Project #: B64

Title: Seabird Broad-Scale Distribution

Principal Investigator(s) and Recipient Organization(s):
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$550,438

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Report Date: 1 October 2008

Lead Author of Report: Kathy Kuletz

Proposed timeline and milestones within report period: BSIERP Broadscale Seabird Distribution, PI Kathy Kuletz, Kathy_kulet@fws.gov; 907-786-3453 2008 Timeline and Milestones

What	*Who*	*Start (2008)*	*Other key dates/items*
Plan studies, including liaison with other BSIERP & PDS collaborators	**Kuletz, Irons, Byrd, Roby, Kitaysky**	February	Coordination in person at Pacific Seabird Group Meeting in February
Coordinate cruises with NSF and NOAA chief scientists	**Kuletz**	January – August	Met at BSIERP Jan meeting, rest via email & phone
Plan travel & personnel budgets, allocate observer time	**Kuletz**	Feb - August	2008-2010, annually
Hire or contract new observers for seabird surveys	**Kuletz**	March - August	Hired two FWS biotechs and contracted others
Update protocols for data collection and order equipment and supplies	**Kuletz**	April - May	Met with other at-sea surveyors during PSG meeting, Feb/Mar 2008
Coordinate with other at-sea PIs to prepare for data exchange/analysis	**Kuletz, other PIs (NSF & BSIERP)**	April - August	Continue each year
Conduct broad-scale at-sea surveys (9 cruises completed)	**Kuletz, Labunski, other observers**	February - September	Complete field studies in conjunction with NSF & BSIERP cruises, 2008-2010
Coordinate with PDS –PIs, and conduct surveys with PDS	**Kuletz, grad student,Heppell, Benoit-Bird**	July-August	Pribilofs only in 2008 – Hired grad student Nate Jones (Moss Landing Mar.Lab)
Arranged contract to have edited raw data processed for formatting and entry into NPPSD	**Kuletz**	June-September	In process
Send diet samples to contractor	**Kuletz, Byrd**	September	Delayed 1 month; expect to send in Oct.
Complete NPRB progress reports	**Kuletz**	1 October	Semi-annually, 2008-2011

Project Summary: This project will examine seabird (and marine mammal) distribution relative to oceanographic and biological features of the Bering Sea. Our goal is to examine the current influence of oceanographic and prey dynamics on the distribution and abundance of seabirds as top predators. By using multiple years of data to examine seabird response to these variables, we aim to predict how changes in the Bering Sea ecosystem will alter the distribution of apex predators.

This project addresses the following BSIERP hypotheses:

3a: Competition with abundant, piscivorous fish species for forage species will lead to a decline in murres, kittiwakes and fur seals.
3b: Growing populations of humpback and fin whales increasingly will both consume and compete with forage fish (juvenile pollock) for zooplankton (euphausiids and copepods). By reducing the prey base of forage fish, whales not only reduce the amount of forage fish available to other predators, but also their quality (lipid content).
3c: In a top-down control community, fishing will reduce the degree of top-down control of forage species (including juvenile pollock) by adult pollock, cod and arrowtooth flounder. Owing to light exploitation rates, top-down control by arrowtooth flounder will increase, as will their level of competition with piscivorous fish, seabirds and marine mammals. As a result of these two processes, arrowtooth flounder will determine ultimate community composition, such that the climax community will be arrowtooth flounder-dominated (similar to the Gulf of Alaska).
4a: Climate-ocean changes will displace predictably located, abundant prey (hot spots) necessary for successful foraging by central place (seabirds and fur seals while nurturing young) and hot spot (baleen whales, walrus) foragers.
4b: Central place foragers will shift their diet, foraging locations or rookery locations to increase foraging opportunities (based on differential foraging success).

Progress Summary: We successfully placed seabird observers on 9 cruise legs, representing 4 different programs. These included: a) the BEST spring cruises (March – May) in the ice edge and northern Bering Sea onboard the USCGC Healy; b) NOAA's June-July MACE hydroacoustic surveys of the Bering Sea shelf; c) the July BEST survey in the eastern Bering Sea onboard the Healy; d) NOAA's September FOCI icthyoplankton project in the southeastern Bering Sea/Bristol Bay area; e) the September BASIS cruise in the southeastern Bering Sea. NOAA ships were the Oscar Dyson and the Miller Freeman. Data from all completed surveys (BASIS has not returned) has been edited and is ready for processing to calculate seabird and marine mammal densities.

Lessons learned and project adjustments: Travel costs in 2008 were higher than estimated at the time the proposal was submitted (in 2006). Increased costs were due to airline cost increases and more than expected travel delays in remote ports-of-call, with high per diem rates. In 2008, a lack of observers resulted in a couple cruises that were not staffed, which compensated for the higher travel costs. It may be necessary in 2009 to prioritize observer coverage to selected cruises. Some travel funds were saved by having the same observer stationed on a vessel through sequential legs of the same project, but this can be difficult for the observer. This field season began well in the spring, but when a key employee had to leave for a family emergency, it affected the schedule of observers. It proved difficult to locate available, experienced observers during summer months. For 2009, we will emphasize securing observers, if necessary, hiring someone for the entire summer despite periods of 'down time' between cruises.

Integration activity: This project depends on securing vessel space for two observers on the BEST, NOAA, and BASIS cruises. It will depend on temperature, salinity, and chorophyll measurements from the biophysical moorings project (B52) and those collected during vessel transits. It will require data on the summer spatial distribution and abundance of juvenile pollock, forage fish, euphausiids, and other forage species (B58, B59, B60, B62) as well as nutritional energy data from the seasonal bioenergetic project (B54), which will be related to seabird (B64) broad-scale distributions. The direct sampling of

seabird diet at the forage patches depends on the fine-scale Patch Dynamics Study (B67). The broad-scale at-sea observations (from 2007 and 2008) were mapped to assist the definition of the study area around the Pribilof Islands for the Patch Dynamics Study. On all cruises that we participated in, we provided the chief scientists with trip reports, including summaries of species recorded, which were included in their cruise reports. Data is currently being processed for inclusion in the North Pacific Pelagic Seabird Database, and these files will be provided to the BEST and BSIERP data manager. Data collected for this project (B64) will also be used to examine Seabird and Cetacean Foraging Response to Prey Persistence (B92), and retrospective analyses of trophic interactions among fish, birds, and mammals (B68).

Education and Outreach: During the three cruises on the USCGC Healy our work was profiled by 'Teachers at Sea' reports posted on the web, through the PolarTREC (www.polartrec.com) program with both NSF and NPRB support (http://www.polartrec.com/ bering-ecosystem-change)and by NPRB staff postings on the NPRB web site (www.bsierp.nprb.org). The surveys were also noted in the Polar-palooza ((http://passporttoknowledge. com/polar-palooza). The historic location of most of the world'd population of over-wintering Spectacled Eiders was captured by the film crew of the BBC Natural History Unit for their Frozen Planet series (http://en.wikipedia.org/wiki/The_Frozen_Planet).

During a layover on St. Paul Island, KJK informally discussed the surveys and the BSIERP project with the city manager and others in the community. Preliminary results from these surveys were presented at the 4th International Albatross and Petrel Conservation meeting in Capetown, South Africa, August 2008.

Next year's Workplan: Following is our workplan for the coming year.

BSIERP Broadscale Seabird Distribution, PI Kathy Kuletz, Kathy_kulet@fws.gov; 907-786-3453
2009-2012 Tasks, Assignments, Timeline

What	*Who*	*Start (2009)*	*Other key dates/items*
Plan studies, including liaison with other BSIERP & PDS collaborators	**Kuletz, Irons, Byrd, Roby, Kitaysky**	October / February	Meetings at PI meeting (Oct), AMSS (Feb), Pacific Seabird Group Meeting (Feb)
Coordinate cruises with NSF and NOAA chief scientists	**Kuletz**	January – August	Met at BSIERP Jan meeting, rest via email & phone.
Plan travel & personnel budgets, allocate observer time	**Kuletz**	Feb - August	2009-2010, annually
Hire or contract new observers for seabird surveys	**Kuletz**	March - May	Post bio tech positions and notice on PSGlistserver
Update protocols for data collection and order equipment and supplies	**Kuletz**	March	Meet with other at-sea surveyors via email and during PSG meeting, Feb 2009
Prepare permits for collection of birds for Patch Dynamics Study	**Kuletz**	March-April	Apply for additional 2009 collections (Bogoslof)
Initiate contracts for prey remains identification & stable isotope analyses	**Byrd, Kuletz**	October	
Coordinate with other at-sea PIs to prepare for data exchange/analysis	**Kuletz, other PIs (NSF & BSIERP)**	November - May	Annually, 2009-2011
Conduct broad-scale at-sea surveys	**Kuletz, Labunski, other observers**	February - October	Complete field studies in conjunction with NSF & BSIERP cruises, 2009-2010
Conduct surveys for Patch	**Kuletz, Jones, 2nd**	July-August	Two sites in 2009: Pribilofs

Dynamics Studies	**observer, Heppel, Trites**		and Bogoslof
Send diet samples to contractor	**Kuletz, Byrd**	October-Nov	Expect results by December
Supply data to data manager	**Kuletz, Coyle**	November	Annually, 2009-2010
Complete NPRB progress reports	**Kuletz**	October / April	Semi-annually, 2009-2011
Prepare survey data for NPPSD & submit to database	**Kuletz, Labunski, contractor**	November-December	Annually, 2009-2010
Examine broad-scale distribution of seabirds in response to physical, biological factors	**Kuletz, Sigler, Wilson, other NSF & BSIERP PIs**	January, 2009	Continue 2009-2012
Contrast distributions of central place foragers to non-breeders	**Kuletz, Irons, Byrd, Roby**	January 2009	Continue 2009-2012
Examine seabird & cetacean foraging response to prey persistence, and retrospective analyses of trophic interactions	**Sigler, Kuletz, Friday, Wilson, Mueter**	January 2009	Continue 2009-2012