

**Project #:** B77

**Title:** Bogoslof Patch Dynamics Study

**Principal Investigator(s) and Recipient Organization(s):**

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**Contract Period and Amount of Funding:**

October 2007-September 12, 2012: \$2,290,126

**Report Period:**

1 October 2008 through 31 March 2009

**Report Date:**

5 April 2009

**Lead Author of Report:**

Andrew W. Trites

**Proposed timeline and milestones within report period:**

**Forage Fish**

<i>What</i>	<i>Who</i>	<i>Start ( 2008)</i>	<i>Other key dates</i>
PI meeting	Heppell	October, 2008	
Contract Vessel	Benoit-Bird/Heppell	November, 2008	
Purchase equipment	Benoit-Bird, Heppell	October-December, 2008	
Recruit field assistants	Benoit-Bird, Heppell	February-April 2009	
Fine-tune plan studies, including coordination with other BSIERP-Patch collaborators	Benoit-Bird, Heppell	February-March 2009	Review annually as needed

**Northern Fur Seals**

<i>What</i>	<i>Who</i>	<i>Start ( 2008)</i>	<i>Other key dates</i>
Purchase tags for 2009 field season	Battaile, Nordstrom, Trites	January to May	
Hire research assistants for 2009 field season	Trites, Battaile	January to May	
Attend 2009 NPRB Alaska Marine Science Symposium and BSIERP PI meeting	Trites, Battaile	January	
Review and update protocols for	Battaile,	January to June	

2009 field season	Nordstrom, Trites		
Organize and procure supplies and logistics for 2009 field season	Battaile, Trites	March-June	

### Seabird and Mammal Surveys

<i>What</i>	<i>Who</i>	<i>Start ( 2008)</i>	<i>Other key dates</i>
AMSS and PI meeting	Kuletz	January / October	annually
Fine-tune study plans, coordinate with other PDS collaborators.	Kuletz, Heppell, Benoit-Bird, Irons, Kitaysky, Roby	January-March	Annually
Hire second Observer/collector	Kuletz	Feb.-March	Hired Brian Hoover (Moss Landing Marine Lab, CA)
Prepare detailed protocols for data collection and order equipment and supplies	Kuletz, Jones (grad.student)	March-May	Have protocols reviewed by other PIs by May
Arrange permits for collection of seabirds around Bogoslof	Kuletz	Feb-April	Submit IACUC proposal by April
Complete NPRB progress reports	Kuletz	1 April	annually

### Seabird Telemetry & Logistics (FWS)

<i>What</i>	<i>Who</i>	<i>Start ( 2008)</i>	<i>Other key dates</i>
Plan studies, including liaison with other BSIERP collaborators	Irons, Kuletz, Roby	February	Coordination in person at Pacific Seabird Group Feb
Select seasonal biologists for Bogoslof	Irons, Roby, Harding	March	2009
Order GPS data loggers	Irons, Roby and Harding	March	2009
Prepare detailed protocols for data collection and order needed equipment and supplies	Irons, Roby, and Harding	March-April	2009
Have protocols reviewed by other seabird colony team members	Byrd, Irons, Kitaysky, Roby	April	Review annually as needed
Coordinate field approaches to avoid conflicts	Byrd, Irons, Kitaysky, Roby	April	Review annually as needed

### Seabirds (UAF)

<i>What</i>	<i>Who</i>	<i>Start ( 2008)</i>	<i>Other key dates</i>
Task: Analyze stress and stable isotope blood samples	Kitaysky UAF group	October'08-March'09	Submit data to BSIERP data manager in April 2009

## **Project Summary:**

Patches are significant spatial variations in oceanic biomass and are broadly recognized to reflect significant spatial variation in any feature of prey that is important for exploitation of the resource by the predator. Our research is addressing the BSEIRP hypothesis that climate-ocean changes will displace predictably located, abundant prey patches necessary for successful foraging by central place (seabirds and fur seals while nurturing young) and hot spot (baleen whales, walrus) foragers. We are also testing the hypothesis that central place foragers will shift their diet, foraging locations or rookery locations to increase foraging opportunities (based on differential foraging success). We are undertaking a fine-scale predator-prey study at Bogoslof Island and surrounding waters in 2009 on seabirds (thick-billed murre and black-legged kittiwakes), marine mammals (northern fur seals), and forage fishes to examine controlling mechanisms that determine whether populations of top-predators grow or decline. Data from Bogoslof Island will be combined and contrasted with the Patch Dynamic Study at the Pribilof Islands (2008 and 2009) to predict how species in different domains of the Bering Sea ecosystem will respond to climate change.

## **Progress Summary:**

**Forage Fish.** We have identified a research vessel (*F/V Goldrush*) and anticipate completing a formal contract in April. We also purchased a Simrad EK60 Echosounder, CTD, and other associated sampling gear, and are in the process of having trawl nets constructed. Selection of field crew is underway and will soon be finalized for the 2009 field season.

**Seabird and Mammal Surveys.** We have purchased some of the extra field gear (laptop computer, binoculars) needed for surveying birds and mammals around Bogoslof Island. Remaining supplies will be purchased after April. We have also decided to hire a student (Brian Hoover) to participate in the at-sea survey component to work closely with the PDS crew in conjunction with Mr. Jones. Both at-sea observers will work with the prey/oceanographic crew on board either of two PDS vessels, the *F/V Frosti* or the *F/V Goldrush*, to conduct surveys in the combined Pribilofs-Bogoslof study area.

**Northern fur seals.** Our focus since October has been on planning and purchasing equipment for the 2009 field season on Bogoslof Island. Field assistants have been selected and data loggers have been ordered along with all major research field equipment needed for the summer field season. Ann Harding has been in charge of general logistical planning for the field camp, and has completed most of the major organization challenges including transportation, energy, housing, food and water.

**Seabird Telemetry & Logistics (FWS).** We have been preparing for the upcoming 2009 field season. Much time has been spent coordinating logistics among the different land-based components. Several meetings were held in conjunction with the AMSS in January. Contracts for the boats to travel to Bogoslof Island have been let, field personnel have been hired, paperwork for scientific permits have been submitted, many field supplies have been ordered including the GPS, and field protocols have been written.

**Seabirds (UAF).** Between October and March we finished all planned analyses of stress hormones (20 kittiwakes and 23 thick-billed murre) and stable isotopes (10 individuals of each species) samples collected on Bogoslof I. in 2008. Stress and stable isotope data from Bogoslof Island were combined and contrasted with the Patch Dynamic Study at the Pribilof Islands, and preliminary results were reported during October'08 and January'09 PIs meetings. Stable isotope analyses of bird blood samples collected at Bogoslof in previous years and a compilation of 2008 data for submission to BSEIRP data manager are in progress.

### **Lessons learned and project adjustments:**

**Forage Fish.** No modifications have been made, and we are proceeding as planned.

**Seabird and Mammal Surveys.** We expect to increase efficiency of survey data collection and bird collections by retaining the same graduate student (Mr. Jones) that worked on the PDS in 2008, who will also assist in training the new observer (Mr. Hoover) for the second vessel. Mr. Hoover will begin working for FWS in June to enable him to be trained at sea during a NOAA (BSIERP) cruise. Our experience in 2008 will also enable us to more efficiently transfer information on tagged foraging birds to the prey sampling vessels. Based on the 2008 diets of collected birds and on behavioral evidence of nighttime foraging by birds, we will attempt more late evening or early morning collections in 2009. We are also exploring options that will allow for nighttime surveys of birds.

**Northern fur seals.** Field work will be fully integrated with the seabird research on Bogoslof Island to increase day to day collaboration and enhance day-to-day living. Some fine tuning of tagging schedules will occur to maximize data collection while minimizing disturbance to the animals. Collaborations with Wildlife Computers have accelerated development of a new 3 dimensional dive profile logger and we have switched to a much smaller CTD.

**Seabird Telemetry & Logistics (FWS).** Bogoslof is a small island where we must limit our activity. A maximum of six people will be permitted on the island at a time. There is no potable water on the island, so we will be meeting with the Maritime Refuge in April to discuss most feasible method to bring water to the island. There will be considerable power needs on the island, with three computers, phone and radio communication, centrifuge use, and the recharging of a VHF receiver and GPS loggers. We will meet with alternative energy experts in Anchorage to design an appropriate solar system to meet these needs.

**Seabirds (UAF).** As we expected, nutritional stress (based on plasma concentrations of corticosterone) was lower in kittiwakes and murrelets breeding on Bogoslof compared to that in their con-specifics breeding on the Pribilofs. Analyses of stable isotope signatures of birds' blood samples showed that diet compositions and foraging locations were different among the colonies; and changed in an expected manner – stable isotope signatures became enriched following the ocean basin–shelf trajectory (Bogoslof had the lowest isotope values and St. Paul had the highest values, with St. George falling in between). According to these results, kittiwake foraging locations and/or diet compositions were similar between Bogoslof and St. George Island in 2008, and were different from those used by kittiwakes on St. Paul Island.

*Air transportation for all components of the Patch Dynamics Study could be affected by Mount Redoubt volcanic activity. We may therefore need to allow extra travel days (with associated costs) and may be forced to adjust start times.*

### **Integration activity:**

PIs involved in the Patch Dynamic Study participated in the BSIERP PI meeting in Girdwood in October, and all PIs (along with some graduate students, post doctoral fellows and research associates) participated in a one-day Patch Dynamics Study workshop that preceded the Alaska Marine Science Symposium in January 2009. A major focus of the workshop was coordination of field work planned for Bogoslof Island and the Pribilof Islands.

**Forage Fish.** No additional integration activities were undertaken.

**Seabird and Mammal Surveys.** No additional integration activities were undertaken.

**Northern fur seals.** No additional integration activities were undertaken.

**Seabird Telemetry & Logistics (FWS).** No additional integration activities were undertaken.

**Seabirds (UAF).** In addition to participating in the PI meetings, preliminary results for inter-colony comparisons of nutritional stress and stable isotopes were presented at the BSIERP meetings in Girdwood and Anchorage.

**Education and Outreach:**

No education and outreach has occurred during this period for any of the components of the Bogoslof Patch Dynamics Study.

**Work plans (2009-2012 Tasks, Assignments, Timeline):**

**Forage Fish.** BSIERP B77, Forage Fish Patches Bogoslof Island, Scott Heppell, 541-737-1086, [scott.heppell@oregonstate.edu](mailto:scott.heppell@oregonstate.edu)

<i>What</i>	<i>Who</i>	<i>Start ( 2008)</i>	<i>Other key dates</i>
Complete NPRB progress reports	<b>Benoit-Bird, Heppell, Co-PI's</b>	March, October 2009	Semi-annually 2008-2010
Finalize vessel charter for B67 (and B77)	<b>Benoit-Bird and Heppell</b>	April, 2009	
Prepare protocols for data collection and order needed supplies	<b>Benoit-Bird, Heppell</b>	May, 2009	Review annually as needed
Load gear and ship supplies to Alaska	<b>Benoit-Bird, Heppell, students, techs</b>	June, 2009	
Conduct field studies	<b>Benoit-Bird, Heppell, students, techs</b>	July-August, 2009	Complete field studies in August each year 2008-2009
Analysis of acoustic data	<b>Benoit-Bird</b>	Ongoing, 2009	
Analyze CTD data	<b>Benoit-Bird, student</b>	October, 2009	
Finish species ID for those organisms not positively ID'd onboard	<b>Heppell, student</b>	September, 2009	
Energetic content analysis	<b>Heppell, student</b>	Ongoing, 2009	
Attend 2009 BSIERP Principal Investigators meeting	<b>Benoit-Bird, Heppell</b>	October, 2009	

**Northern fur seals.** BSIERP B77, Fur seal foraging and patch dynamics, Andrew Trites, 604-822-8181, [a.trites@fisheries.ubc.ca](mailto:a.trites@fisheries.ubc.ca)

<i>What</i>	<i>Who</i>	<i>Start ( 2009)</i>	<i>Other key dates</i>
Review and update protocols for 2009 field season	Battaile, Nordstrom, Trites	January to June	
Train field personal	Battaile, Nordstrom, Trites	June- July	
Organize and procure supplies and logistics for 2009 field season	Battaile, Trites	March-June	
Conduct field studies, capture, tag, retrieve tags and consolidate data	Battaile, Research assistants	July-September	

2009 field season Data Analysis	Battaile, Nordstrom, Trites	July-December 31	Ongoing
Supply data to data manager	Battaile, Nordstrom, Trites	January	Annually
Complete NPRB progress reports	Battaile, Nordstrom, Trites	April 1, October 1	Semi-annually 2008-2010
Report to communities of Dutch Harbor / Unalaska	Trites	TBD	2009-10
Complete publications	Collaborative among various PIs	January 2010	Continue thru 2012

**Seabirds (UAF)** BSIERP B77, Seabird Diving, Stress & Stable Isotopes – Bogoslof Island, PI- Kitaysky, 907 474-5179, [ffask@uaf.edu](mailto:ffask@uaf.edu)

<i>What</i>	<i>Who</i>	<i>Start ( 2009)</i>	<i>Other key dates</i>
Compile and submit 2008 data on stress & stable isotopes	Kitaysky	March-April	April 2009
Stable isotope analysis of blood samples collected at Bogoslof during previous years (1999, 2000, 2004, 2005)	Kitayskaia	April	September'09
Coordinate logistics of field camp on Bogoslof	Byrd, Trites, Barger, Harding, Irons, Kitaysky	April-May	
Order data loggers and field supplies	Kitaysky, Barger, NPRB	March-May	
Revise protocols for data collection and order needed equipment and supplies	Kitaysky, Barger, Harding	March-May	
Have protocols reviewed by other team members	Kitaysky, Barger	April-May	
Coordinate field approaches to avoid conflicts	Byrd, Trites, Irons, Kitaysky	April-May	
Train field personnel	Kitaysky	June	
Conduct field studies: deploy dataloggers, collect blood and diet samples	Barger, field tech	July-August	September
Complete NPRB progress reports	Kitaysky, Barger	October 1	

**Seabirds (USFWS)**, BSIERP B77, Seabird Telemetry, Diets, and Productivity, David Irons, 907/786-3376, [david\\_irons@fws.gov](mailto:david_irons@fws.gov); Dan Roby 541/737-1955

<i>What</i>	<i>Who</i>	<i>Start ( 2009)</i>	<i>Other key dates</i>
Have protocols reviewed by other seabird colony team members	Byrd, Irons, Kitaysky, Roby	April	Review annually as needed
Coordinate field approaches to avoid conflicts	Byrd, Irons, Kitaysky, Roby	April	Review annually as needed
Train field personnel	Irons, Roby, Post Doc	June	June each year 2008-2009
Conduct field studies	Irons, Roby, Post	July-August	Complete field studies

	Doc seasonal field biologists		in August
Send diet and blood samples to contractor	Byrd, field biologists	September	Expect annual results by end of year 2008-2009
Summarize available data	Irons, Roby, Post Doc	October	Annually 2008-2009
Supply data to data manager	Irons, Roby, Post Doc	November	Annually
Complete NPRB progress reports	Irons, Roby, Post Doc	1 April 1 October	Semi-annually 2008-2010
Complete publications	Collaborative among various PIs	January 2011	Continue thru 2001

**Seabirds (USFWS)**, BSIERP B77, Seabird At-Sea Distribution and Diet, Kathy Kuletz, 907/786-3453, [kathy\\_kuletz@fws.gov](mailto:kathy_kuletz@fws.gov)

<i>What</i>	<i>Who</i>	<i>Start ( 2009)</i>	<i>Other key dates</i>
AMSS and PI meeting	Kuletz	January / October	annually
Prepare detailed protocols for data collection and order equipment and supplies	Kuletz, Jones (grad.student)	March-May	Have protocols reviewed by other PIs by May
Arrange permits for collection of seabirds around Bogoslof	Kuletz	Feb-April	Submit IACUC proposal by April
Conduct at-sea surveys of birds and mammals in conjunction with prey studies	Kuletz, Jones, Hoover	July-August	Also coordinate on-site tagged bird data transfer ( <b>Irons, Roby, Post Doc</b> )
Send diet and blood samples to contractor	Kuletz, Jones, Byrd	September -October	Arrange contracts starting in July-August
Summarize available data	Kuletz, Jones	October - December	Exchange data with forage fish PIs; preliminary analysis
Supply data to data manager	Kuletz	December	annually
Complete NPRB progress reports	Kuletz	1 April 1 October	annually
Complete publications on seabird response (foraging, productivity) to changes in prey base.	Collaborative among PIs	January 2010-April 2012	Continue as integrated data analysis becomes available.