Papahānaumokuākea Marine National Monument
Permit Application Cover Sheet

This Permit Application Cover Sheet is intended to provide summary information and status to the public on permit applications for activities proposed to be conducted in the Papahānaumokuākea Marine National Monument. While a permit application has been received, it has not been fully reviewed nor approved by the Monument Management Board to date. The Monument permit process also ensures that all environmental reviews are conducted prior to the issuance of a Monument permit.

Summary Information

Applicant Name: Dr. Scott A. Shaffer
Affiliation: University of California, Santa Cruz and San Jose State University.

Permit Category: Research
Proposed Activity Dates: December 31 2010 - December 31 2015
Proposed Method of Entry (Vessel/Plane): USFWS chartered plane or vessel
Proposed Locations: Tern Island, French Frigate Shoals; Midway Atoll NWR; and Laysan Island

Estimated number of individuals (including Applicant) to be covered under this permit: 7
Estimated number of days in the Monument: Approximately 150 days per year per site. The bulk of the research will be conducted during the albatross incubation and chick-brooding periods (Dec - Mar) and another effort would be conducted in June/July to deploy tags on fledglings. The summer time period would only likely require 2-3 weeks on island. We also understand that the timing of our visits will depend on availability of flights or ship transport to the islands, USFWS schedules, and weather.

Description of proposed activities: (complete these sentences):

a.) The proposed activity would…

1) Continue our long-term monitoring of Laysan and black-footed albatrosses at sea using satellite transmitting tags, GPS archival loggers, and/or geolocation data loggers, 2) conduct dual deployments with GPS and geolocating archival data loggers to obtain high resolution tracking data with environmental data (i.e. sea surface temperature; SST) collected by the geolocation logger, 3) obtain feather or blood samples for analysis of stable isostopic (Carbon & Nitrogen) signatures to infer proximate diet, 4) collect stomach oil from adults to analyze fatty acid signatures, and 5) to study fledgling albatross dispersal from the aforementioned locations in the Northwest Hawaiian Islands.

b.) To accomplish this activity we would ….

At EACH location (i.e. Tern Island and Midway Atoll), we would deploy GPS loggers or satellite transmitting tags (here after called PTT) in combination with geolocating archival loggers on up to 20 breeding Laysan albatrosses AND on up to 20 breeding black-footed albatrosses during the incubation phase AND up to 20 of EACH albatross species during the brooding phase in EACH breeding season (see Collection Table). In summary, we would study up to 40 individuals of each species at each site in each breeding season. In all likelihood, our numbers of tag deployments would be much lower because of limitations on tracking tags, funding, number of personnel in the field, etc. Trip durations will be measured on both equipped and non-equipped birds to test for gear-effects (we have done this in previous seasons as well and have not found any affects). To compare the post-breeding distribution of EACH albatross species at EACH location (i.e. Tern, Midway, and Laysan Islands), we would deploy geolocating archival loggers on 15 breeding adults of EACH species at EACH location in EACH season, and we would recover those tags when the birds return at the beginning of the following breeding season. We currently have similar tags out on albatrosses that we have started to recover this season. When possible, EACH bird would be weighed and up to 0.5 mL of blood sampled for the isotopic analysis and genetic profiling. This sample would be collected after the bird returns and the tracking tags are removed. Conduct post-hoc analyses to compare isotopic signatures from feathers to estimate trophic structure of diet between species. In EACH breeding season and EACH location, we request to collect up to 30 stomach oil samples from tracked adults. In June/July, a technician would return for a few weeks to deploy satellite transmitting tags on up to 10 albatross fledglings (5 on each species).

c.) This activity would help the Monument by …

Providing insight into the foraging behavior, movements, distribution, and habitat use of adult and fledgling Laysan and black-footed albatrosses from Tern Island and Midway Atoll NWR during the breeding and post-breeding periods, as well as dispersal of fledgling albatrosses. We are starting our nineth consecutive year of tracking at Tern Island (and fifth at Midway Atoll NWR) during the incubation and brooding periods, which is unprecedented because there are only a few research labs in the world who have such longterm data sets. These datasets are essential for examining the interannual variability in behavior in relation to oceanographic conditions. This information may be critical for designing conservation measures that protect sensitive at-sea habitats for each albatross species (i.e. Marine Protected Areas) and can also be used to examine the overlap with fisheries known to catch albatrosses as bycatch. Our at-sea data can be (and is currently) used to evaluate exposure risk from fishing activity. Moreover, our data on foraging behavior and distribution across consecutive breeding seasons can be examined in the context of overall breeding success. For example, in the 1998-99 and 2009-10 breeding seasons when there was an El Nino followed by a La Nina, albatross breeding performance was lower than normal. This poor breeding performance was likely attributed to unfavorable oceanographic conditions, which could be studied by examining bird distribution and remotely sensed data together. Thus, one of the real values of our effort is the study of how albatrosses adjust foraging effort under variable environmental conditions. Ultimately, this information collectively could be used to create predictive models to forcast long range population trends under different climate change senarios.

Finally, the USFWS recently (Naughton et al. 2007) released an action plan for the management of both Laysan and black-footed albatrosses. In this action plan, a key provision was the specific need for more information on the at-sea distribution of Laysan and black-footed albatrosses. This information provides greater understanding of how albatrosses respond to environmental variability. Therefore, our continued study will directly contribute to this need. Furthermore, our data are also being used in several new initiatives examining habitat use and interactions with fisheries.

Other information or background:

Background:

The foraging ecology of Hawaiian albatrosses has been previously studied, however, our understanding of the relationships between where birds forage and the physical environment is still limited. For example, we know little about where Hawaiian albatrosses disperse to during periods between breeding events, during sabbatical years, or where fledglings disperse. The effects of inter-annual variability on the foraging distribution and behavior of albatrosses is also not described for Hawaiian species. Yet, it is clear that many regions in the oceans are heterogeneous with respect to both temporal and spatial scales. Consequently, physical processes that drive biological productivity can alter the behavior of pelagic species on a variety of temporal scales. Surprisingly, only a few studies have examined these effects in seabirds. There are significant gaps in our knowledge of the relationship between where birds forage, the prey they consume, the energy they expend while foraging, and the physical environment that affects these parameters. Thus, a comprehensive study that combines the use of tracking devices with secondary analyses of diet to measure prey quality and quantity (from previous seasons), stable isotope analysis for determination of trophic levels of foraging. This is a major theme of our proposed research in the Tagging of Pacific Pelagics (TOPP) program (see http://www.topp.org).

Seabirds are major marine predators known to use both meso- and broad-scale oceanographic features to find food. Their integration into the TOPP program is essential because 1) many seabird species overlap spatially and trophically with other marine organisms studied under the TOPP program; 2) seabirds return to land to breed and typically nest in large, dense colonies so accessibility is excellent; 3) adult survival rates are high and most species are philopatric to their natal colonies, ensuring a high rate of recapture and successful use of archival tags; 4) large samples of known-age, known-sex, and known-breeding history individuals are available for tagging, adding an important extra dimension to the TOPP program; and 5) most importantly, they operate over very large spatial scales in a minimum of time, because they can fly quickly over the sea surface (400-500 km/day in albatrosses, Kappes et al. 2010).

Hence, the role of seabirds in TOPP is important because they can sample the marine environment quickly, so their response to changes in oceanographic features occurs over relatively short temporal scales. Furthermore, there is the possibility of tracking the movements of individual birds over multiple trips to sea, which could elucidate individual specialization to find oceanic “hotspots”.

The following are highlights of research to date:

MAJOR HIGHLIGHTS

1) Habitat use and segregation at sea of Hawaiian albatrosses throughout the yearly cycle
2) Habitat use and at sea ranges of Laysan albatrosses from Mexico throughout the yearly cycle

3) Comparison of habitat use within the California Current System (a TOPP focus)
4) Involvement with several conservation measures to protect albatrosses from their greatest threat – bycatch in fishing operations

SUMMARY

Habitat Use of California Current and North Pacific

Seabirds are one of the most abundant predators in the California Current System (CCS). However, only one species that TOPP currently studies breeds within the CCS – Laysan albatrosses from Guadalupe Island, Mexico. Hence most of the seabirds studied by TOPP researchers travel from colonies located several 1000 km away. Yet, our tracking studies clearly show that black-footed albatrosses and sooty shearwaters come to the CCS and remain for several months during their post-breeding hiatus (Shaffer et al. 2006, Kappes et al. 2010, Shaffer et al. in prep). Black-footed albatrosses breed sympatrically with Laysan albatrosses in the northwest Hawaiian Islands, yet both species segregate when breeding (Kappes et al. 2010, Kappes unpublished) and when not breeding (Shaffer et al. in prep.). During the post-breeding period, black-footed albatrosses visit the CCS whereas Laysan albatrosses from Hawaii remain the central north Pacific. Within the core habitats, neither species overlaps in their ranges and the environmental conditions that each species experiences differ substantially. For example, black-footed albatrosses more frequently occur in warmer waters with higher productivity along the shelf whereas Laysan albatrosses are more commonly found in cooler North Pacific waters. Residency patterns show that black-footed albatrosses remain in the CCS from mid-June to end of October.

APPLICATIONS FOR CONSERVATION

One of the central objectives of the seabird research in TOPP is to apply what is learned about the distribution of the birds into conservation action. It is clear that the single greatest threat to albatrosses and petrels is the negative interactions with fishing vessels that take birds as bycatch. One of the first steps to address the pervasiveness of the problem is to identify the occurrence of overlap between birds and fishing effort within each Regional Fisheries Management Organization (RFMO). To this end, researchers from TOPP have been working with a team from Duke University to create a dynamic habitat suitability model that predicts where interactions are likely to occur based upon oceanographic conditions (Žydelis et al. in revision). The paper was reviewed in Proceedings of the Royal Society of London and is under consideration for publication pending revision.

In 2007, TOPP researchers worked collaboratively with the US Fish and Wildlife Service to create a comprehensive Albatross Conservation Action Plan (Naughton et al. 2007). This plan outlines several conservation/management actions to be taken to maintain and grow black-footed and Laysan albatrosses in the Hawaiian Islands.

Since the start of TOPP, the seabird tracking data (primarily the albatross data sets) have been used in over 10 reports to the Inter American Tropical Tuna Commission (IATTC), West Coast Pacific Fisheries Council (WCPFC), and the committee for Agreement on the Conservation of Albatrosses and Petrels (ACAP). These served the purpose of showing the overlap between birds and fishing effort and have been key in placing pressure on IATTC to mandate observer coverage on 100% of all vessels fishing within IATTC waters. We have also been collaboratively sharing our tracking data with others outside the TOPP community to examine problems of albatross bycatch in trawl fishing along the coastal shelf waters of Oregon,

Washington, Canada, and Alaska. A preliminary technical report has been created but there are plans to develop this into a peer-reviewed publication this year.
All tracking and associated metadata for each seabird species studied have been deposited in the Global Procellariiform Tracking Database, hosted by BirdLife International in the UK. The data (TOPP has contributed data for more 500 individual birds) in the database have been used for numerous reports, outreach activities, and governmental assessment.
PUBLICATIONS
To date, the TOPP seabird team has published 14 peer-reviewed papers in journals like Proceedings of the National Academy of Sciences, PLoS One, Journal of Experimental Biology, Marine Ecology Progress Series, Progress in Oceanography, Deep-Sea Research, Marine Biology, and Auk. In addition, there are four more papers in review or revision, and at least four unpublished manuscripts. This grant has also supported the work of three doctoral students who are conducting their thesis research on the albatrosses (Kappes finished in 2009, Henry in progress, and Conners in progress). Two other doctoral students are using part of all of the TOPP seabird data for part of their dissertations (Harrison in progress and Maxwell in progress). TOPP researchers also co-wrote a chapter in a technical report published by NOAA. Finally, the seabird team has given over 50 presentations at conferences, university seminars, local special interest groups (e.g. bird clubs), and government sponsored meetings since 2003.