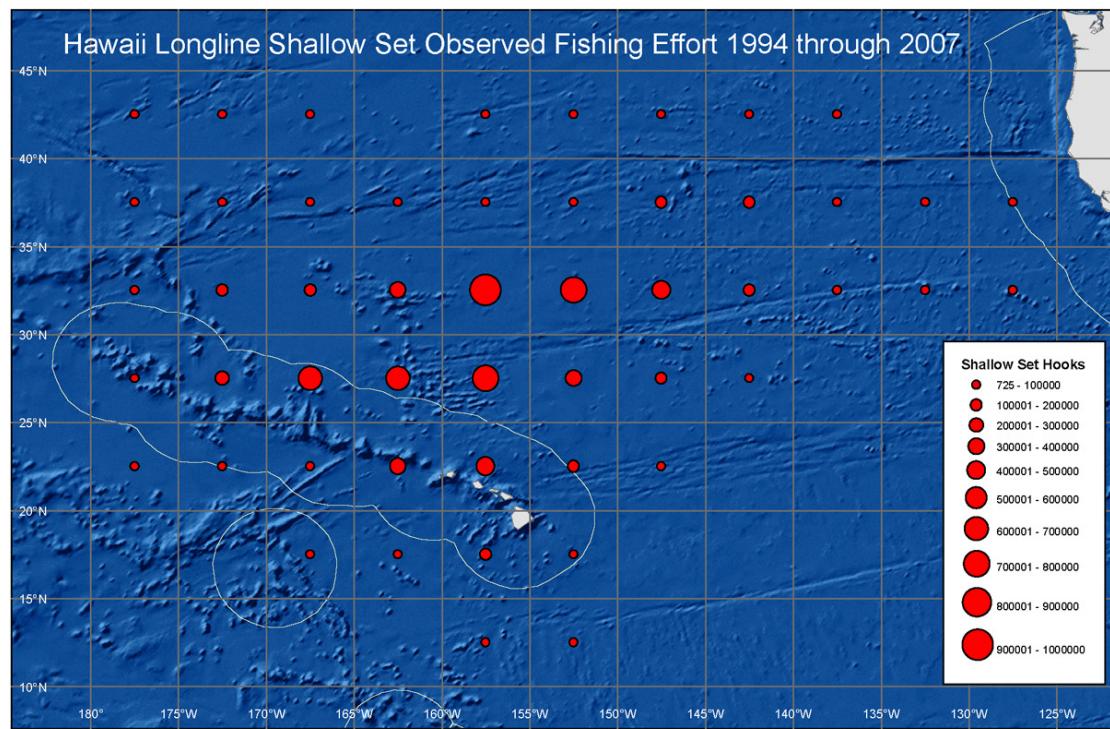


Figure 1. Observed fishing effort in the shallow-set fishery, 1994-2007.

(Source: NMFS PIRO)

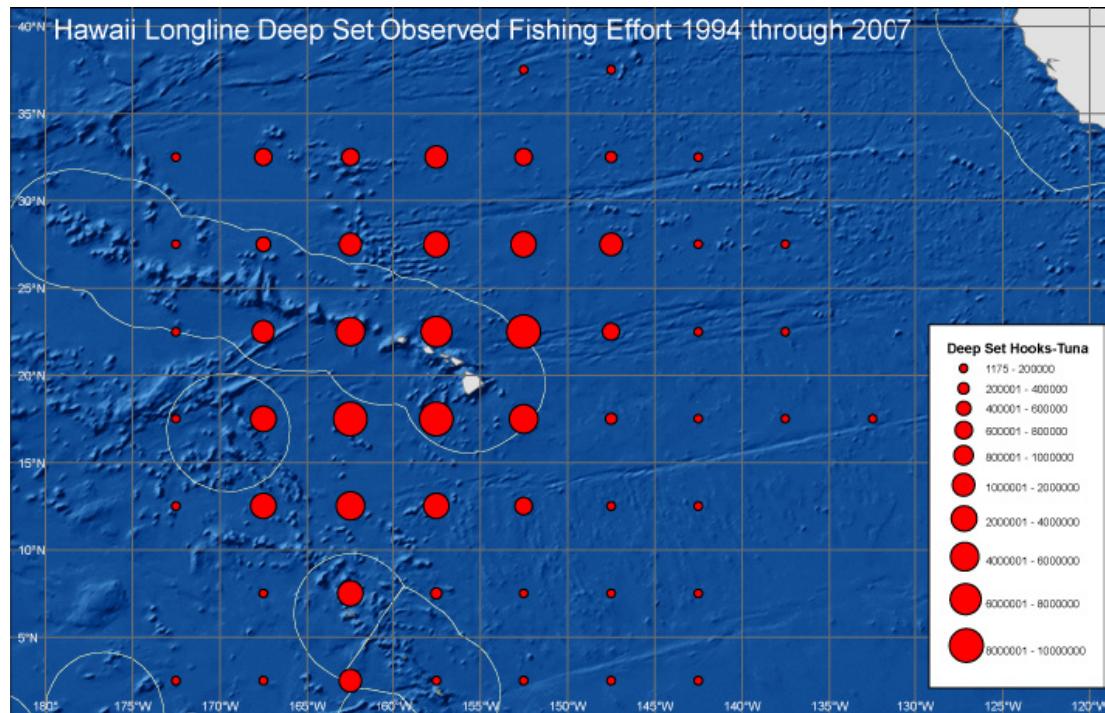


Figure 2. Observed fishing effort in the deep-set fishery, 1994-2007.

(Source: NMFS PIRO)

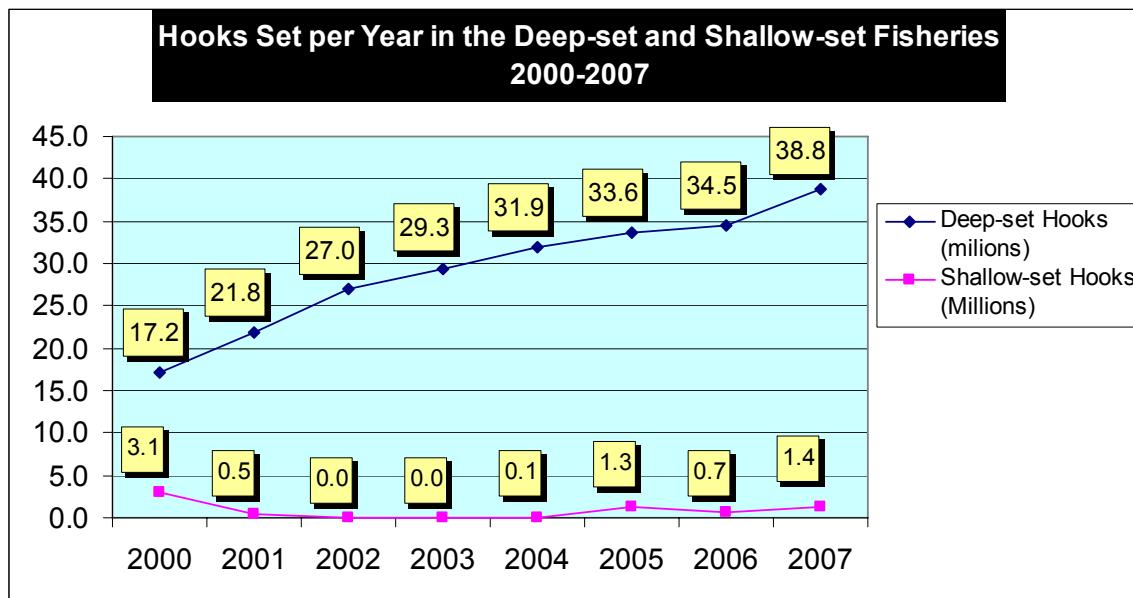


Figure 3. Hook Effort in the Hawaii-based Tuna and Swordfish Fisheries, 2000-2007. (Source: NMFS PIRO)

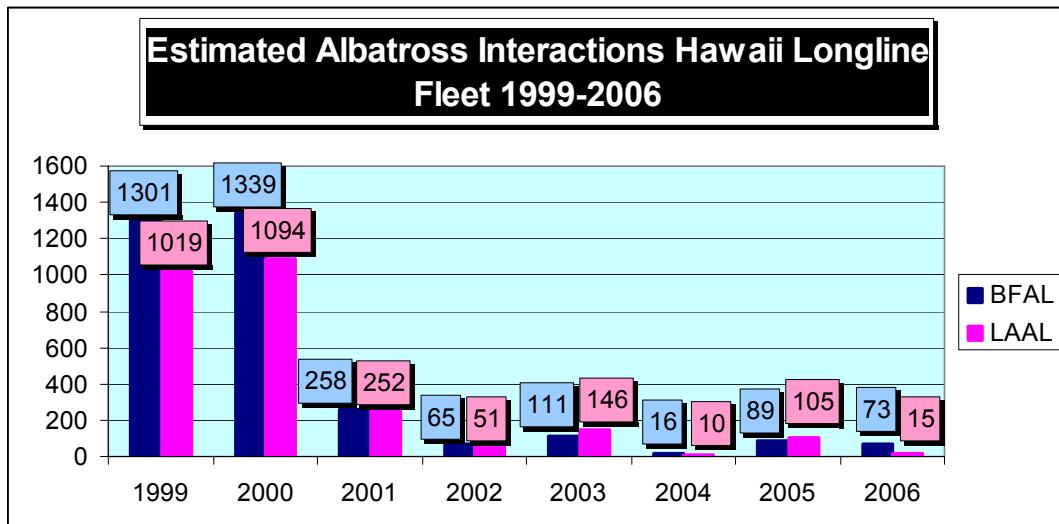


Figure 4. Estimated fleet-wide annual incidental take of black-footed and Laysan albatross in the Hawaii pelagic longline fishery, 1999-2006. (Source: NMFS PIRO)

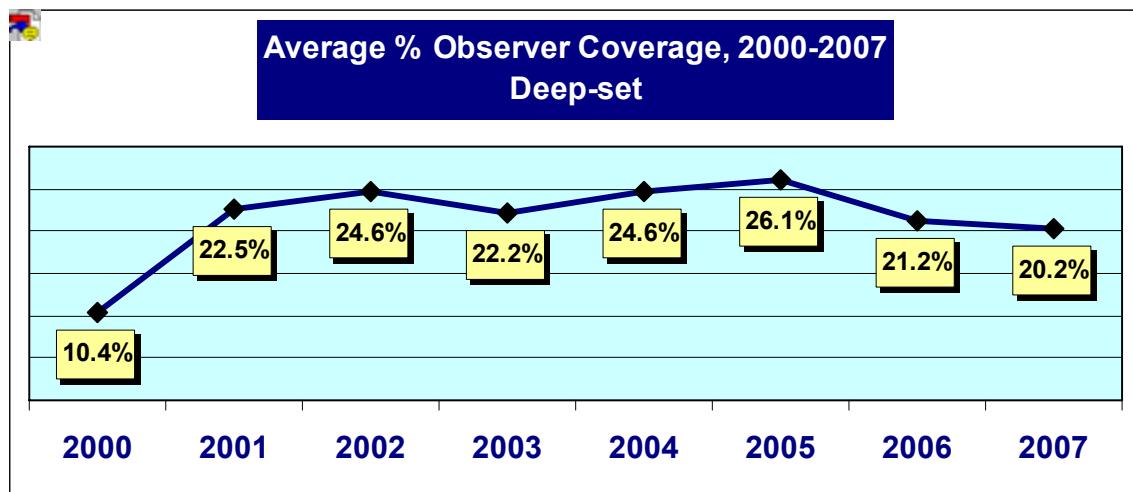


Figure 5. Average Percent of Observer Coverage in the Hawaii Pelagic Deep-set (Tuna) Fishery, 2000-2007. (Source: NMFS PIRO).

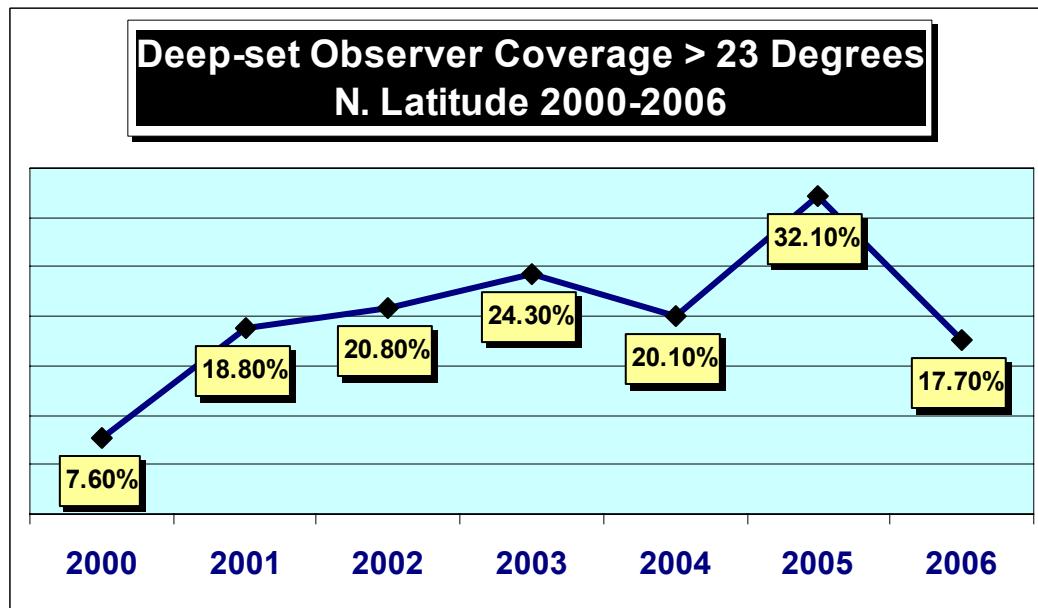


Figure 6. Average Percent of Observer Coverage in the Hawaii Pelagic Deep-set (Tuna) Fishery operating north of 23°N, 2000-2006. (Source: NMFS PIRO).

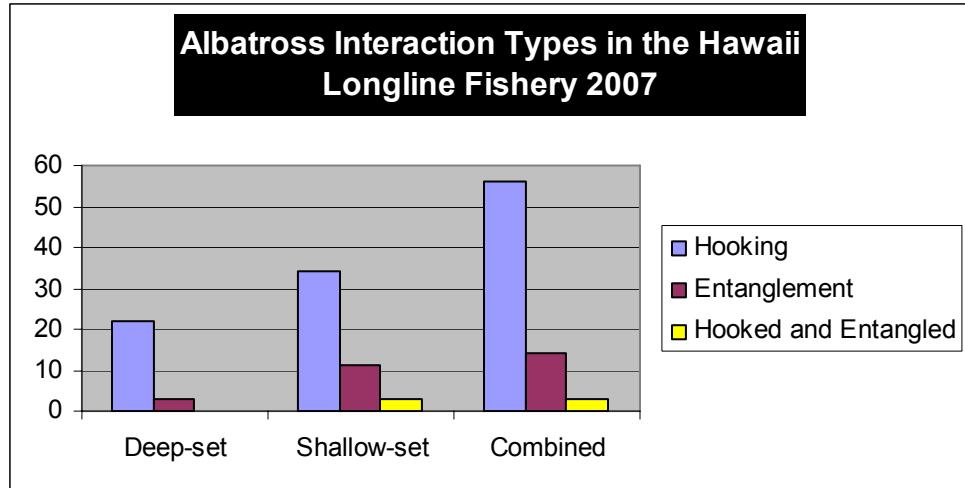


Figure 7. Observed albatross interaction types in the Hawaii pelagic longline fishery, 2007. (Source: NMFS PIRO).

Laysan albatross studies --- Guadalupe Island, Mexico

This section includes information on the Guadalupe Island –based studies on Laysan albatross on these topics :

- ✓ Satellite and archival tagging
- ✓ Documented fisheries bycatch
- ✓ Other breeding colonies
- ✓ Diet studies and at-sea utilization
- ✓ Cat control program

NOAA Fisheries is working with the U.S. Fish & Wildlife Service in its implementation of “A Conservation Action Plan for Black-footed Albatross and Laysan Albatross” (Naughton et al 2007). In recognition of their conservation status and the ongoing threats facing these two species, the Albatross Conservation Action Plan is intended to provide a framework for partnership-based conservation and management actions. The purpose of the Albatross Conservation Action Plan is to facilitate a collaborative, proactive approach to albatross conservation. The Plan identifies recommended conservation actions and prioritizes action items, including those relating to fishery bycatch mitigation and monitoring.

Consistent with this Action Plan, NOAA Fisheries is working with scientists at the University of California, Santa Cruz (UCSC) to learn more about the at-sea utilization and bycatch interactions of the Laysan albatross that breed on Guadalupe Island, Mexico in the eastern Pacific. The role of Guadalupe Island as suitable breeding habitat for Laysan and possibly other albatross species is of particular interest for research and conservation efforts. Laysan albatrosses recently underwent a major range expansion, colonizing Guadalupe and other islands in the Eastern Pacific in the 1980s (Gallo-Reynoso and Figuero-Carranza 1996, Pitman and Ballance 2002). The Guadalupe Island population is growing at a very high rate (Figure 8) underscoring a growing need to ensure that this breeding population is maintained. Recent successful invasive species control efforts on Guadalupe by Grupo de Ecología y Conservación de Islas (GECI), Mexico have also contributed to the suitability of this site for breeding albatrosses. Furthermore, future impacts of climate change with predicted increases sea levels and coastal marine hazards (peak wave events, storm surges, and high tides) threaten to inundate important breeding colonies for this and other albatross species of low-lying islands of the Hawaiian Archipelago. These changes are expected to increase the importance of Guadalupe and its surrounding waters for the long-term conservation of this and potentially other albatross species.

An overall objective of this cooperative effort will be to provide IATTC member nations with information on the risk of its longline fisheries to albatross species distributed within the IATTC Convention Area, with particular focus on those breeding on Guadalupe Island, Mexico. In the absence of observer data, this information will assist the IATTC in focusing its efforts to avoid seabird bycatch by providing it with more detailed information about which fisheries are most likely interacting with vulnerable seabird species. Through combined analyses of previous tracking studies and new satellite and archival tagging work on Laysan albatrosses, analyses of diet samples, informal interviews with fishermen in Mexico, the project will shed light on the risk of inshore as well as high seas longline fisheries to these albatrosses. More specifically, the projected work will: 1) create a spatially explicit model of albatross occupancy in the region's EEZs and international waters, using a five-year distribution dataset from tracked adult Guadalupe Laysan albatrosses; 2) complement this model with diet analyses using prey collected from breeding birds returning from at-sea foraging trips; 3) conduct semi-structured interviews with regional fisheries to determine fisheries distribution, bycatch, and discard 4) estimate exposure to fisheries via comparison of albatross prey items with bait and discards commonly produced by regional fisheries, and 5) model the bycatch risk of naïve juvenile Guadalupe Laysan albatrosses in comparison to adults, thereby filling in the current gaps in our current knowledge of juvenile distribution in relation to regional fisheries. This project will be conducted by UCSC, in collaboration with: the Tagging of Pacific Pelagics Program (TOPP) program and GECI. The project's results will be available for use by BirdLife International, NOAA Fisheries, and the IATTC, among others. (Note, Figures 8 to 14 depict preliminary results from UCSC researchers. The figures and the information contained therein is currently in preparation for publication and is not to be used or copied without the permission of R. William Henry and Scott A. Shaffer).

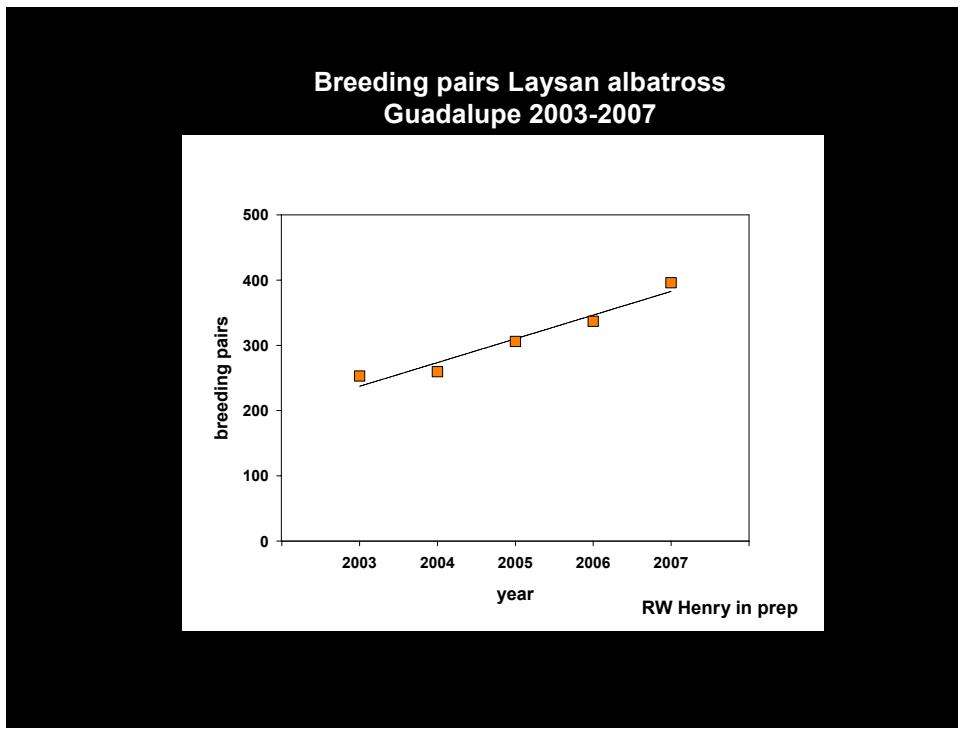


Figure 8. Annual number of breeding pairs of Laysan albatross at Guadalupe Island. (Source: RW Henry, in prep.)

Some albatrosses are more vulnerable to bycatch than others due to geographic differences in colony location, at-sea distribution, and foraging behavior. In the North Pacific, fishery interactions for Laysan and Black-footed albatrosses from central North Pacific (i.e. Hawaii) colonies have been studied (Melvin and Parrish 2001, Cousins et al 2001, Lewison and Crowder 2003, Hyrenbach and Dotson 2003, Veran et al. 2007). In contrast, until recently, little was known about fisheries interactions and distribution of albatross in Mexican and international waters of the eastern Pacific Ocean for newer (circa 1980) Laysan albatross colonies.

Tagging studies of Guadalupe Island Laysan albatrosses

In collaboration with TOPP and GECI, UCSC researchers tracked over 140 adult Guadalupe Laysan albatrosses from 2003-2008, revealing that Guadalupe Laysan albatrosses spend a significant portion of time in Mexican, U.S., and international waters during the breeding season, likely utilizing the same areas as longline fisheries (see Figure 9). Using standard satellite tracking methodologies (RW Henry pers com, in prep), UCSC researchers have noted high densities of Laysan albatross around the breeding colony of Guadalupe Island (Figure 10). This is consistent with records of the highest albatross interaction rates for a Hawaii pelagic longline fishery occurred near the breeding colonies of albatross (Cousins 2000).

Fisheries Bycatch of Guadalupe Laysan albatross

Bycatch of banded albatrosses by northern Baja longline fisheries has been confirmed (RW Henry, UCSC; E Everett, IATTC; pers comm.) (Figure 11). A band from a Laysan albatross was returned by a fisherman in May 2005 in the port of Ensenada. The bird was incidentally caught on a longline vessel that fished less than 10,000 hooks per day. A second band from a Laysan albatross was returned by a fisherman in October 2007 in the port of San Carlos. This bird was incidentally caught on a longline vessel targeting shark and fishing with 6,000 to 8,000 hooks per day. Both birds were banded as breeding adults by UCSC and GECI researchers on Guadalupe Island, one banded in 2005 and the other in 2003. Given that the minimum observed breeding age for LAAL is 5 years, the band recovered in Ensenada was from a bird with a minimum age of 5 years and the band recovered in San Carlos was from a bird with minimum age of 9 years. Although this represents a very small sample size of 2 bycaught birds, it is reasonable to assume that some portion of the Guadalupe population is taken incidentally in fisheries. Using data from long-term colony monitoring and demographic studies (the annual number of breeding adults and the annual number of banded birds is known), preliminary analysis suggests that the Guadalupe colony may experience higher levels of bycatch (as a percent of the banded population) than the global (i.e. Hawaii) population (Figure 12).

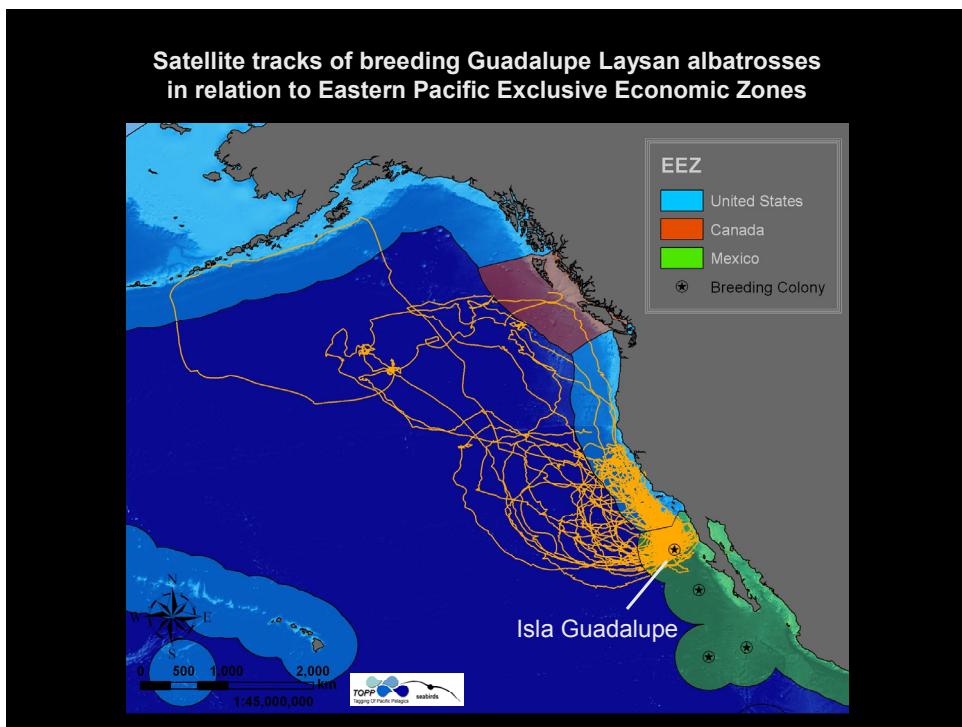


Figure 9. Satellite tracks from Laysan albatross during the first 2.5 months of breeding seasons (2003, 2005, 2006) and overlay with the EEZs of Mexico, USA, and Canada, and international waters. (Source: RW Henry, in prep).

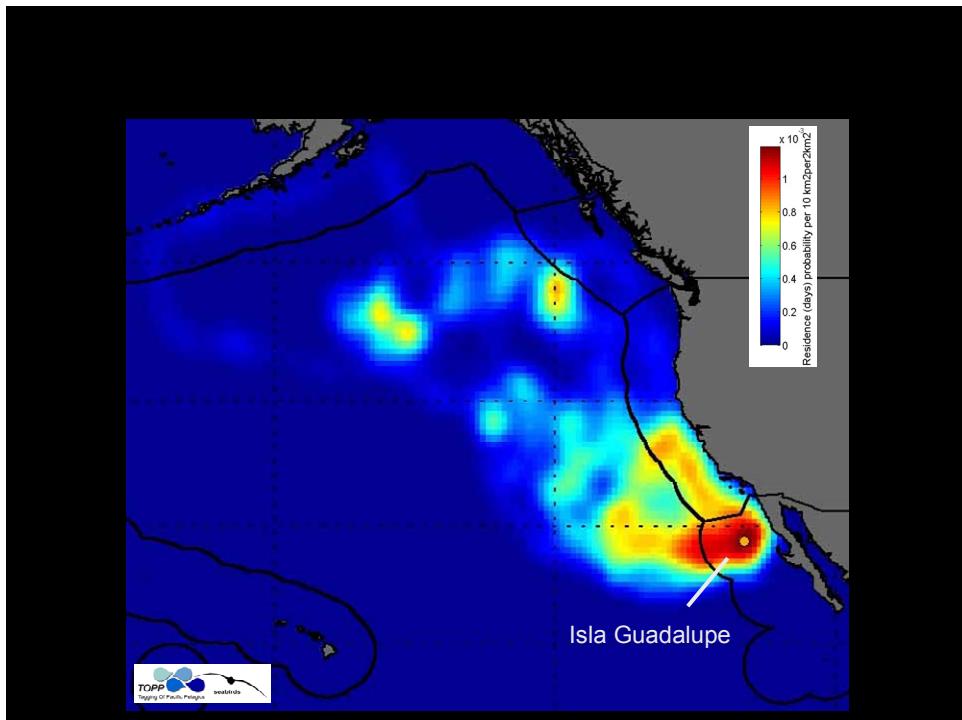


Figure 10. Kernel density plots of satellite-tagged Laysan albatross from Guadalupe Island. Plots are corrected for tagging effort and show relative density usage. (Source: RW Henry, in prep).

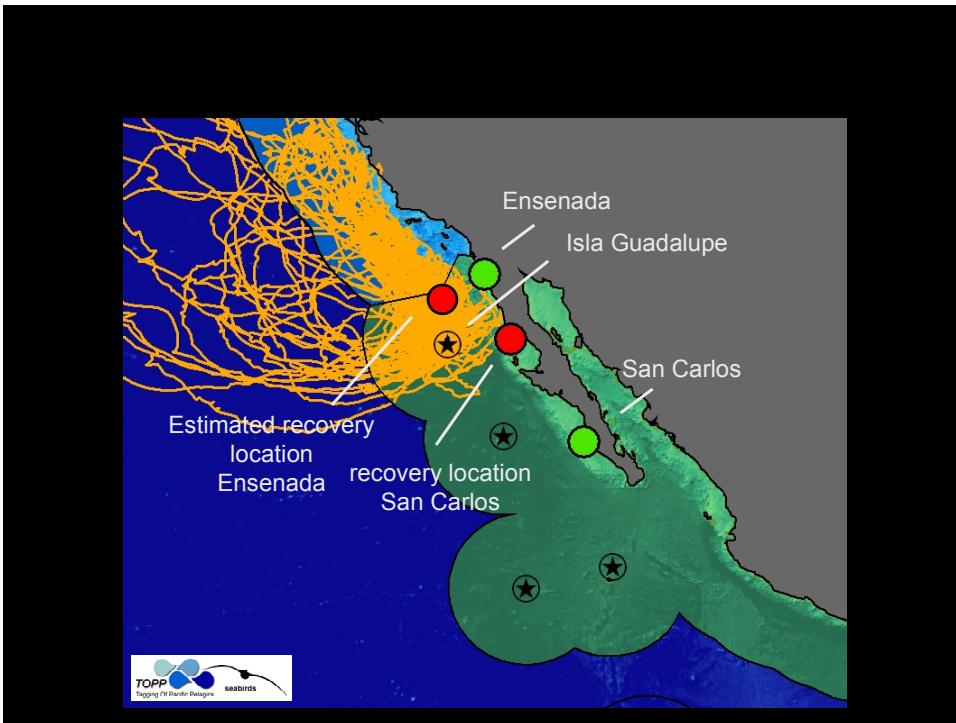


Figure 11. Satellite tracks of Laysan albatross (orange-yellow lines) tagged at Guadalupe Island. Stars denote albatross colony locations. Fishing ports are indicated by green points and approximate bycatch locations by red points. (Source: RW Henry, in prep.).

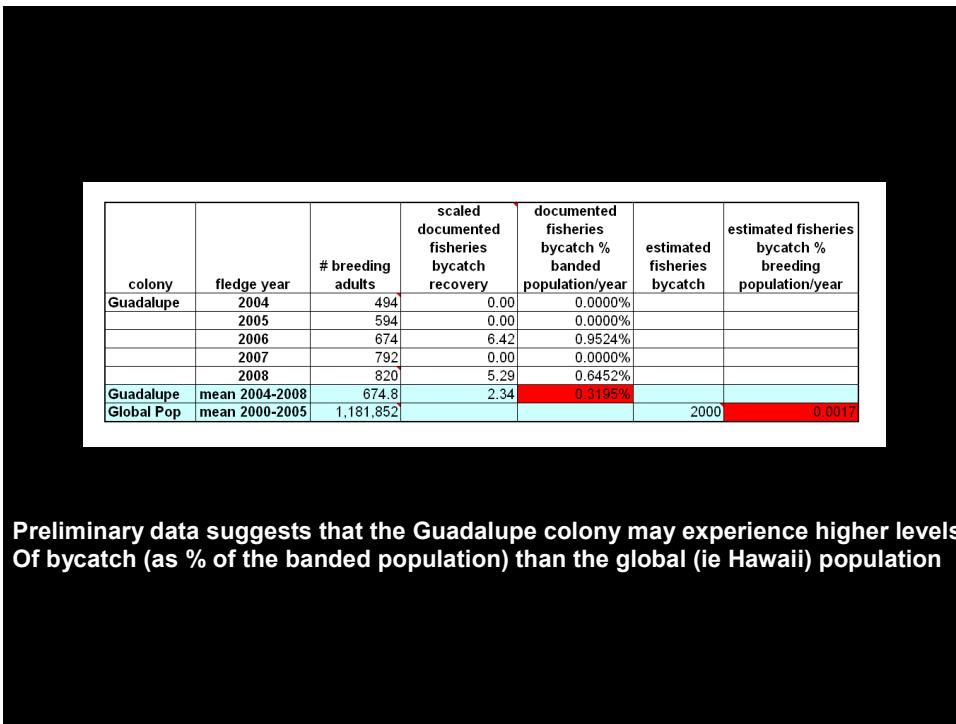


Figure 12. Preliminary information on relative levels of fisheries bycatch of Laysan albatross at Guadalupe Island population and Global population. (Source: RW Henry, in prep.)

Laysan Albatross Breeding Colonies and the Mitigation Area Suggested by IATTC to Protect Seabird Species of Concern

In 2007, the IATTC Bycatch Working Group requested that the Stock Assessment Working Group (SAWG) suggest areas where mitigation measures for reducing seabird mortality could be most effectively adopted (i.e. where bird distributions and longline effort overlap). IATTC staff presented a paper to the SAWG with a potential area identified with a boundary of 23°N (IATTC 2007c), north of which two mitigation measures could be required. This information was conveyed to the IATTC Commission at its 75th meeting in June 2007 (IATTC 2007d). The 23°N boundary was likely suggested because: a) it has been identified in the Hawaii longline fishery as a potential area of overlap between albatrosses and the Hawaii-based pelagic longline fishery, and b) it would also allow for protective measures around the Guadalupe Island breeding colony.

In addition to the larger colony at Guadalupe Island (337 breeding pairs in 2003) (Naughton et al 2007, RW Henry pers comm.), smaller colonies exist further south on the islands of Rocas Alijos (3 pairs in 2003), Isla Clarion (17 breeding pairs in 2003) and Isla San Benedicto (49 breeding pairs in 2003) (Figure 13). With the exception of space-limited Rocas Alijos, the other small colonies have potential to grow (RW Henry, pers comm.). These smaller colonies located south of Guadalupe Island were not considered when the 23°N boundary was suggested in the IATTC documents in 2007. It is reasonable to consider that necessary protections of these Laysan albatross breeding colonies south of Guadalupe Island would require some boundary south of the suggested 23°N boundary.

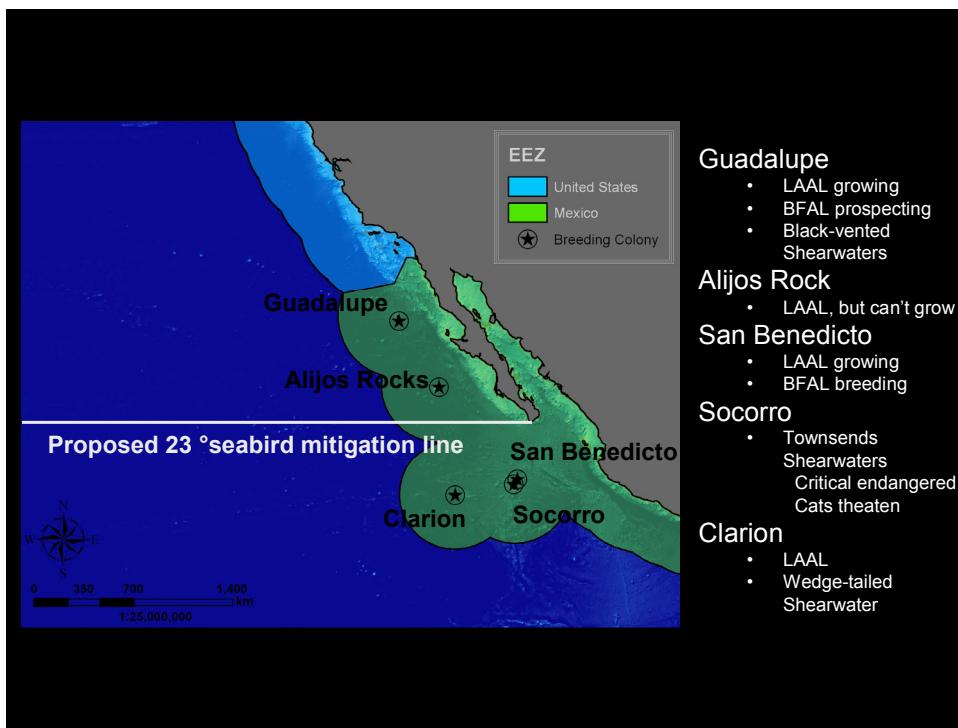


Figure 13. Laysan albatross breeding colonies off Mexico (stars on map) and northern boundary of a suggested mitigation area (see IATTC Document 75-07c, Figure 2, June 2007). (Source: RW Henry , in prep.)

Diet studies and at-sea utilization by Laysan albatross

Previous diet analyses of a) boluses (non-digested prey remains) collected from chicks and b) stable isotope values in whole albatross blood suggest that Guadalupe Laysan albatrosses consume different prey than Hawaiian albatrosses (RW Henry pers comm.; Pitman et al. 2004). Preliminary bolus analyses show that Hawaiian birds consume four times the number of squids than Guadalupe birds, suggesting that Guadalupe birds may compensate by consuming a larger fraction of prey items that break down rapidly in albatross stomachs. Fish is an example of such a prey item, having short durability in albatross stomachs. Stable isotope studies of blood samples collected from satellite-tagged Laysan albatross reveal Guadalupe Laysan albatross populations have significantly higher $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values (t-test, $\delta^{13}\text{C}$ $p<.001$ $x^2=20.48\pm.36$ and $-19.12\pm.364$ & $\delta^{15}\text{N}$ $x^2=13.57\pm.732$ and $16..96\pm.55$ Tern Island (Hawaii) and Guadalupe, respectively; RW Henry in prep). These differences in $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values support tracking work that shows that the populations feed in distinct regions and may corroborate with bolus data with Guadalupe birds feeding on higher trophic prey items. While further work is needed to clarify these patterns, preliminary data is suggestive of differences in diet whereby Guadalupe birds consume more fish. Fish are incidentally common bait items in regional eastern Pacific longline fisheries. In addition to inter-population differences, a stable isotope analysis of feather samples from the Guadalupe population also indicates differences between juvenile and adult birds (RW Henry in prep). This suggests spatial and/or dietary segregation of juveniles which, if true, could expose young birds to different threats than adults.

With support from NOAA Fisheries a new collaborative project between UCSC researchers and Mexican agencies was initiated to collect prey samples from breeding Laysan albatrosses returning to Guadalupe Island following at-sea foraging trips. Diet analyses in conjunction with tracking datasets will inform us as to the foraging ecology in eastern Pacific Laysan albatrosses, where they are feeding and what they are feeding on. Resulting data will help to confirm or refute the importance of regional fisheries as a significant food source for Guadalupe birds.

Program for control of non-native predator species on Guadalupe Island

A collaborative program between GECI, Island Conservation, and UCSC began in 2003 to control the non-native feral cats that were decimating the Laysan albatross breeding colony on Guadalupe Island. The program was successful in that the albatross fledgling rate increased dramatically once the control program began (Figure 14). This illustrates that in addition to at-sea threats, albatross populations also face land-based threats and that, if such threats are abated, populations can recover. However, such control is not a long-term solution to protecting the Guadalupe albatrosses. As the Guadalupe population continues grow, birds have colonized several new widely separated locations on this large island, and cat control is no longer a viable option to protect these growing satellite colonies and ensure continued expansion of this population. The necessary long-term solution is a large-scale feral cat eradication project. GECI has taken the first steps to complete this action by holding a Cat Eradication Workshop on Guadalupe Island in Spring 2007, resulting in the preparation of a preliminary feral cat eradication plan. Appropriate mitigation methods have been identified for both land-based and at-sea threats. Care should be taken to assess the relative conservation value of these mitigation methods prior to directing seabird conservation efforts (see Finkelstein et al. in press).

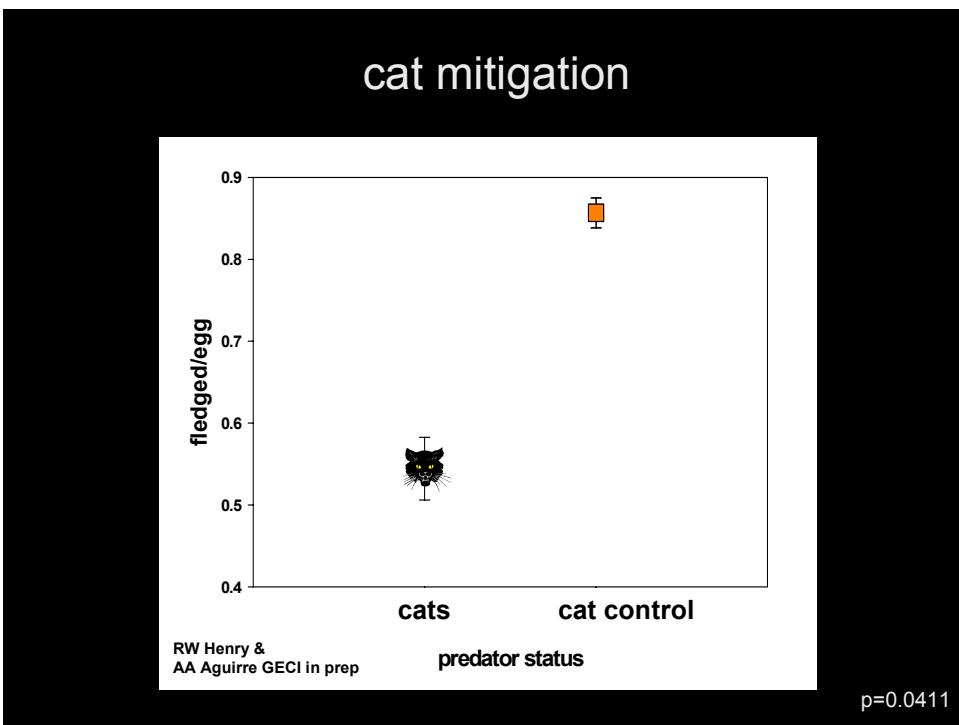


Figure 14. Laysan albatross fledgling rate in response to presence and non-presence of cat predators. (Source: RW Henry, in prep).

ACAP Report of a Waved Albatross Workshop

The IATTC's Stock Assessment Working Group identified the waved albatross (*Phoebastria irrorata*) as a seabird species of concern (IATTC 2006, 2007c, 2007d). The species is also on the Annex 1 list of species addressed by the Agreement on the Conservation of Albatrosses and Petrels (ACAP). A workshop was held in June 2007 in Peru to discuss draft action plans which had been developed by the Ecuadorian government and ACAP Parties. Representatives at the workshop included: ACAP, the governments of Ecuador and Peru (both ACAP Parties and also parties to IATTC), the Peruvian fishing industry, scientific community and inter-and non-governmental organizations. The biology of the species and threats it faces were reviewed. Considerable discussion occurred on how to manage and reduce both the incidental and intentional take of waved albatrosses. The governments of Ecuador and Peru, together with ACAP, will continue to consult over priorities and action plan implementation. The workshop report can be downloaded at

http://www.acap.aq/en/index.php?option=com_docman&task=cat_view&gid=50&Itemid=33
(see Doc 28).

Acknowledgement Thank you to Tom Graham, NOAA Fisheries, PIRO, for review of this paper.

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