Papahānaumokuākea Marine National Monument

RESEARCH Permit Application

NOTE: ***This Permit Application (and associated Instructions) are to propose activities to be conducted in the Papahānaumokuākea Marine National Monument. The Co-Trustees are required to determine that issuing the requested permit is compatible with the findings of Presidential Proclamation 8031. Within this Application, provide all information that you believe will assist the Co-Trustees in determining how your proposed activities are compatible with the conservation and management of the natural, historic, and cultural resources of the Papahānaumokuākea Marine National Monument (Monument).***

ADDITIONAL IMPORTANT INFORMATION:

- Any or all of the information within this application may be posted to the Monument website informing the public on projects proposed to occur in the Monument.

- In addition to the permit application, the Applicant must either download the Monument Compliance Information Sheet from the Monument website OR request a hard copy from the Monument Permit Coordinator (contact information below). The Monument Compliance Information Sheet must be submitted to the Monument Permit Coordinator after initial application consultation.

- Issuance of a Monument permit is dependent upon the completion and review of the application and Compliance Information Sheet.

INCOMPLETE APPLICATIONS WILL NOT BE CONSIDERED

Send Permit Applications to:
Papahānaumokuākea Marine National Monument Permit Coordinator
6600 Kalaniana'ole Hwy. # 300
Honolulu, HI 96825
nwhipermit@noaa.gov
PHONE: (808) 397-2660 FAX: (808) 397-2662

<u>SUBMITTAL VIA ELECTRONIC MAIL IS PREFERRED BUT NOT REQUIRED. FOR ADDITIONAL SUBMITTAL INSTRUCTIONS, SEE THE LAST PAGE.</u>

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: Myra Finkelstein
Affiliation: University of California Santa Cruz

Permit Category: Research
Proposed Activity Dates: October 2008 to June 2011
Proposed Method of Entry (Vessel/Plane): Plane
Proposed Locations: Midway Atoll National Wildlife Refuge

Estimated number of individuals (including Applicant) to be covered under this permit:
5
Estimated number of days in the Monument: Total number of days ~420 (combined):
Research technician 1: ~4 months per year on Midway Atoll during years 1-3 and ~2 weeks during year four. We would like this person to spend a proportion of their time (~50-75%) volunteering for the refuge while they are on island during years 1-3.
Research technician 2: ~2 weeks per year during years 1-3 on Midway Atoll.

Description of proposed activities: (complete these sentences):

a.) The proposed activity would…
assess the relationship between contaminant exposure (e.g., PCBs, DDTs, mercury), indicators of health effects (hematology, immune, and endocrine function, egg shell thickness), and demography (survival, breeding probability, hatching/breeding success) in black-footed albatross in order to understand how contaminant exposure affects long-term population survival.

b.) To accomplish this activity we would ….
1) monitor a plot of ~100 black-footed albatross on Midway Atoll for survival and probability of breeding (the percent of banded birds that return to breed), hatching/breeding success (the number of eggs that hatch, the number of chicks that survive to fledge); 2) for a subset of these birds we will collect blood samples (2-5 mLs) to evaluate contaminant levels (PCBs, DDTs, mercury) and indicators of health effects (hematology, immune, and endocrine function, egg shell thickness); 3) construct population models to investigate the effects of contaminant exposure on the long-term population viability of black-footed albatross.

c.) This activity would help the Monument by …
providing important information on the long-term population-level effects of contaminant exposure in black-footed albatross, whose second largest breeding colony is located in the Monument (Midway Atoll) and is currently under review for possible listing under the US Endangered Species Act. The US Fish and Wildlife Service's 90-day finding on the listing petition (USFWS 2007) cited contaminants as one of the main threats that may warrant listing, yet there is no information on how contaminant exposure impacts black-footed albatross population health.

Other information or background:
Background:
Black-footed and Laysan albatrosses, which forage in the North Pacific, have the highest organochlorine concentrations of any albatross species studied (Guruge et al. 2001). Several studies have also described 2 to 5 times higher organochlorine concentrations in black-footed albatrosses compared to Laysan albatrosses (Jones et al. 1996, Finkelstein et al. 2006), which also bred on Midway Atoll. Finkelstein et al. (2006) recently suggested that the higher organochlorine and mercury body burdens in black-footed albatross are primarily due to regional differences in North Pacific foraging patterns and that the most probable route of contaminant exposure was contamination of food sources, a finding supported by Jones et al. (1996). In addition to the differences between species, Finkelstein et al. (2006) found that PCBs and DDE may be increasing in both albatross species, whose foraging ranges together encompass the entire North Pacific.

The black-footed albatross is currently under review for possible listing under the US Endangered Species Act, and the US Fish and Wildlife Service's 90-day finding on the listing petition (USFWS 2007) cited fisheries bycatch and contaminants as two of the main threats that may warrant listing. Exposure to contaminants such as those documented in black-footed and Laysan albatross (e.g., PCBs, DDTs, mercury) have been related to reproductive, immune, endocrine, and hematological disruption in many wild species (Fossi et al. 2001, Grasman & Fox 2001). Indeed, Finkelstein et al. (2007) recently determined organochlorine and mercury exposure are related to altered immune and hematological function in black-footed albatrosses. Despite these data, the effect of contaminant exposure on the long-term population viability of black-footed albatross, and indeed any pelagic seabird, remains unknown.

Rationale:
Midway Atoll National Wildlife Refuge is an ideal location to carry out the colony-based work for our project. M. Finkelstein conducted several years of field research that involved collecting blood samples from albatrosses on Midway (Finkelstein et al. 2003b, Finkelstein et al. 2006, Finkelstein et al. 2007), and thus is familiar with Midway's research facilities as well as the logistical constraints of working at this remote island location. S. Converse is also familiar with the field site as a member of a research team that designed the long-term population monitoring and analysis protocols for albatrosses on Midway Atoll and other locations in the Hawaiian

Islands – protocols which have been used by the US Fish and Wildlife Service over the past 3 years and will be used in the future.

Approach:
We will identify a sampling plot (~100 black-footed albatross) that does not interfere with ongoing monitoring efforts by USFWS and collect mark-recapture data, along with data on reproductive success, contaminant concentrations (e.g., DDT), and hematological parameters (hematocrit, WBC counts and differentials) every year over three breeding seasons. Mark-recapture data will be collected in a fourth season to obtain data adequate for estimating demographic rates (e.g., survival). On a subset (n=40) of monitored birds in the plot, we will evaluate immune, endocrine function and comprehensive contaminant (e.g., PCBs, DDTs, mercury) assessment, based on previously develop methods by M. Finkelstein (Finkelstein et al., 2003). Due to financial and logistical constraints, we can not conduct a comprehensive contaminant analysis and evaluate immune function for every bird monitored in the plot, but our previous work has demonstrated that a sampled population of n=26 black-footed albatross has a wide range of contaminant exposure (mercury = 3400-6400 ng/mL whole blood, PCBs = 77-460 ng/mL plasma, DDTs = 44-780 ng/mL plasma). Furthermore, past research on contaminant associations with immune function (Finkelstein et al., 2007) predicts that n=40 birds will provide sufficient statistical power to detect contaminant-associated effects if they exist.

We will then use demographic rates obtained through mark-recapture analyses (prediction of how many birds are alive based on re-sighting probabilities) on birds with known contaminant exposure as well as published fisheries bycatch estimates (Lewison & Crowder 2003, Véran et al. 2007) to build population-based models that allow a combined assessment of bycatch and contaminant exposure effects on black-footed albatross population growth and future stability.

Detailed methods of data collection and analysis:
1) Demographic parameters. Black-footed albatross mark-recapture sampling will consist of capturing breeding birds by hand in a defined sampling plot and marking birds with metal USGS and field-readable plastic bands. Subsequent samples will consist of reading field-readable bands. Albatross generally nest within 1 m of previous nests, but may move a small distance between years. In years 2-4, birds will again be sampled in the plot; also a buffer area around the plot will be searched and previously marked birds in these areas will be monitored, to avoid confounding mortality with movement outside the plot. Reproductive success (hatching and fledging success) will be evaluated through nest monitoring for every sampled bird.

Blood collection methods. Blood samples will be collected from banded adult black-footed albatrosses hand-caught from the monitored plot during the breeding season during years 1-3 of the proposed project. 2-5mLs of blood (as needed) will be collected from the cutaneous ulnar vein with a 21g Vacutainer winged collection kit attached to a pre-heparinized syringe. Following blood sampling, all birds will be immediately released. Whole blood will be processed (e.g., centrifuged for plasma collection) within 6 hours of collection according to established protocols.

Contaminant exposure.

Organic Analysis (e.g., PCBs, DDT, DDE). Plasma and egg/eggshell samples, collected and stored using established methods (Finkelstein et al. 2006) (~1mL), will be evaluated for organochlorines (PCBs, chlorinated pesticides) and PBDEs using gas chromatographic separation with electron capture and mass spectrometric detection (GC-ECD and GC-MS).

Mercury Analysis. All sample processing will be conducted under trace metal-clean HEPA filtered air (Class 100) laboratory conditions using clean techniques (Smith et al. 1992) and previously published methods (Finkelstein et al. 2003b). Samples will be analyzed using a Tekarn 2500 and 2600 cold vapor atomic fluorescence spectrometer.

Biological markers of contaminant exposure.
Hematology (hematocrit, WBC counts and differentials) values will be assessed to identify diseased individuals, provide important baseline data on the health status of each bird sampled, as well as examine relationships between hematology variables with both demography and contaminant exposure. Hematocrit will be determined by the microhematocrit method, and total WBC counts will be determined with the Unopette prepared dilutent (Becton Dickinson, Franklin Lakes, NJ) within 3 hours of sample collection. Thin blood smears will be prepared within 5 minutes of sample collection. Slides will be sent to a commercial diagnostic laboratory (ANTECH diagnostics, Irvine, CA) where they will be stained with Wright/Giemsa, evaluated for RBC morphology, presence of thrombocytes, hemoparasites, and a WBC differential will be preformed.

Egg shell thickness: We will, using accepted USFWS protocols, collect up to 30 abandoned/failed eggs per year in the monitored plot, buffer, and surrounding areas to measure egg shell thickness and DDE concentrations.

Immune Function - Mitogen-induced lymphocyte proliferation. Immune function, and specifically mitogen-induced lymphocyte proliferation, is recognized as a sensitive biological marker for contaminant exposure effects in wildlife (Keller et al. 2000, Finkelstein et al. 2003a) including black-footed albatross (Finkelstein et al. 2007). In order to evaluate lymphocyte proliferation, cryopreserved white blood cells will be thawed and evaluated for mitogen-induced T lymphocyte proliferation according to previously published methods (Finkelstein et al. 2003a, Finkelstein et al. 2007). Briefly, for mitogen-induced T lymphocyte proliferation, 100µl of 3.5x106 live lymphocytes/mL will be distributed per well in triplicate wells in 96 well plates with either concavalin A mitogen (Con A, Sigma, St. Louis, MO) (2.5 and 5 µg/well) or no mitogen (non-stimulated). Plates will be incubated for 48 hours (41˚C, 5% CO2) after which the 5-bromo-2'-deoxyuridine (BrdU, Boehringer Manneheim, Indianapolis, IN) labeling agent is added to each well and the plates incubated for an additional 22 hours. Cells will be harvested and BrdU label absorbance and measured on an ELISA plate reader (Bio-RAD model 3550-UV).

Endocrine Function. Xenoestrogens are compounds that have structural similarities to estrogen and are therefore capable of binding to estrogen receptors, potentially invoking a biological response through endocrine disruption (Witorsch 2002). Some well-known xenoestrogens are persistent organic pollutants such as DDTs and PCBs (Colborn et al. 1993).

A) Vitellogenin (VTG) Induction. VTG is a precursor protein for egg production that is synthesized in the liver of egg-producing vertebrates and circulates in the blood stream where it is taken up by oocytes to be cleaved into nutritional proteins for egg development. Male and juvenile oviparous animals have the genetic information to produce VTG, however, physiological levels of estrogen are normally only sufficient to stimulate VTG synthesis in egg-laying females. Upon exposure to estrogen, or estrogen-like compounds (xenoestrogens), VTG can be detectable in blood in male oviparous species, indicating endocrine disruption. VTG induction will be examined in plasma samples from male seabirds (determined through genetic gender identification) to assess if male albatrosses are experiencing contaminant-induced endocrine disruption.

B) Thyroid Hormone Levels. Altered plasma thyroid hormone levels have been shown to be correlated with organochlorine concentrations in Arctic glaucous gulls (Larus hyperboreus) (Verreault et al. 2004). Thyroid levels (T3 and T4) will be assessed according to the methods of (Verreault et al. 2004). Briefly, plasma samples (~1 mL) will be isolated from whole blood via centrifugation, transferred to cryogenic vials and stored in liquid nitrogen until analysis. Commercially available radioimmunoassays (Coat-A-Count; Diagnostic Products Corporation Inc., Los Angeles, CA, USA) will be used to determine the plasma concentration of total and free T3 and T4 levels.

Section A - Applicant Information

1. Applicant

Name (last, first, middle initial): Finkelstein, Myra, E.

Title: Assistant Researcher

1a. Intended field Principal Investigator (See instructions for more information):
Myra Finkelstein

2. Mailing address (street/P.O. box, city, state, country, zip):

Phone:

Fax:

Email:

For students, major professor's name, telephone and email address:

3. Affiliation (institution/agency/organization directly related to the proposed project):
University of California Santa Cruz, USGS

4. Additional persons to be covered by permit. List all personnel roles and names (if known at time of application) here (e.g. John Doe, Research Diver; Jane Doe, Field Technician):
Sarah Converse - data management, modeler
Marc Romano - field support
Field technician 1 - to be determined
Laboratory technician - to be determined

Section B: Project Information

5a. Project location(s):

		Ocean Based	
☐ Nihoa Island	☐ Land-based	☐ Shallow water	☐ Deep water
☐ Necker Island (Mokumanamana)	☐ Land-based	☐ Shallow water	☐ Deep water
☐ French Frigate Shoals	☐ Land-based	☐ Shallow water	☐ Deep water
☐ Gardner Pinnacles	☐ Land-based	☐ Shallow water	☐ Deep water
☐ Maro Reef			
☐ Laysan Island	☐ Land-based	☐ Shallow water	☐ Deep water
☐ Lisianski Island, Neva Shoal	☐ Land-based	☐ Shallow water	☐ Deep water
☐ Pearl and Hermes Atoll	☐ Land-based	☐ Shallow water	☐ Deep water
☒ Midway Atoll	☒ Land-based	☐ Shallow water	☐ Deep water
☐ Kure Atoll	☐ Land-based	☐ Shallow water	☐ Deep water
☐ Other			

NOTE: There is a fee schedule for people visiting Midway Atoll National Wildlife Refuge via vessel and aircraft.

Location Description:
Research will be conducted on Sand Island, Midway Atoll

5b. Check all applicable regulated activities proposed to be conducted in the Monument:

☒ Removing, moving, taking, harvesting, possessing, injuring, disturbing, or damaging any living or nonliving Monument resource
☐ Drilling into, dredging, or otherwise altering the submerged lands other than by anchoring a vessel; or constructing, placing, or abandoning any structure, material, or other matter on the submerged lands
☐ Anchoring a vessel
☐ Deserting a vessel aground, at anchor, or adrift
☐ Discharging or depositing any material or matter into the Monument
☐ Touching coral, living or dead
☐ Possessing fishing gear except when stowed and not available for immediate use during passage without interruption through the Monument
☐ Attracting any living Monument resource
☐ Sustenance fishing (Federal waters only, outside of Special Preservation Areas, Ecological Reserves and Special Management Areas)
☐ Subsistence fishing (State waters only)
☐ Swimming, snorkeling, or closed or open circuit SCUBA diving within any Special Preservation Area or Midway Atoll Special Management Area

6 Purpose/Need/Scope ***State purpose of proposed activities:***
1) Monitor a plot of black-footed albatross: collect demographic data (survival, breeding hatching, reproductive success) to evaluate contaminant-induced changes in demographic rates
2) Collect blood samples from black-footed albatross: evaluate blood concentrations of contaminants (PCBs, DDTs, mercury) as well as biological indicators of health (hematology, immune, and endocrine function, egg shell thickness) to evaluate contaminant-associated changes in physiological functions.
3) Collect abandoned/failed eggs and egg shells from monitored plot to assess relationship between DDE exposure, egg shell thickness, and hatching success.

7. Answer the Findings below by providing information that you believe will assist the Co-Trustees in determining how your proposed activities are compatible with the conservation and management of the natural, historic, and cultural resources of the Monument:

The Findings are as follows:

a. How can the activity be conducted with adequate safeguards for the cultural, natural and historic resources and ecological integrity of the Monument?
We will work closely with John Klavitter, Midway Atoll's refuge biologist to ensure our project will have no negative effects on black-footed albatross breeding on Midway Atoll. Our project will not interfere with the cultural or natural resources of the Monument.

b. How will the activity be conducted in a manner compatible with the management direction of this proclamation, considering the extent to which the conduct of the activity may diminish or enhance Monument cultural, natural and historic resources, qualities, and ecological integrity, any indirect, secondary, or cumulative effects of the activity, and the duration of such effects?
Our close collaboration with John Klavitter, Midway's refuge biologist as well as other USFWS staff on Midway will dictate that our work is complementary to Midway's current management activities. Our work will not affect the Monument's cultural, natural or historic resources, qualities and ecological integrity.

c. Is there a practicable alternative to conducting the activity within the Monument? If not, explain why your activities must be conducted in the Monument.
Because our project requires access to a large breeding colony of black-footed albatross, Midway Atoll is the ideal location. In addition, the logistical support at Midway (housing, airfield, etc.) is vital to the success of our research.

d. How does the end value of the activity outweigh its adverse impacts on Monument cultural, natural and historic resources, qualities, and ecological integrity?
We anticipate no long-term adverse impacts to the Monument from our activity; indeed our work will provide critical information to ensure the long-term health of Midway Atoll's black-footed albatross population, an important ecological resource for the Monument.

e. Explain how the duration of the activity is no longer than necessary to achieve its stated purpose.
Preliminary analysis by S. Converse has demonstrated that 4 years of demographic data (observing the number of adults that return to breed successfully) are the minimum needed to determine black-footed albatross annual survival rates. This is because only ~80% of black-footed albatross adults will breed in a given year, and, thus 4 years is the minimum number to determine if birds have just skipped breeding for a year or two, or have died.

f. Provide information demonstrating that you are qualified to conduct and complete the activity and mitigate any potential impacts resulting from its conduct.
Principal investigator Dr. Finkelstein has studied the sources and effects of contaminant exposure in albatrosses over the last 8 years and has several publications that have advanced our state of knowledge on North Pacific pollution. Most notably, she provided evidence that North Pacific pollution may be increasing (Finkelstein et al. 2006) and recently published one of the first studies to document detrimental effects from global pollution (e.g., PCBs, mercury) on a pelagic seabird, the black-footed albatross (Finkelstein et al. 2007).
Co-investigator Sarah J. Converse has experience designing and analyzing demographic studies of seabirds. In particular, Dr. Converse was a member of a research team which developed long-term population monitoring and analysis protocols for black-footed and Laysan albatrosses on Midway Atoll (the proposed site for this research), French Frigate Shoals, and Laysan Island, which have been adopted by the US Fish and Wildlife Service. Dr. Converse's training is in quantitative population ecology, and her expertise includes demographic estimation methods, population modeling, and decision science.

g. Provide information demonstrating that you have adequate financial resources available to conduct and complete the activity and mitigate any potential impacts resulting from its conduct.
We have applied for funds (~$350,000) through the North Pacific Research Board (www.nprb.org/) to conduct the proposed research. We should be notified if our proposal is successful in May, 2008.

h. Explain how your methods and procedures are appropriate to achieve the proposed activity's goals in relation to their impacts to Monument cultural, natural and historic resources, qualities, and ecological integrity.
Our methods are non-invasive and will provide important information on the survival, breeding success, and physiological health of an important Monument species, black-footed albatross. M. Finkelstein has vast experience collecting blood samples from black-footed albatross, and the amount of blood to be collected (at most 5 mL) is well under the maximum advised for a 3kg bird.

i. Has your vessel has been outfitted with a mobile transceiver unit approved by OLE and complies with the requirements of Presidential Proclamation 8031?
NA, we will not be using a vessel.

j. Demonstrate that there are no other factors that would make the issuance of a permit for the activity inappropriate.

Our project is very specific and will be conducted under the supervision of Midway Atoll USFWS personnel. We can think of no factors that would make the issuance of a permit for our proposed research inappropriate.

8. Procedures/Methods:
Monitor a plot of ~100 black-footed albatross and collect mark-recapture data, along with data on reproductive success, contaminant concentrations (e.g., DDT), and hematological parameters (hematocrit, WBC counts and differentials) every year over three breeding seasons. Mark-recapture data will be collected in a fourth season to obtain data adequate for estimating demographic parameters. Abandoned and failed eggs as well as egg shells will be collected from plot and surrounding buffer area according to USFWS accepted protocols. On a subset (n=40) of monitored birds in the plot, we will evaluate immune, endocrine function and comprehensive contaminant (e.g., PCBs, DDTs, mercury) assessment, based on previously develop methods by M. Finkelstein.

We will then use demographic rates obtained through mark-recapture analyses (prediction of how many birds are alive based on re-sighting probabilities) on birds with known contaminant exposure as well as estimates of fisheries bycatch to build population viability analysis (PVA) models that allow a combined assessment of bycatch and contaminant exposure effects on black-footed albatross population growth.

See above under 'other information' for detailed description of methods.

NOTE: If land or marine archeological activities are involved, contact the Monument Permit Coordinator at the address on the general application form before proceeding, as a customized application will be needed. For more information, contact the Monument office on the first page of this application.

9a. Collection of specimens - collecting activities (would apply to any activity): organisms or objects (List of species, if applicable, attach additional sheets if necessary):

Common name:
Black-footed albatross blood samples, eggshells and failed/abandoned eggs

Scientific name:
Phoebastria nigripes

& size of specimens:
Monitor plot of ~100 black-footed albatross and collect blood samples, egg shells and failed/abandoned eggs

Collection location:
Midway Atoll National Wildlife Refuge

☐ Whole Organism ☐ Partial Organism

9b. What will be done with the specimens after the project has ended?
Post analysis, we will archive remaining blood samples, egg material, and eggshells in freezer space at the University of California Santa Cruz.

9c. Will the organisms be kept alive after collection? ☒ **Yes** ☐ **No**
We will take a blood sample from each bird, then release the bird immediately.

• General site/location for collections:
University of California Santa Cruz, Santa Cruz, CA, 95064

• Is it an open or closed system? ☐ Open ☐ Closed
NA

• Is there an outfall? ☐ Yes ☐ No
NA

• Will these organisms be housed with other organisms? If so, what are the other organisms?
NA

• Will organisms be released?
NA

10. If applicable, how will the collected samples or specimens be transported out of the Monument?
Blood samples, abandoned/failed eggs, and egg shells will be frozen and transported from Midway Atoll by aircraft.

11. Describe collaborative activities to share samples, reduce duplicative sampling, or duplicative research:
As part of the North Pacific Albatross Working Group, M. Finkelstein will inform other albatross researchers of the project and availability data/samples for future work. Additionally, all data/samples will be available to USFWS personnel.

12a. List all specialized gear and materials to be used in this activity:
No specialized gear will be used in this activity. We will bring out blood collection and processing materials, including centrifuge, microscope, dry ice, and a cold storage dewer for sample processing, storage, and transport.

12b. List all Hazardous Materials you propose to take to and use within the Monument:
Dry ice, see attached material safety data sheet (MSDS).

13. Describe any fixed installations and instrumentation proposed to be set in the Monument:
NA

14. Provide a time line for sample analysis, data analysis, write-up and publication of information:
Year 1:
data collection:
-Contaminant concentrations
-Immune function
-Endocrine function
-Hematology
-Demographic data (survival, breeding probability, hatching/fledging success)
-Egg shells from failed nests
sample analysis:
-Contaminant (metals, OCs) assessment
-Immune assessment
-Endocrine assessment
-Hematological assessment
-Egg shell thickness assessment

Year 2:
data collection:
-Contaminant concentrations
-Hematology
-Demographic data (survival, breeding probability, hatching/fledging success)
-Egg shells from failed nests
sample/data analysis:
-Build framework for mark-recapture and population viability models
-Evaluate data on immune/endocrine function and contaminant exposure
-Year 2 hematological assessment
-Year 2 contaminant assessment
-Year 2 egg shell thickness assessment

Year 3:
data collection:
-Contaminant concentrations
-Hematology
-Demographic data (survival, breeding probability, hatching/fledging success)
-Egg shells from failed nests
sample/data analysis/write-up:
-Continue development of mark-recapture models
-Write up immune, endocrine function and contaminant exposure
-Year 3 hematological assessment
-Year 3 contaminant assessment

-Year 3 egg shell thickness assessment

Year 4:
data collection:
-Demographic data (survival, breeding probability, hatching/fledging success)
sample/data analysis/write-up:
Complete mark-recapture models
Complete population viability models
Write up modeling results
Write up results on DDE exposure and egg shell thickness/hatching success

15. List all Applicants' publications directly related to the proposed project:

M.Finkelstein: Finkelstein, M.E.; Grasman, K.A.; Croll, D.A.; Tershy, B.; Keitt, B.S.; Jarman, W.M.; and Smith, D. 2007. Contaminant-associated Immune Alteration in Black-footed Albatrosses (Phoebastria nigripes), North Pacific Predators. Environmental Toxicology and Chemistry, 26(9): 1896-1903.

Finkelstein, M.; Keitt, B.S.; Croll, D.A.; Tershy, B.; Jarman, W.M.; Rodriguez-Pastor, S.; Anderson, D.J.; Sievert, P.R.; and Smith, D. 2006. Albatross Species Demonstrate Regional Differences in North Pacific Marine Contamination. Ecological Applications, 16: 678-686.

Finkelstein, M.E.; Gwiazda, R.; Smith, D.R. 2003. Lead poisoning of seabirds: Environmental risks from leaded paint at a decommissioned military base. Environmental Science and Technology, 37: 3256-3260. Including coverage in News Brief section of journal.

Finkelstein, M.; Grasman, K.A.; Croll, D.A.; Tershy, B.; Smith, D.R. 2003. Immune function of cryopreserved avian peripheral white blood cells: Potential biomarkers of contaminant effects in wild birds. Archives of Environmental Contamination and Toxicology, 44: 502-509.

S. Converse: Converse, S. J., W. L. Kendall, P. F. Doherty, Jr., and P. G. Ryan. In Review. Multistate models for estimation of survival and reproduction in Grey-Headed Albatross. Auk.

Kendall, W. L., S. J. Converse, P. F. Doherty, Jr., M. B. Naughton, J. E. Hines, A. Anders, and E. Flint. In Review. Design considerations in demographic studies of animal populations: a case of colonial seabirds. Ecological Applications.

Bailey, L. L., S. J. Converse, and W. L. Kendall. In Revision. Bias, precision, and parameter redundancy in complex multi-state models with unobservable states. Ecology.

Converse, S. J., W. L. Kendall, P. F. Doherty, Jr., M. B. Naughton, and J. E. Hines. In Press. A traditional and a less-invasive robust design: choices in optimizing effort allocation for seabird population studies. Environmental and Ecological Statistics.

With knowledge of the penalties for false or incomplete statements, as provided by 18 U.S.C. 1001, and for perjury, as provided by 18 U.S.C. 1621, I hereby certify to the best of my abilities under penalty of perjury of that the information I have provided on this application form is true and correct. I agree that the Co-Trustees may post this application in its entirety on the Internet. I understand that the Co-Trustees will consider deleting all information that I have identified as "confidential" prior to posting the application.

_____ _____

Signature Date

SEND ONE SIGNED APPLICATION VIA MAIL TO THE MONUMENT OFFICE BELOW:

Papahānaumokuākea Marine National Monument Permit Coordinator
6600 Kalaniana'ole Hwy. # 300
Honolulu, HI 96825
FAX: (808) 397-2662

DID YOU INCLUDE THESE?

☒ Applicant CV/Resume/Biography
☒ Intended field Principal Investigator CV/Resume/Biography
☐ Electronic and Hard Copy of Application with Signature
☐ Statement of information you wish to be kept confidential
☒ Material Safety Data Sheets for Hazardous Materials