Institute for Seabird Research and Conservation

Reclaiming Middleton Island one nest at a time

SECURING THE FUTURE OF THE MIDDLETON ISLAND MARINE BIOLOGICAL STATION

CONTENTS

Essential Reading

Prospectus and funding request 3

Aerial photography 5

Institutional versus government stewardship 6

Testimonials 9

Active management & public outreach..... 11

A unique venue (slide presentation) 18

Optional Reading

Current research projects 30

Collaborators 32

Research products 33

Media coverage 37

Breaking news 38

ISRC Articles of Incorporation 39

ISRC Directors 40

PROSPECTUS AND FUNDING REQUEST

Project Title: Securing the future of the Middleton Island Marine Biological Station

Objective: Acquire vital acreage and infrastructure (transfer title from private ownership to a public charity) on Middleton Island, Alaska, and secure the future of a unique facility for research and conservation of marine birds and other wildlife.

Vision: The Middleton Island Marine Biological Station will be a one-of-a-kind field laboratory managed by the Institute for Seabird Research and Conservation for the protection and enhancement of wildlife resources, offering unprecedented opportunities for the observation, individual sampling, and experimental manipulation of seabirds nesting in specially created and controlled habitats.

Background: The Middleton Island Air Force Base (defense radar) was operated for 6 years during the cold war, decommissioned in 1963, and sold to a consortium of private investors (MIDICO) in 1966. Middleton Island is the summer home of thousands of breeding seabirds, including black-legged kittiwakes, pelagic cormorants, common murres, tufted puffins, rhinoceros auklets, glaucous-winged gulls, and black oystercatchers. Since the mid-1990s, many birds have established nesting sites on the now derelict buildings of the MIDICO property, and biologists have capitalized by augmenting the artificial habitats for research purposes and conducting long-term monitoring and research. In 2010, MIDICO agreed to sell its entire property (182 acres and improvements) for the discounted price of $50,000.

Institute for Seabird Research and Conservation (ISRC): Incorporated in Washington state in 2009, ISRC is a nonprofit 501(c)(3) public charity dedicated to seabird research and conservation in the northeast Pacific, with a focus on consolidating, protecting, and developing the wildlife values and scientific benefits of the Middleton Island facility. Its current directors are three senior biologists with more than 100 years collective experience in seabird research and conservation in California, Alaska and Hawaii.

Action Plan: ISRC has entered into an option-to-purchase agreement with MIDICO—good through 30 November 2011—for acquisition of the Middleton property. Upon successful fundraising, IRSC will purchase the property and begin implementation of a well-established plan for perpetual use in support of conservation, scientific research, and education. ISRC will manage the Middleton Island Marine Biological Station in furtherance of several principles and objectives:

- Continuation of long-term experimental studies of seabird life histories, including supplemental feeding of select species, to gauge the health of the marine ecosystem in the Gulf of Alaska

- Conduct year-round tracking of seabirds using state-of-the-art telemetry to establish cross-seasonal connections between the Gulf of Alaska and wintering areas throughout the northeast Pacific

- Employ seabirds as indicators of climate change effects in the marine environment

- Use seabirds as monitors of critically important forage fish populations (rhinoceros auklets and tufted puffins as fish samplers)

- Enhance seabird populations on Middleton Island by creating high-quality nesting habitat (kittiwakes, murres, cormorants, auklets and puffins)

- Ensure the availability in perpetuity of an unparalleled research facility to federal, state, private, university, and international cooperators

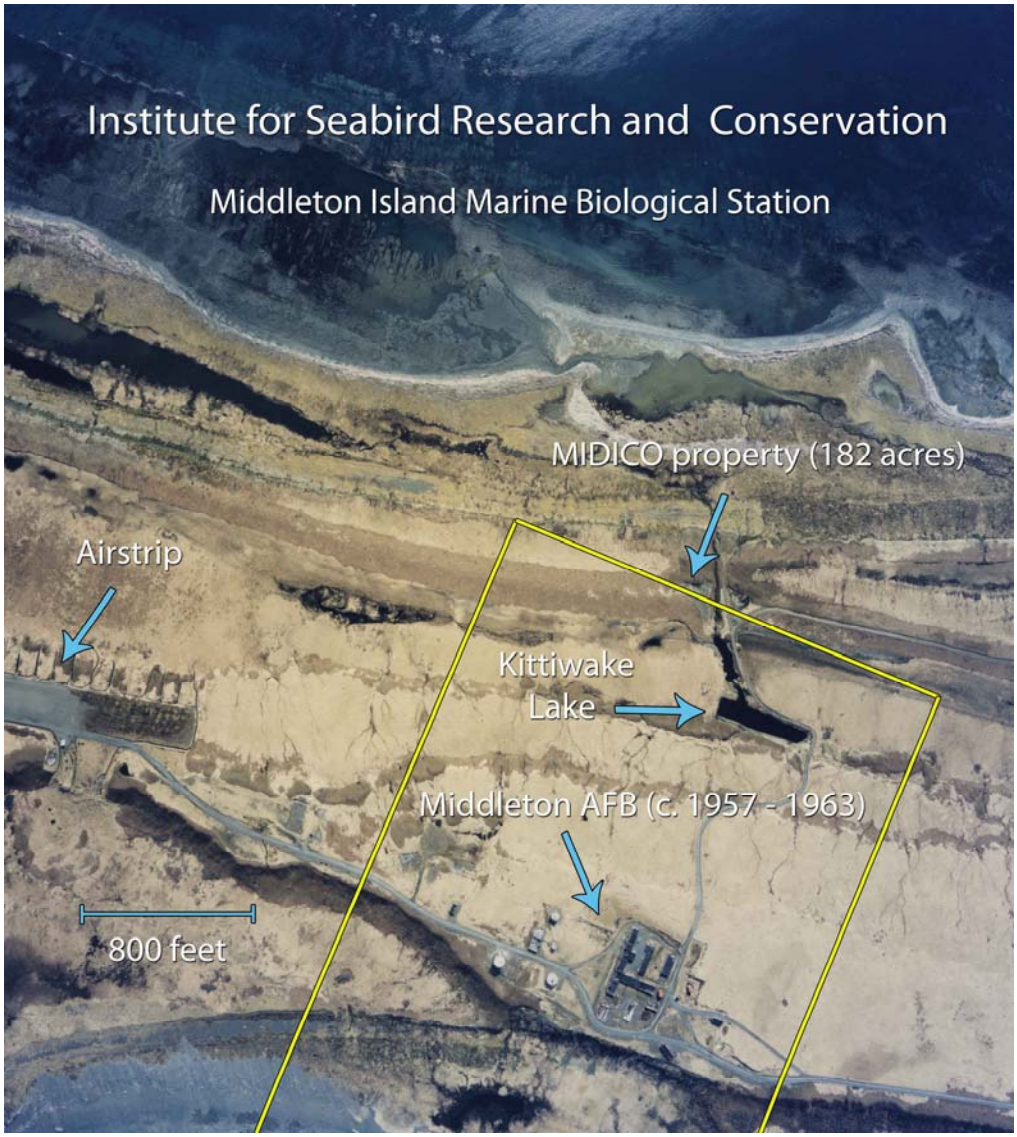
Budget: ISRC seeks start-up funding in the amount of $300,000 for:

- Purchase of the MIDICO tract and existing structures (of which nine buildings are targeted for preservation and renovation) [$50 K]

- Renovation, removal of unwanted structures, and construction/maintenance of seabird nesting habitats [$250 K]

Longer-term, the Institute seeks to build an endowment (~$1M), the annual earnings of which (~$50K) will support both incremental additions, upgrades, and maintenance of facilities and continuity in a core program of seabird monitoring and research.

Bottom Line: The history, unique features, and time-limited availability of privately owned seabird habitat on Middleton Island present a rare opportunity to create and foster a facility with far-reaching benefits for Pacific seabirds.


Institute for Seabird Research and Conservation
Middleton Island Marine Biological Station
MIDICO property (182 acres)
Airstrip
Kittiwake Lake
Middleton AFB (c. 1957 - 1963)
800 feet

The "Chateau"
200 feet
East tower
Little tower
Tractor shed
The "Cabin"
Warehouse
Main tower
West tower
Murre building

Appendix 1

Institutional Versus Government Stewardship

Upon reviewing the Middleton Island prospectus, Anna Weinstein, Seabird Conservation Coordinator for Audubon California, posed pertinent questions as follows:

"Have you considered asking the state of Alaska or the Federal governement (via Interior or FWS) to purchase the island? Most seabird breeding islands are owned by governments. Also, what is the threat? Is the private consortium trying to unload the island? If so, how real is that threat? Is it strategically located for a commercial industry such as fishing, mining, or transport that would threaten the seabirds and reduce researcher access? Finally, how is it that researchers have had access for so long, and, is buying the island needed to ensure that access and conservation continues into the future?"

Scott Hatch, ISRC Executive Director, responds:

Middleton Island was in the Alaska Maritime National Wildlife Refuge for 3-4 years after the ANILCA (Alaska National Interest Lands Conservation Act) passed in 1980, but was then "selected" by and conveyed to the Chugach Alaska Native Corporation. That includes most of the acreage of the island (~1500 acres), but the FAA still has small land parcels for their facilities, and the MIDICO tract has remained in private hands all along. It used to be that the Air Force (MIDICO) property had no particular wildlife value (a few burrow nesters perhaps), but that has changed completely. All seven seabird species (kittiwakes, cormorants, murres, puffins, auklets, gulls and oystercatchers) now nest abundantly on the property, which is in fact becoming the center of seabird action on the island.

I and others worked persistently for years to try to get either the USFWS or USGS to acquire the MIDICO property and put it into the refuge system or manage it as a research station—but to no avail. The government is simply not interested in taking possession of anything that would entail maintenance of facilities, and they worry obsessively about getting stuck "holding the old maid" and having to pay for environmental clean-up and site restoration. (I have arranged numerous VIP trips to the island, including, for example, the USFWS Alaska regional director on one occasion, and the Deputy Secretary of the Interior and Assistant Director for Migratory Birds of the the Fish and Wildlife Service on another, plus numerous administrators from my own agency). While everyone has always been highly impressed by what they see, the situation does not fit neatly within any of the existing models for Interior land ownership. So several years ago I concluded that the only way the Middleton biological station would be viable long-term would be to establish a nonprofit organization (ISRC) specifically to take ownership and perform the stewardship role on behalf of all potential users.

I first went to Middleton Island in 1978, and have been going there annually since 1986. In the early years, the seabird work occurred mostly elsewhere on the island (as mentioned), but since birds started nesting on the buildings and I decided to work with them in that situation, we have conducted the work with the tacit permission of the landowners. This has never been completely comfortable, as it would not be unreasonable of the owners to become concerned about liability issues and put a stop to the activity. In essence, we could be evicted on a moment's notice at the discretion of current or future owners, and this will always be the case unless the property is owned by an entity dedicated to its wildlife values. As ownership stakes become increasingly divided among the children and grandchildren of the original partners, there is no predicting (and much peril concerning) the disposition of the owners toward the seabird work. I was greatly relieved to get the option-to-purchase agreement in place by working directly with the son of the last surviving member of the original group of owners (said senior having passed away at age 92 in July 2010).

So, the answer to the specific question, "Is buying the [MIDICO tract] needed to ensure that access and conservation continues into the future?" is definitely "yes." It is interesting too, that as time goes on, the site has ever-increasing importance to seabirds. In its heyday (around 1980) the Middleton colony of kittiwakes totaled around 160,000 birds (possibly the world's single largest colony of the species). Due apparently to a combination of habitat alteration (1964 Alaska earthquake), increased predation by bald eagles (*Haliaeetus leucocephalus*), and poor foraging success, the population declined steadily to as few as 10-12,000 birds, but appears to have bottomed out as birds continue to crowd into the Air Force site. Some 6,000 kittiwakes currently nest on the MIDICO property. With the enhancements to kittiwake nesting habitat I envision, some 10,000 to 15,000 kittiwakes can (and likely will) be supported on the property. I predict that in 10-20 years, the species will nest essentially nowhere else on the island.

Murres also have declined at least in part because of successional changes to the natural habitat brought about by the 1964 earthquake. What used to be upwards of 11,000 common murres is now around 2,000, almost all of which use the MIDICO property. Without intervention and construction of the artificial habitat envisioned for the site, I predict that murres essentially have no future on Middleton.

Tufted puffins and rhinoceros auklets are increasing all over the island (with approximately 20,000 of each species currently). While neither species is dependent on the MIDICO property, the largest concentration of rhinos is within its boundaries, and the presence of both species invites the creation of habitat (artificial ceramic burrows) managed for research purposes.

There are stories upon stories to tell about Middleton, but the best way for a person to understand the situation is to see it first-hand. We're hoping to arrange for a party of potential donors to visit the island in July 2011.

We would emphasize the following point in our proposed Budget: "Longer-term, the Institute seeks to build an endowment (~$1M), the annual earnings of which (~$50K)

will support both incremental additions, upgrades, and maintenance of facilities and continuity in a core program of seabird monitoring and research." There is no question that funds placed in an endowment would be the way for any donor to get the absolute greatest value for their money (...the proverbial gift that keeps on giving). In the most optimistic scenario, we would attract one or two major donors in the private sector and match those contributions with funds provided by state and/or federal agencies on a one-time basis. A lot of "ifs" to be sure, but an outcome that would allow the Middleton facility to achieve—in the most cost-effective manner possible—its full potential under the direction of ISRC.

Given the expected realities of public funding in the future (i.e., increasingly scarce and unpredictable), we believe that new thinking, creative partnerships, and an increased role for the nonprofit sector will be needed to meet the needs of environmental research and conservation going forward. Seabird work conducted in the Farallon Islands, under the direction of the Point Reyes Bird Observatory, is in some respects a fitting model for the future of field operations on Middleton.

Appendix 2

Middleton Island Marine Biological Station - Testimonials

Middleton is without question the most important seabird monitoring and research site in the Gulf of Alaska (notwithstanding some other very important sites in the AMNWR monitoring protocols). In part, this is due to its longevity and substantial time series datasets, but also because [it houses] the longest-running seabird ecology experiment in the world, allowing for tests of hypotheses that are simply not possible without an experimental approach. – ***Bill Sydeman, PhD (The Farallon Institute)***

The Middleton Island project is notable especially for the ease with which the study population can be accessed for manipulation and experimentation. It provides a tremendous opportunity for long-term research in a region where, other than count monitoring, long-term demographic studies of marine birds are more or less non-existent. Over the past two decades we have seen many far-reaching changes in the marine ecosystems of the NE Pacific. Such studies become more valuable as they lengthen, as they allow us to better understand the effects of oceanographic cycles taking place on a variety of time scales. – ***Tony Gaston, PhD (Canadian Wildlife Service)***

The seabird research and monitoring opportunities present on Middleton Island are unparalleled...probably unique worldwide. The kittiwake nesting colony on the tower allowed us to collect a large data set in a short period of time, with little or no effect on the productivity of the study subjects. We were stunned by the potential for rapid advances in understanding the factors that limit seabird populations. The Middleton Island field station is very well positioned to play a major role in improving our understanding of the effects of ocean conditions in the Gulf of Alaska on top trophic level predators, such as seabirds and marine mammals. – ***Dan Roby, PhD (Oregon State University)***

There is a great need for set-ups like that on Middleton Island where hypotheses generated from field data can be rigorously tested. The Middleton Island research station can facilitate not just the collection of information on the ecology of seabirds but the improvement in ecological theory. – ***Mike Harris, PhD (Institute of Terrestrial Ecology, UK)***

The North Pacific appears to be shifting to a cooler phase. Middleton, because of its position, samples a large area not otherwise covered, and it can contribute greatly to our understanding of how fish and their predators respond to that shift. The tower situation on the island allows hands-on research not possible anywhere else, including in-depth population studies rivaled only by Coulson's now-legendary studies of Atlantic kittiwakes. – ***David Duffy, PhD (University of Hawaii)***

Some investigations [on black-legged kittiwakes] led to field experiments. First, Thomas (1983) manipulated clutch size, then an experiment was imposed at the North Shields colony by netting over many of the ledges to study relocation of adults (Fairweather and

Coulson 1995). However, the experiment par excellence was that initiated by Gill and Hatch (2002) on a colony nesting on a building at Middleton Island, in the Gulf of Alaska. – ***John Coulson, PhD (University of Durham, UK, retired)***

...This willingness [of seabirds] to use manmade facilities affords a unique research and habitat restoration opportunity, as the structures not only replace habitat lost due to the earthquake, but provide researchers easy access to nesting adults and their eggs and young. Monitoring the island's seabirds and the unique opportunity for experimental research on the ecological factors that influence their numbers have made the island a seabird study site of national and international importance. – ***Stan Senner (Ocean Conservancy)***

Middleton Island is home to one of the most important seabird colonies in the Gulf of Alaska, and the seabird monitoring database that was initiated in the mid- to late 1970s has become particularly valuable. The kittiwake research is at the cutting edge, and the promise to expand that type of research to include murres and cormorants is exciting. As supervisory biologist at Alaska Maritime NWR, I am interested in seeing the time-series continue on seabirds, but I am particularly interested in seeing the results of ecological studies conducted there, including the prey experiments. – ***Vernon Byrd (Alaska Maritime National Wildlife Refuge)***

There is a need for a facility that is intermediate between seabird research done "on the cliff" and that done in a totally captive environment such as the Seward SeaLife Center. What exists at Middleton Island is truly unique. – ***Dan Mulcahy, PhD, DVM (USGS Alaska Science Center)***

Middleton Island provides a unique situation to study seven seabird species simultaneously, providing information on reproductive effort and success, population trends, and other parameters as desired. No other kittiwake colony in the world has the experimental capabilities of the tower. Numerous researchers from around the world have collaborated on projects, including physiology, behavioral ecology, and genetic studies of kittiwakes. – ***Rick Lanctot, PhD (USFWS, Migratory Birds)***

Appendix 3

Middleton Island Marine Biological Station

Active Management & Public Outreach

The Middleton facility proposed to be purchased and managed by the Institute for Seabird Research and Conservation is notable not only for its unique capabilities to support innovative research, but also for its potential to contribute meaningfully to seabird conservation, environmental education, and public use and enjoyment. Plans for realizing these important values include:

- Arrest declines, then produce, and/or conserve cliff-nesting birds by building and maintaining high-quality nesting habitat to replace what is being lost—affects ~15,000 black-legged kittiwakes, 2000 common murres, and 2000 pelagic cormorants

- Use social attraction techniques and habitat construction to establish viable breeding populations of horned puffins and/or northern fulmars, fork-tailed storm-petrels, Leach's storm-petrels

- Use cross-fostering techniques to re-introduce or establish two species of special interest: thick-billed murre (former breeder on Middleton) and red-legged kittiwake (vulnerable species on Audubon's Alaska WatchList 2010)

- Promote public use and enjoyment of marine wildlife through ecotourism and environmental education on-island, plus data-sharing and remote, real-time observation of breeding seabirds on the Internet

An island in flux

For reasons at least partially understood, populations of seabirds and other wildlife on Middleton Island have been more dynamic over the past several decades than at possibly any other location in Alaska (refer to plots of census data on page 21). When Robert Rausch visited Middleton in 1956 to conduct a biological reconnaissance for the U.S. military (Rausch, 1958, "The occurrence and distribution of birds on Middleton Island, Alaska," Condor 60: 227-242), he found a kittiwake population roughly one-fifth the size it would be (~160,000 birds) in the early 1980s. Rausch counted some 400 murres on the island, most of which were thick-billed murres (*Uria lomvia*), and he considered glaucous-winged gulls to be a nonbreeding species, as only a few individuals were seen roosting on offshore rocks. Rausch reported no rhinoceros auklets from his trip but could have missed small numbers of that nocturnal species. Pelagic cormorants and tufted puffins were present in low numbers (Rausch 1958; pers. comm.).

In the mid-1970s to early 1980s, seabird counts conducted by the U.S. Fish and Wildlife Service indicated large changes since the time of Rausch's observations. As noted, kittiwakes had increased manyfold to become possibly the largest and densest colony in the world for any island of comparable size. Pelagic cormorants had also increased several-fold (USFWS data and Rausch, pers. comm.). Murres were up from ~400 (mostly thick-billed) to more than 10,000 individuals, most of which were common murres. Thick-billed murres were still present in numbers similar to what Rausch had reported. By the mid-1970s, glaucous-winged gulls were established breeders, numbering 1000–2000 adults. In all likelihood, rhinoceros auklets first bred on Middleton Island sometime after Rausch's 1956 reconnaissance—by 1976 they were estimated to number 1000–2000 birds.

Following their "heyday" in the 1970s and 1980s, colonies of cliff-nesting species declined in an equally dramatic fashion. Having experienced chronic, widespread breeding failure in all natural nesting habitats on the island, kittiwakes now number around 10,000 individuals (spring 2011), a 94% decline since 1981. Common murres currently number about 2000 birds, an 80% decline, and thick-billed murres are effectively extinct on Middleton—only one individual was seen in 2011. Pelagic cormorant numbers are down about 80% from peak levels in the late 1980s. In contrast, other seabirds have seen major increases over the same period. The most recent (2008-2009) count of rhinoceros auklets burrows island-wide indicated a population of not less than 15,000 and possibly >20,000 auklets. Tufted puffins are also increasing, numbering more than 20,000 birds in 2010, versus estimates of <5000 in the 1970s. Breeding glaucous-winged gulls increased exponentially to more than 20,000 individuals (adjusting for attendance during census counts) from the 1970s through the 1990s, and may have stabilized at around 15,000 gulls.

Besides the changes in seabird populations just described, other wildlife species have seen marked fluctuations on Middleton Island. No black oystercatchers (*Haematopus bachmani*) were present in 1956, but a single breeding pair was noted in 1976. Subsequently, the population exploded to >170 territorial pairs and >700 individuals (including nonbreeders) island-wide (Gill et al., 2004, "Colonization, population growth, and nesting success of black oystercatchers following a seismic uplift," Condor 106: 791-800). Oystercatchers on Middleton are now believed to constitute around 7% of that species' world population. The first family group of Canada geese (*Branta canadensis*) was seen on Middleton in 1981; subsequently the summer population increased to around 2000 highly productive adult geese (M. Petrula, Alaska Department of Fish and Game, pers. comm.). Formerly numbering 2000-3000 animals (National Marine Fisheries Service data), Steller sea lions (*Eumetopius jubata*; mostly nonbreeding individuals) vanished abruptly in the late 1980s and have not returned (no more than a dozen or so sea lions are seen around the island in summer in recent years). The decline of sea lions is part of a larger collapse of the species' population in western Alaska since the 1980s. It is reasonable to assume that Middleton Island will again be important to sea lions if and when this threatened species is able to rebuild its numbers.

A suite of factors is responsible for the volatility of bird populations on Middleton Island. The Alaska earthquake of 1964 (magnitude 9.2) raised the island approximately 4 m. Hundreds of acres of previously submerged land were exposed, initially as a bare substrate of clay, boulders, sand and gravel. The earthquake caused no immediate changes to the sea cliffs, however, and it is necessary to postulate other events, possibly related to the earthquake, to account for changes in seabirds. For example, the uplift may have created attractive spawning habitat for species such as sand lance (*Ammodytes hexapterus*) and capelin (*Mallotus villosus*), which are key prey species of Alaska seabirds. Fish-eating birds responded in turn, but the timing and trajectories of various species were influenced by successional changes in the island's topography and vegetation. In the 1970s, a burgeoning population of kittiwakes colonized habitats uncharacteristic of the species, including flat ground in places, soil-covered slopes, boulders, and the decks and rigging of the *S.S. Coldbrook* shipwreck. As kittiwakes declined from the 1980s to present, former sea cliffs eroded from near-vertical faces to slopes approaching 45° near their bases. Vegetation is steadily advancing up the slopes, already overtopping the bluffs in places. In future the process will be completed, and extensive cliff habitat will never again be available to ledge-nesting seabirds on Middleton (at least not in the context of human timelines). Murres are at a particular disadvantage, as their still-flightless young must now traverse several hundred meters of densely vegetated ground to reach the sea when they leave their nest ledges.

Middleton Island comprises about 2200 acres, excluding the supra-tidal lands resulting from the 1964 earthquake. The latter totals an additional 1000 acres by rough estimate, but has never been adequately surveyed or mapped, and continues to evolve through longshore deposition, sedimentation, and plant succession. New beach and brackish meadow habitats have proven especially attractive to oystercatchers, gulls, and geese. As sea cliffs are transformed to vegetated bluffs, an ever-increasing amount of soil habitat is available where underground nesters can dig their burrows. Rhinoceros auklets and tufted puffins are clearly taking advantage of that development.

The decline of kittiwakes and cormorants on Middleton is thought to have been precipitated by a failure of the food supply beginning in the mid-1970s or early 1980s. In 1977, a well-documented ocean regime shift (from cooler to warmer conditions) occurred throughout the NE Pacific that proved to be beneficial for some species and detrimental to others, the latter including many seabirds and pinnipeds in Alaska. It is reasonable to attribute the food-related change of fortune among Middleton seabirds to that larger event. Kittiwakes, in particular, exhibited unmistakable signs of food-stress, failing almost completely at breeding for more than two decades, and responding dramatically to supplemental feeding on the Middleton tower. Compounding the effects of food shortage has been a marked increase of predators, notably glaucous-winged gulls and bald eagles (*Halialeetus leucocephalus*). Gulls take the eggs and young of kittiwakes, cormorants, and murres opportunistically. Eagles create opportunities by flushing seabirds off their nests, and they also prey directly on the young and/or adults of several species, including kittiwakes, cormorants, murres, and puffins. Formerly absent from Middleton, bald eagles likely responded to the presence of introduced rabbits (O'Farrell, 1962, "The rabbits of Middleton Island, Alaska," J. Mammal. 46: 525-527). First nesting by eagles

was noted in the mid-1980s. Today the breeding population is usually 4-6 pairs, and rabbits also attract raptors in winter—FAA personnel report up to 50 bald eagles (including many juveniles) and similar numbers of snowy owls (*Nyctea scandica*) wintering on Middleton in some years.

Ecologists have long awaited a reversal of the 1977 regime shift, as the processes that led to the shift are thought to be cyclical, and a return to something like pre-1977 conditions is expected (overdue, in fact). It is possible that kittiwakes are giving us an early indication of such a transition (witness a change in foraging strategies, diet, and increased breeding success in 2010 and 2011 on Middleton). Whatever nature has in store, however, the maintenance of robust populations of cliff nesters on Middleton will depend substantially on active management of their nesting habitats.

Direct benefits of habitat acquisition and management

With changes in the distribution and abundance of seabirds on Middleton Island, the importance of the MIDICO property to several species has increased. The following table summarizes the past and current status of kittiwakes, murres, and cormorants:

Nesting seabirds on the MIDICO tract—then and now

	Population status				
	Formerly (c. 1980-1990)		Present-day (2011)		
Species	Island total (individuals)	Proportion in MIDICO tract	Island total (individuals)	Population change	Proportion in MIDICO tract
Black-legged kittiwake	160,000	0%	10,000	-94%	60%
Common murre	10,000	0%	2000	-80%	100%
Pelagic cormorant	9000	0%	1600	-82%	55%

Because the concentration of cliff nesters on the Air Force site can be attributed in large measure to construction of the tower colony, supplemental feeding and improved reproduction of kittiwakes, and the social attraction (including interspecific attraction) those developments created, the current status of cliff nesters on Middleton is dependent

on human intervention and hands-on management. An artificial habitat for murres (including facilitated access to the sea by murre fledglings) is under construction, which is planned to accommodate the current population of 2000 common murres and thereby arrest the decline of that species on Middleton. In the near future, both kittiwakes and cormorants may be largely dependent on the Air Force buildings for nesting, but those sites will not remain usable indefinitely without continued upkeep by humans. It is estimated that by augmenting existing structures, it will be possible to increase the kittiwake population on the MIDICO property from its current level of 6000 birds (60% of island total) to around 15,000 birds (~100% of island total). Cormorants will also use such nesting ledges as may be provided, and site use by cormorants and kittiwakes can be managed by design of the ledges. In simple numerical terms, the acquisition and management of the MIDICO property by ISRC is expected to produce and/or conserve the following numbers of cliff-nesting seabirds, which would otherwise be lost: 15,000 black-legged kittiwakes, 2000 common murres, and 2000 pelagic cormorants. Management will augment seabird numbers directly by increasing nesting habitat and indirectly by increasing breeding success (which is high on artificial habitats and low to nonexistent in remaining natural habitats on Middleton).

Other enhancements to seabird nesting habitats are planned primarily to support improved access for research. Artificial burrows for tufted puffins and rhinoceros auklets, composed of ceramic material (àla Año Nuevo Island in California) or lightweight concrete, will provide for close observation and experimentation on ~100 pairs of each species. Preliminary success in drawing horned puffins (*Fratercula corniculata*) to the site using social attraction techniques (see Appendix 9, page 38) suggests it may be possible also to establish a viable population of that species for research purposes. Northern fulmars (*Fulmarus glacialis*), fork-tailed storm-petrels (*Oceanodroma furcata*), and Leach's storm-petrels (*O. leucorhoa*) are additional species that might be encouraged to breed on Middleton Island through active management (Appendix 9).

Finally, ISRC may pursue, with the concurrence and cooperation of the U.S. Fish and Wildlife Service, the establishment or restoration on Middleton of two species of special interest—thick-billed murres and red-legged kittiwakes (*Rissa brevirostris*). Viable populations of both species could likely be established by cross-fostering—placing eggs obtained from other Alaska colonies in the nests of common murres and black-legged kittiwakes, respectively. As noted, thick-billed murres formerly bred on Middleton, and their disappearance is probably the result of natural degradation of nesting habitat. It is desirable to restore thick-billed murres as an ecological complement to common murres, for their value as indicators of ocean conditions. Red-legged kittiwakes are also unique indicators, but active management is recommended mainly as a hedge against possible population problems for this species in the future (as might result, for example, from volcanism, other isolated events, or ecosystem changes related to global warming). From early accounts of Alaska naturalists (circa 1880s), it is clear that red-legged kittiwakes were formerly much more abundant than at present (purportedly more widespread and numerous than black-legged kittiwakes), and also more prolific (two- and three-egg clutches versus single-egg clutches today). Currently, the species breeds on

only a few islands in the Bering Sea, with most of the birds concentrated on St. George Island, Bogoslof Island, Buldir Island, and the Komandorskie Islands (Russia). Given its proximity to the shelf edge, Middleton Island is potentially a viable breeding site for red-legs, which are specialized for foraging over deep ocean water. In the most dire scenario, the Middleton seabird facility, with its capability to support successful breeding of kittiwakes through supplemental feeding, might someday be a vital lifeline for a struggling world population of red-legged kittiwakes.

Wildlife appreciation & public outreach

In recent years, the Anchorage chapter of Audubon Alaska has organized occasional day trips to Middleton for viewing birds and other wildlife—typically using a DC-3 to ferry 18 passengers to and from the island. Because of its strategic position as a resting place for spring and fall migrants, smaller, self-organized groups of birders also visit the island occasionally, where they enjoy the comfort of renovated buildings on the Air Force site. That custom will continue under the direction of ISRC. At any time from May through September, Middleton offers a high-quality wildlife viewing experience upon a one-hour flight from the main population centers of south-central Alaska. Extended summer camps—short courses in environmental and wildlife science for secondary and post-secondary students—are an option to consider.

The novelty of "up close and personal" viewing of seabirds on the tower has attracted considerable attention in the public media since 1998 (Appendix 8). Most recently (summer 2011), three new documentaries have appeared on APRN (Alaska Public Radio Network), NPR (National Public Radio), and the Seattle Times website:

http://www.alaskapublic.org/2011/06/08/solving-a-biological-puzzle-on-middleton-island/

http://seattletimes.nwsource.com/html/fieldnotes/2015661715_sniffing_out_the_other_sex_people_do_it_as_do_mice_and_lizards_b.html

http://www.npr.org/2011/07/23/138574244/the-kittiwake-winging-it-survival-wise

As a matter of policy, all research data collected at the ISRC facility will be publicly available online via the Pacific Seabird Monitoring Database, soon to be implemented as a World Seabird Monitoring Database under the auspices of the World Seabird Union (Hatch, 2010, "Seabird databases and the new paradigm for scientific publication and attribution," Marine Ornithology 38: 1-6; Hatch, 2010, "A world seabird organization and seabirds.net: meeting the challenge of the new paradigm," Marine Ornithology 38: 69-77). In addition, salient results of seabird monitoring and research will be attractively packaged and shared routinely at the Institute's website, isrcweb.org.

The availability of AC-power and accessible, sheltered nest sites at the Middleton facility means that unprecedented, continuous viewing of seabird breeding behavior can be

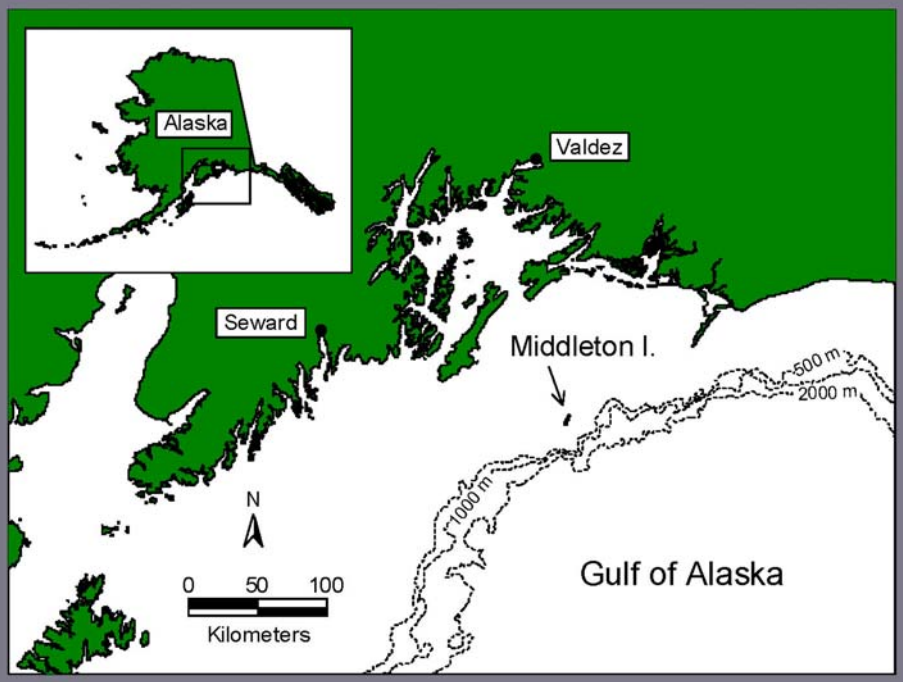
shared with the public via live, streaming video. That prospect includes black-legged kittiwakes, pelagic cormorants, common murres, rhinoceros auklets, and tufted puffins. Therefore, as soon as it is feasible (i.e., as soon as dedicated funds are available), the relevant technologies will be implemented on the island and at isrcweb.org.

THE MIDDLETON ISLAND MARINE BIOLOGICAL STATION:

A UNIQUE VENUE FOR SEABIRD RESEARCH AND MONITORING IN THE GULF OF ALASKA

Institute for Seabird Research and Conservation

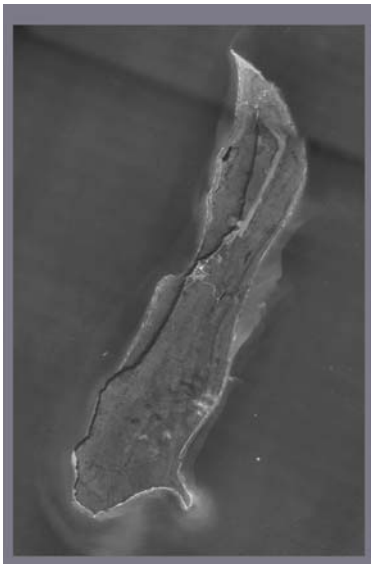
Middleton Island, North-Central GOA



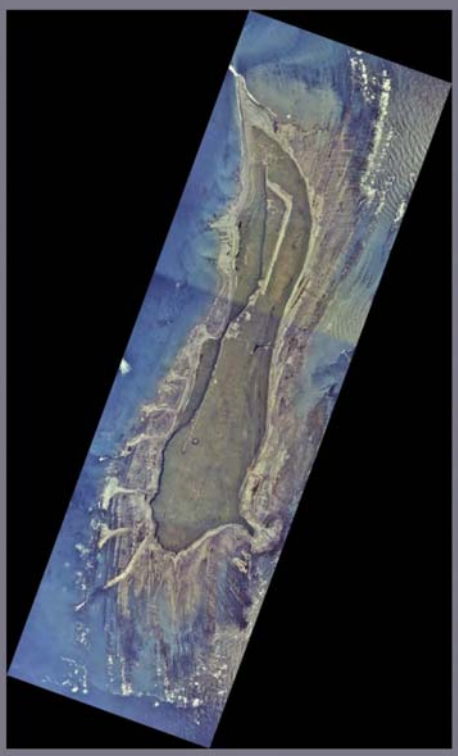
VISION STATEMENT

- The Middleton Island Marine Biological Station will be a one-of-a-kind field laboratory owned and managed by the Institute for Seabird Research and Conservation
- The site will be an internationally recognized venue for innovative research on marine birds and other wildlife
- Trademark will be unique infrastructure for the observation, individual sampling, and experimental manipulation of five seabird species in specially created and controlled nesting habitats

Uplifted ~ 4 m 1964



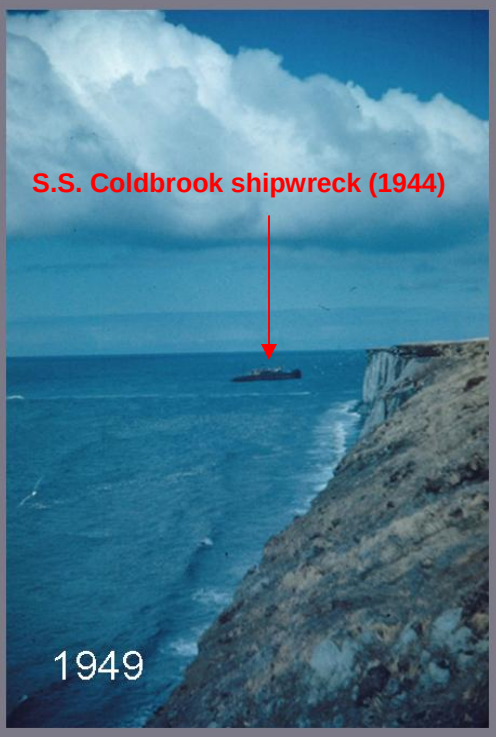
1955

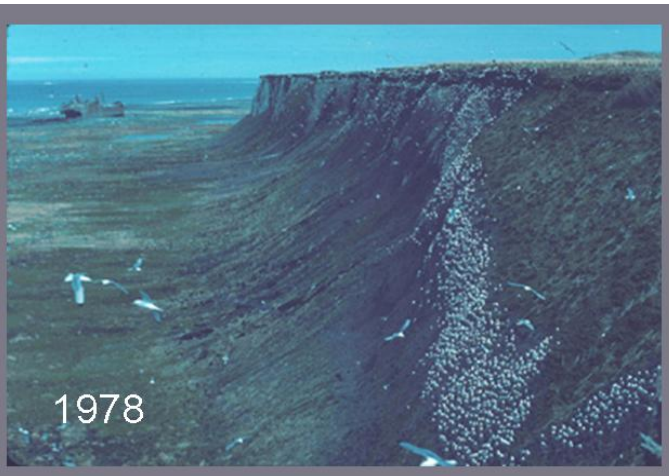


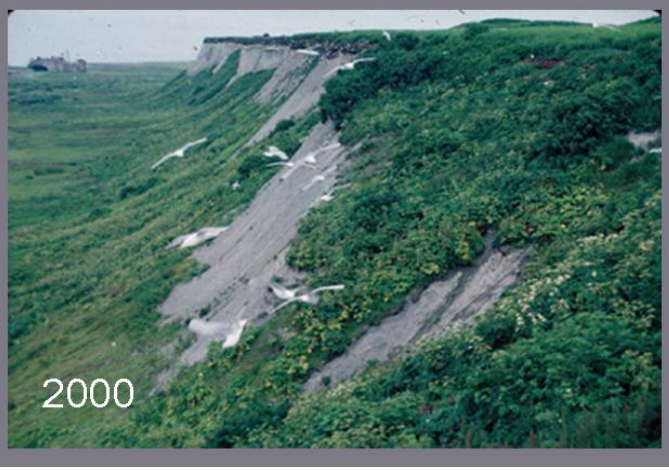
1967

2005

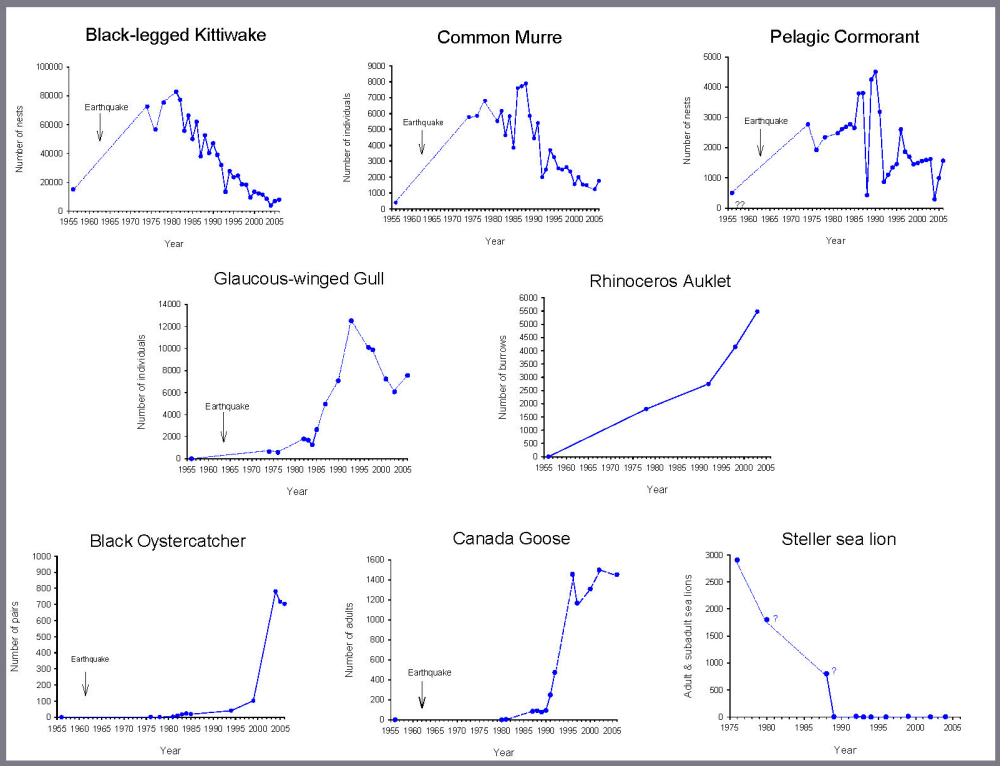
Present-day shoreline
Pre-1964 sea-cliffs


S.S. Coldbrook shipwreck (1944)
1949

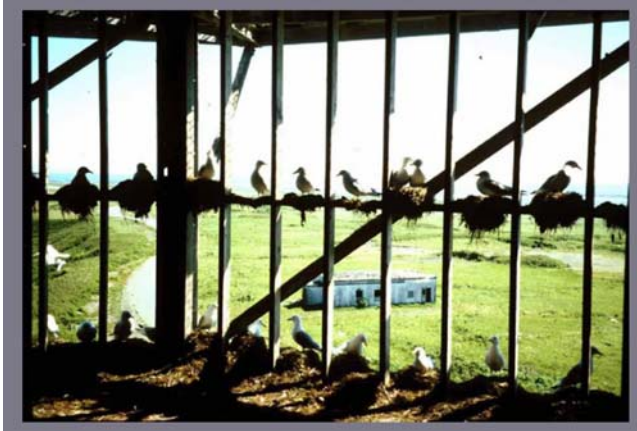

1978


2000

Long-term monitoring



1989
1996
2000



TOWER

TOWER

PELAGIC CORMORANTS IN WINDOW SITES

MURRE HABITAT – IN PROGRESS

RESEARCH HABITATS

GOALS

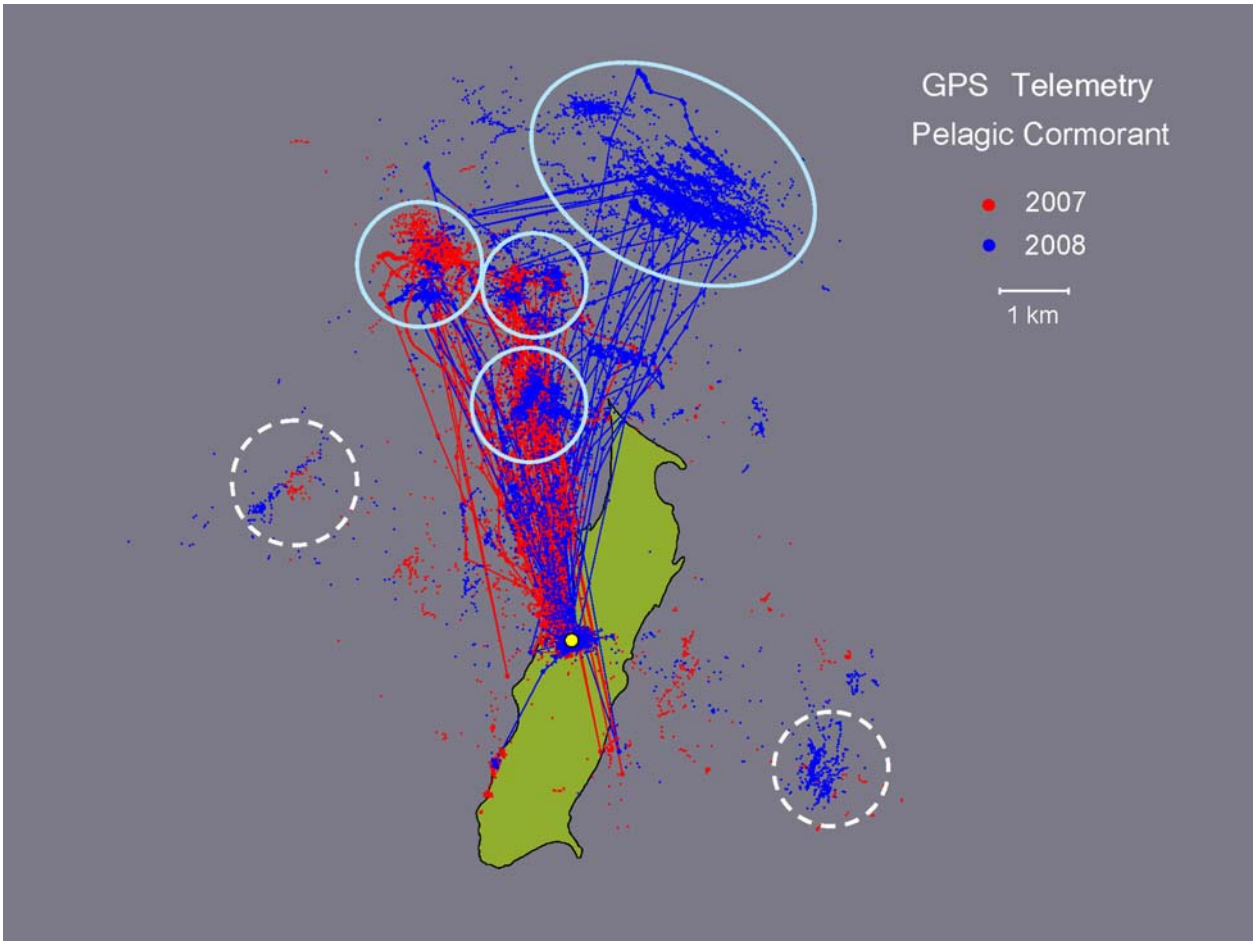
- Black-legged kittiwake - > 400 pairs nesting in window sites (DONE)
- Pelagic cormorant - ~ 100 pairs nesting in window sites (DONE)
- Common murre – 1000-2000 birds in artificial habitat (IN PROGRESS)
- Tufted puffin & Rhinoceros auklet - > 100 pairs each in artificial burrow habitat (PLANNED)

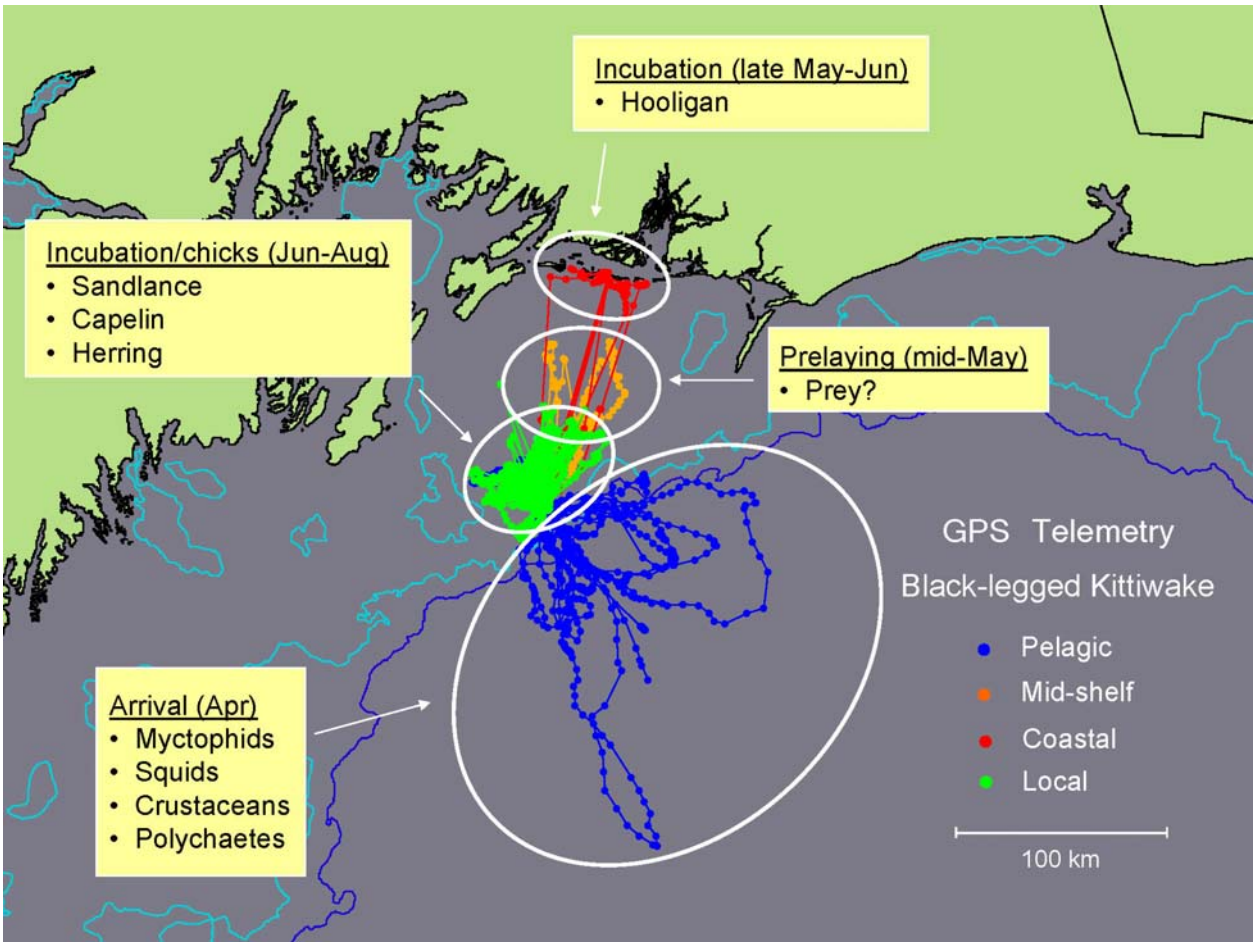
OFFICE & LIVING SPACE

WAREHOUSE

ACCESSIBLE BY AIR

PUFFINS AS FISH SAMPLERS





MDO Station Summary

- Isolated marine station on OCS of NE Gulf of Alaska – proximity to shelf edge
- Easily accessible by air
- Facilities to support 10-15 scientific personnel
- Unique research infrastructure – controlled seabird habitats
- Longest time series of seabird monitoring in Alaska
- Puffins sample forage fish (>15 years)
- Ongoing kittiwake population study:
  - Color-banded population
  - Known-age birds
  - Complete individual histories – 14+ years
  - Continuous supplemental feeding since 1996
  - Genetics database

July
2008
Lynn Scarlett,
(then) Dep. Sec. Interior
Paul Schmidt, Asst.
Dir., USFWS
Stan Senner,
Ocean Conservancy
S.A. Hatch, ISRC

Appendix 5

Current Research Projects - Middleton Island Marine Biological Station:

- Validation of telomere techniques for known-age black-legged kittiwakes
- Life expectency in relation to early nutritional history and availability of food during reproduction
- Intrinsic limitation of the field metabolic rate in free-ranging kittiwakes: the role of oxidative stress
- The role of physiology and behavior in determining aging and individual heterogeneity in colonial birds
- Physiological versus chronological age in marine organisms and implications for life history variation
- Using serum and adipose tissue to determine turnover rates of fatty acids in captive black-legged kittiwakes
- Identifying summer foraging areas of black-legged kittiwakes with GPS dataloggers
- Wintering areas of black-legged kittiwakes from Middleton Island determined with geolocators
- Sex-allocation in relation to body condition and environmental predictability in a monogamous bird
- Sexual conflicts in a monogamous arctic bird: copulation, hatching failure and brood reduction
- Interannual variability and long-term trends in forage fish populations in the Gulf of Alaska

Current Collaborators:

A. S. Kitaysky, University of Alaska Fairbanks
J. Welcker, Norwegian Polar Institute, Tromso, Norway
K. Elliott, University of Manitoba, Canada
N. Bargmann, University of Alaska Anchorage
J. Kotzerka, University of Kiel, Germany
D.B. Irons, USFWS, Anchorage
E. Danchin, Université Paul Sabatier, Toulouse, France
P. Blanchard, Université Paul Sabatier, Toulouse, France
T. Merkling, Université Paul Sabatier, Toulouse, France
R.H. Wagner, Konrad Lorenz Institute for Ethology, Vienna, Austria

Upshot:

Ongoing and future (5-10 years) seabird research on Middleton emphasizes:

- Using seabirds as indicators of large-scale oceanographic change in the NE Pacific
- Scenescence and life history adaptation in food-stressed individuals and comparisons with supplementally fed treatment groups
- Seasonal movements and habitat use (summer foraging, migration, and wintering areas) of kittiwakes, cormorants, gulls, and puffins using satellite telemetry, GPS, and geolocator technologies
- Using seabirds as samplers of forage fish in the northern Gulf of Alaska and predicting year-class strength of commercially important black cod (*Anoplopoma fimbria*) and salmon (*Onchoryhnchus* spp.)
- Behavioral ecology of black-legged kittiwakes in relation to nutrition and social context

Appendix 6

Middleton Island Marine Biological Station

Collaborating Institutions and Personnel, 1996 – 2011

Alaska Department of Fish and Game – B. Guzzetti, D. Tessler, M. Petrula

Konrad Lorenz Institute for Ethology, Austria – R.H. Wagner

Max Planck Institute for Ornithology, Germany – B. Kempenaers

Norwegian Polar Institute, Tromsø – J. Welcker

Oregon State University – D. Roby, P. Jodice

Université P. & M. Curie, Paris – J. White, H. Mulard

University of Alaska Anchorage – D.C. Duffy, I. van Tets, F. von Hippel

University of Alaska Fairbanks – A. Kitaysky, J. Sears, Z.M. Benowitz-Fredericks

University of Kiel, Germany – J. Kotzerka, S. Garthe

Université de Lausanne, Switzerland – J. Gasparini

University of Manitoba, Canada – K. Elliott

Université Paul Sabatier, Toulouse – E. Danchin, S. Leclaire, P. Blanchard, T. Merkling

U.S. Fish and Wildlife Service – R. Lanctot, D. Irons, H. Renner

U.S. Geological Survey, Alaska Science Center – S. Hatch, D. Mulcahy, V. Gill

Appendix 7

Middleton Island Field Station - Research Products

1. Hatch, S.A., T.W. Pearson, and P.J. Gould. 1979. Reproductive ecology of seabirds at Middleton Island, Alaska. U.S. Dep. Commer. NOAA, ***OCSEAP Ann. Rep***. 2: 233-308.

2. Hatch, S.A. 1983. The fledging of common and thick-billed murres on Middleton Island, Alaska. ***J. Field Ornithol***. 54: 266-274.

3. Hatch, S.A. 1984. Nestling diet and feeding rates of rhinoceros auklets in Alaska. Pages 106-115 *in* D.N. Nettleship, G.A. Sanger, and P.F. Springer (eds.), Marine birds: their feeding ecology and commercial fisheries relationships. ***Can. Wildl. Serv. Spec. Pub.***, Ottawa.

4. Hatch, S.A., B.D. Roberts, and B.S. Fadely. 1993. Adult survival of black-legged kittiwakes *Rissa tridactyla* in a Pacific colony. ***Ibis*** 135: 247-254.

5. Roberts, B.D. and S.A. Hatch. 1993. Behavioral ecology of black-legged kittiwakes during chick rearing in a failing colony. ***Condor*** 95: 330-342.

6. Roberts, B.D. and S.A. Hatch. 1994. Chick movements and adoption in a colony of black-legged kittiwakes. ***Wilson. Bull***. 106: 289-298.

7. Jodice, P.G.R., R.B. Lanctot, V.A. Gill, D.D. Roby, and S.A. Hatch. 2000. Sexing adult black-legged kittiwakes by DNA, behavior, and morphology. ***Waterbirds*** 23: 407-417.

8. Gill, V.A., S.A. Hatch, and R.B. Lanctot. 2002. Sensitivity of breeding parameters to food supply in black-legged kittiwakes *Rissa tridactyla*. ***Ibis*** 144: 268-283.

9. Gill, V.A. and S.A. Hatch. 2002. Components of productivity in black-legged kittiwakes *Rissa tridactyla*: response to supplemental feeding. ***J. Avian Biol***. 33: 113-126.

10. Jodice, P.G.R., D.D. Roby, V.A. Gill, S.A. Hatch, R.G. Lanctot, and G.H. Visser. 2002. Does food availability affect energy expenditure of nesting seabirds? A supplemental feeding experiment with black-legged kittiwakes. ***Can. J. Zool***. 80: 214-222.

11. Lanctot, R.B., S.A. Hatch, V.A. Gill, and M. Eens. 2003. Are corticosterone levels a good indicator of food availability and reproductive performance in a kittiwake colony? ***Hormones and Behav***. 43: 489-502.

12. Hatch, S.A. 2003. Statistical power for detecting trends with applications to seabird monitoring. ***Biol. Conserv***. 111: 317-329.

13. Gill, V.A., S.A. Hatch, and R.B. Lanctot. 2004. Colonization, population growth, and nesting success of black oystercatchers following a seismic uplift. ***Condor*** 106: 791-800.

14. Gasparini, J., A. Roulin, V.A. Gill, S.A. Hatch, and T. Boulinier. 2006. Kittiwakes strategically reduce investment in replacement clutches. ***Proc. R. Soc. Lond.***, B, Biol. Sci. 273: 1550-1554.

15. Gasparini, J., A. Roulin, V.A. Gill, S.A. Hatch, and T. Boulinier. 2006. In kittiwakes food availability partially explains the seasonal decline in humoral immunocompetence. ***Functional Ecol***. 20: 457-463.

16. Van Nus, T. 2006. The simple diet of a Northern Harrier *Circus cyaneus hudsonius* pair at Middleton Island in the Gulf of Alaska. **De Takkeling** 14: 68-77.

17. Burns, J.M., Williams, T.M., Secor, S.M., Owen-Smith, N., Bargmann, N.A., and Castellini, M.A. 2006. New insights into the physiology of natural foraging. ***Physiol. Biochem. Zool***. 79: 242-249.

18. Kempenaers, B., R.B. Lanctot, V.A. Gill, S.A. Hatch, and M. Valcu. 2007. Do females trade copulations for food? An experimental study on kittiwakes (*Rissa tridactyla*). ***Behav. Ecol***. 18: 345-353.

19. Gasparini, J., T. Boulinier, V.A. Gill, D. Gil, S.A. Hatch, and A. Roulin. 2007. Food availability affects the maternal transfer of androgens and antibodies into eggs of a colonial seabird. ***J. Evol. Biol***. 20: 874-880.

20. Thayer, J.A., D.F. Bertram, S.A. Hatch, M.J. Hipfner, L. Slater, Y. Watanuki, and W.J. Sydeman. 2008. Forage fish around the North Pacific as revealed by diet of a piscivorous seabird: synchrony and relationships with ocean climate. ***Can. J. Fish. Aquat. Sci***. 65: 1610-1622.

21. Sears, J., S.A. Hatch, and D.M. O'Brien. 2008. Disentangling effects of growth and nutritional status on seabird stable isotope ratios. ***Oecologia*** 159: 41-48.

22. Sears, J. and S.A. Hatch. 2008. Rhinoceros auklet developmental responses to food limitation: an experimental study. ***Condor*** 110: 1-9.

23. White, J., R.H. Wagner, F. Helfenstein, S.A. Hatch, L.C. Naves, and E. Danchin. 2008. Multiple deleterious effects of experimentally aged sperm in a monogamous bird. ***Proc. Natl. Acad. Sci. USA*** 105(37): 13947-13952.

24. Guzzetti, B.M., S.L. Talbot, D.F. Tessler, V.A. Gill, and E.C. Murphy. 2008. Secrets in the eyes of black oystercaters: a new sexing technique. ***J. Field Ornithol***. 79: 215-223.

25. Mulard, H., T. Aubin, J.F. White, S.A. Hatch, and E. Danchin. 2008. Experimental evidence of vocal recognition in young and adult black-legged kittiwakes. ***Anim. Behav***. 76: 1855-1861.

26. Hatch, S.A., G.J. Robertson, and P.H. Baird. 2009. Black-legged kittiwake (*Rissa tridactyla*). In ***The Birds of North America, No. 92*** (A. Poole and F. Gill, Eds.). The Birds of North America Online. The Birds of North America, Inc., Philadelphia, PA.

27. Suryan, R.M., V.S. Saba, B.P. Wallace, S.A. Hatch, M. Frederiksen, and S. Wanless. 2009. Environmental forcing on life history strategies: multi-trophic level response at ocean basin scales. ***Prog. Oceanogr***. 81: 214-222.

28. Mulard, H., E. Danchin, S.L. Talbot, A.M. Ramey, S.A. Hatch, J.F. White, F. Helfenstein, and R.H. Wagner. 2009. Evidence that pairing with genetically similar mates is maladaptive in a monogamous bird. ***BMC Evol. Biol***. 9: 147-158.

29. Mulard, H., Aubin, T., White, J. F., Wagner, R. H. and Danchin É. 2009. Voice variance may signify ongoing divergence among black-legged kittiwake populations. ***Biol. J. Linn. Soc***. 97: 289-297.

30. Kitaysky, A.S., J.F. Piatt, S.A. Hatch, E.V. Kitaiskaia, Z.M. Benowitz-Fredericks, M.T. Shultz, and J.C. Wingfield. 2010. Food availability and population processes: severity of of nutritional stress during reproduction predicts survival of long-lived seabirds. ***Func. Ecol.*** 24: 625-637.

31. Kotzerka, J., S.A. Hatch, and S. Garthe. 2010. GPS tracking devices reveal foraging strategies of black-legged kittiwakes. ***J. Ornithol.*** 151: 459-467.

32. White, J., S. Leclaire, M. Kriloff, H. Mulard, S.A. Hatch, and E. Danchin. 2010. Sustained increase in food supplies reduces broodmate aggression in black-legged kittiwakes. ***Anim. Behav***. 79: 1095-1100.

33. Satterthwaite, W.H., Kitaysky, A.S., Hatch, S.A., Piatt, J.F., and Mangel, M. 2010. Unifying quantitative life history theory and field endocrinology to assess prudent parenthood in a long-lived seabird, *Rissa tridactyla*. ***Evol. Ecol. Res.*** 12: 779-792.

34. White, J., P. Mirleau, E. Danchin, H. Mulard, S.A. Hatch, P. Hebb, and R.H. Wagner. 2010. Sexually transmitted bacteria affect female cloacal assemblages in a wild bird. ***Ecol. Lett.*** 13: 1515-1524.

35. Kotzerka, J., S.A. Hatch, and S. Garthe. 2011. Evidence for foraging-site fidelity and individual foraging behavior of pelagic cormorants rearing chicks in the Gulf of Alaska. ***Condo**r* 113: 80-88.

36. Hatch, S.A., V.A. Gill, and D.M. Mulcahy. 2011. Migration and wintering areas of glaucous-winged gulls from south-central Alaska. ***Condor*** 113: 340-351.

37. Hatch, S.A., V.A. Gill, and D.M. Mulcahy. 2011. Wintering areas of adult and juvenile pelagic cormorants determined by satellite telemetry. ***J. Field Ornithol.*** 82: 269-278.

38. Leclaire, S., T. Merkling, C. Raynaud, G. Giacinti, J.-M. Bessière, S.A. Hatch and É. Danchin. 2011. An individual and a gender odour signature in kittiwakes? Study of the semiochemical composition of preen secretion and preen down feathers. ***Naturwissenschaften*** 98: 615-624.

39. Leclaire, S., J. White, M.Battude, R.H. Wagner, S.A. Hatch & É. Danchin. Submitted. Integument coloration signals gender and individual quality in the black-legged kittiwake *Rissa tridactyla*. ***Behav. Ecol***.

40. Leclaire, S., T. Merkling, C. Raynaud, H. Mulard, J.-M. Bessière, E. Lhuillier, S.A. Hatch and Étienne Danchin. Submitted. Semiochemical compounds of preen secretion signal genetic make-up in a seabird species: the black-legged kittiwake. ***Proc. Roy. Soc. Lond. B.***

41. Leclaire, S., R.H. Wagner, V. Bourret, S.A. Hatch, F. Helfenstein, O. Chastel, F. Karadas and É. Danchin. Submitted. Flexibilty in parental effort: effects of male handicap on parental investment and siblicide in the black-legged kittiwake. ***Behav. Ecol.***

42. Benowitz-Fredericks, Z.M., A.S. Kitaysky, J. Welcker and S.A. Hatch. Submitted. Context-dependent effects of food availability on yolk androgen deposition in a seabird with facultative brood reduction. ***Anim. Behav.***

43. Merkling, T., S. Leclaire, E. Danchin, E. Lhuillier, R.H. Wagner, J.White, S.A. Hatch and P. Blanchard. Submitted. Food availability and offspring sex in a genetically monogamous seabird: insights from an experimental approach. ***Behav. Ecol.***

Appendix 8

Middleton Island field station and bird research

featured in popular media, 1999 - 2011

31 Oct 1999: 'Mysterious Middleton Island'; half-hour documentary aired on ***Animal Planet*** series ***All Bird TV***, hosted by U. Montana Prof. Ken Dial

2 Jul 2000: 'Dream home for a kittiwake – crew turns island's cold war radar tower into bird observation site'; Sunday feature-length article with photographs by ***Anchorage Daily News*** correspondent E. Manning

Jan 2001: 'Roosting on a radar tower'; 4-page article with photographs by E. Manning, ***Alaska Geographic*** magazine, vol 38(1)

Dec 2002: 'Experiment of the month'; highlight on Middleton tower kittiwake research by S. Reebs, ***Natural History*** magazine

Dec 2004: 'Indelible season'; essay on volunteer experience by S. Lenoe in ***Birding*** magazine

15 May 2005: 'Bird trap in the Gulf – Middleton Island is paradise for biologists and birders'; feature-length article with photographs by ***Anchorage Daily News*** reporter G. Bryson

Dec 2008: 'High and dry'; feature-length article with photographs by black oystercatcher researcher B. Guzzetti in ***Birder's World*** magazine

8-9 Jun 2011: 'Solving a biological puzzle on Middleton Island'; 2-part documentary on ***Alaska Public Radio*** by producer A. Feidt. Available online at: http://www.alaskapublic.org/2011/06/08/solving-a-biological-puzzle-on-middleton-island

19 Jul 2011. 'Sniffing out the other sex: People do it, as do mice and lizards, but seabirds?', weblog article by **Seattle Times** writer Craig Welch. Available online at: http://seattletimes.nwsource.com/html/fieldnotes/2015661715_sniffing_out_the_other_sex_people_do_it_as_do_mice_and_lizards_b.html

23 Jul 2011. 'The kittiwake: winging it, survival-wise', 5-min documentary on **NPR's Weekend Edition** by producer A. Feidt. Available online at: http://www.npr.org/2011/07/23/138574244/the-kittiwake-winging-it-survival-wise

Note: To view a collection of historical photographs from the Air Force era (1956-1963) on Middleton, go to http://armandphotos.homestead.com/Middleton1.html

Appendix 9

Breaking News

The crew chief on Middleton Island reports (20 June 2011) that horned puffins (*Fratercula corniculata*) are now seen visiting nest boxes placed on the roof of the "murre building" in May 2010. This is the first indication that social attraction methods—which include life-like decoys and a continuously played recording of horned puffin vocalizations—are working.

We believe horned puffins first bred on Middleton Island in 2008, when a crew member discovered two active nests in piles of drift logs at the south end of the island, about 3 miles from the MIDICO property. Currently, the population appears to be fewer than 20 birds and, historically, the lack of nesting on Middleton was likely due to the absence of suitable nest sites for this crevice-nesting species. Piles of fresh logs formed at the shoreline when a large raft of timber logs under tow broke apart near Middleton and washed ashore some years ago. This fortuitous habitat for nesting horned puffins is impermanent.

Social attraction at the Air Force property is testing the feasibility of establishing and growing a breeding population of horned puffins for research purposes. Other species with potential to breed on the property include northern fulmars (*Fulmarus glacialis*) and fork-tailed storm-petrels (*Oceanodroma furcata*), both of which have on rare occasions been noted at Middleton as apparently prospecting individuals, and Leach's storm-petrels (*Oceanodroma leucorhoa*), which feed primarily beyond the continental shelf and thus might be expected to breed on Middleton but for the presence of European rabbits (*Oryctolagus cuniculus).* The latter were introduced on Middleton in 1954 (O'Farrell, T.P. 1965. The rabbits of Middleton Island, Alaska. J. Mammal. 46: 525-527). While no records exist of fulmars or storm-petrels breeding on Middleton, our recent experience with murres and puffins suggests the possibility to create new colonies through active management. Vocal broadcasts for fulmars and storm-petrels are planned to commence in 2012. Attracting another potential breeder, Cassin's auklet (*Ptychoramphus aleuticus*), would likely require the eradication or exclosure of rabbits.

ISRC will support such developments in the interest of enhancing Middleton's role as a sentinel of marine environmental health in the Gulf of Alaska.

Appendix 10

Institute for Seabird Research and Conservation – A Nonprofit Corporation

Articles of Incorporation (Excerpt)

Article IV: Purposes and Powers

Section 1. Purposes. The purposes for which this Corporation is formed are exclusively charitable, scientific, or educational and consist of the following:

A. To aid, support, and assist wildlife research, monitoring, and conservation through development and maintenance of specialized facilities at seabird colonies in the North Pacific, including artificial and/or managed breeding habitats, observational platforms and equipment, and associated infrastructure for the temporary housing and support of scientific personnel.

B. To make such facilities as described in (A) available on a nonprofit basis for use by governmental agencies, university faculty and students, or other nonprofit organizations and individuals engaged solely for purposes of scientific research, education, or the conservation and management of wildlife and wildlife habitats.

Article VII: Directors

The number of directors constituting the initial Board of Directors of the Corporation shall be three (3) directors. The names and addresses of the persons who are to serve as the initial directors of the Corporation are as follows:

Name	Address
Scott A. Hatch	12850 Mountain Place, Anchorage, AK 99516
G. Vernon Byrd	63592 Skyline Drive, Homer, AK 99603
William J. Sydeman	540 King Road, Petaluma, CA 94952

The powers and duties, number, qualifications, terms of office, manner of election, time and criteria for removal of directors shall be as set forth in the Bylaws of the Corporation.

Incorporated in Washington state 28 July 2009
EIN: 27-2108747
IRS Federal Income Tax Exempt (Public Charity) – determination letter dated 3 Mar 2011

Appendix 11

Institute for Seabird Research and Conservation

Officers and Directors

The Institute (ISRC) currently has three Directors, who are also office holders, with qualifications and responsibilities as follows. All work performed by officers/directors on behalf of the Institute is contributed pro bono.

Scott A. Hatch (Ph.D.), President

Scott Hatch is a wildlife biologist specializing in seabird population biology who has a 36-year employment history with federal agencies in Alaska (U.S. Fish and Wildlife Service, U.S. Geological Survey) (see attached résumé). As President, he proposes goals, objectives, and plans for development of the Middleton Island marine research station for consideration and approval by the Board, presides over annual and special meetings of the Board, and represents the Institute in discussions and negotiations with agencies, private land owners, and potential funding sources.

William J. Sydeman (Ph.D.), Vice-President and Secretary

Bill Sydeman is a marine scientist with more than 20 years of experience in marine ecological research in the private sector, working for two nonprofit organizations in California, one of which he incorporated in 2007 (see attached résumé). His responsibilties in ISRC include serving as acting President as needed and ensuring the filing and permanent archival of all documents and records pertaining to business of the Institute. As a member of the Board, he contributes expertise appropriate to program planning, as well as consideration and oversight of priorities and fund-raising for the efficient and successful realization of the Institute's goals and objectives.

G. Vernon Byrd (M.S.), Treasurer

Vernon Byrd is a wildlife biologist with more than 40 years of experience working with seabirds, marine mammals, waterfowl, and other wildlife in Alaska and Hawaii, mostly with the U.S. Fish and Wildlife Service (see attached résumé). His responsibilties as Treasurer of ISRC include managing the receipt and disbursement of funds and preparing annual federal tax returns. As a member of the Board, he contributes expertise appropriate to program planning, as well as consideration and oversight of priorities and fund-raising for the efficient and successful realization of the Institute's goals and objectives.

RÉSUMÉ

Scott Alexander Hatch

ADDRESS

12850 Mountain Place, Anchorage, Alaska 99516 (Home phone: 907-345-6056, work phone: 907-786-7163, e-mail: shatch@usgs.gov)

EDUCATION

Ph.D., University of California, Berkeley, 1985, Zoology

M.S., University of Alaska, Fairbanks, 1979, Wildlife Management

B.S., University of Washington, 1975, Wildlife Science

EXPERTISE

Population ecology of North Pacific seabirds

APPOINTMENTS

May 1996 - present: Research Wildlife Biologist, GS-486-14, Alaska Science Center, U.S. Geological Survey, Anchorage, AK

Jul.-Oct. 1997: Supervisory General Biologist (Acting Center Director), GS-401-15, U.S. Geological Survey, California Science Center, University of California, Davis, CA

Oct. 1993 - Apr 1996: Supervisory Wildlife Biologist (Research) GM-486-13, Alaska Science Center, National Biological Service, Anchorage, AK

Oct. 1989 - Sep. 1993: Supervisory Wildlife Biologist (Research) GM-486-13, Alaska Fish and Wildlife Research Center, U.S. Fish and Wildlife Service, Anchorage, AK

Jun. 1985 - Oct. 1989: Supervisory Wildlife Biologist (Research) GS-486-12, Alaska Fish and Wildlife Research Center, U.S. Fish and Wildlife Service, Anchorage, AK

May 1981 - Jun. 1985: Wildlife Biologist (Research) GS-486-11, Alaska Field Station, Denver Wildlife Research Center, U.S. Fish and Wildlife Service, Anchorage, AK

Sep. 1980 - Apr. 1982: Graduate Teaching Assistant, Zoology, University of California, Berkeley

Jul. 1978 - Apr. 1981: Wildlife Biologist (Research) GS-486-7/9, Office of Biological Services, U.S. Fish and Wildlife Service, Anchorage, AK

Apr. 1975 - Jun. 1978: Biological Technician GS-404-5, Office of Biological Services, U.S. Fish and Wildlife Service, Anchorage, AK

Sep. 1974 - Oct. 1974: Research Field Assistant, College of Forest Resources, University of Washington, Seattle, WA

HONORS AND AWARDS

Graduated summa cum laude and College of Forest Resources nominee for President's Medal, University of Washington, 1975

Elected member: Phi Beta Kappa, Phi Kappa Phi, Xi Sigma Pi national honor societies, for academic achievement

Elective Member, American Ornithologists' Union, 1991; peer recognition of significant contributions in ornithology

AFFILIATIONS

1977 - present	Cooper Ornithological Society
1977 - present	Wilson Ornithological Society
1979 - present	American Ornithologists' Union, Elective Member
1979 - present	Pacific Seabird Group, Life Member, PSG Chair (1988); Chair, Seabird Monitoring Committee (1992-present)
1980 - present	British Ornithologists' Union
1981 - present	Association of Field Ornithologists
1988 - present	The Waterbird Society, Member of Council (Term 2000-2002)

OTHER PROFESSIONAL ACTIVITIES

Feb 1996 - present	Affiliate Assistant Professor of Biological Science, University of Alaska, Anchorage

May 1996 – May 1999	Associate Editor, *Ecological Applications* (Ecological Society of America)
Jan 2005 – present	Editor (North America and Pacific), *Marine Ornithology*

RECENT PUBLICATIONS (2010 – 2011)

Hatch, S.A., V.A. Gill, and D.M. Mulcahy. 2010. Individual and colony-specific wintering areas of Pacific northern fulmars (*Fulmarus glacialis*). ***Can. J. Fish. Aquat. Sci.*** 67: 386-400.

Kotzerka, J., **S.A. Hatch**, and S. Garthe. 2010. GPS tracking devices reveal foraging strategies of black-legged kittiwakes. ***J. Ornithol.*** 151: 459-467.

Kitaysky, A.S., J.F. Piatt, **S.A. Hatch**, E.V. Kitaiskaia, Z.M. Benowitz-Fredericks, M.T. Shultz, and J.C. Wingfield. 2010. Food availability and population processes: severity of of nutritional stress during reproduction predicts survival of long-lived seabirds. ***Func. Ecol.*** 24: 625-637.

Hatch, S.A. 2010. Seabird databases and the new paradigm for scientific publication and attribution. ***Mar. Ornithol.*** 38: 1-6.

Kotzerka, J., **S.A. Hatch**, and S. Garthe. 2011. Evidence for foraging-site fidelity and individual foraging behavior of pelagic cormorants rearing chicks in the Gulf of Alaska. ***Condo***r 113: 80-88.

White, J., P. Mirleau, E. Danchin, H. Mulard, **S.A. Hatch**, P. Hebb, and R.H. Wagner. 2010. Sexually transmitted bacteria affect female cloacal assemblages in a wild bird. ***Ecol. Lett.*** 13: 1515-1524.

White, J., S. Leclaire, M. Kriloff, H. Mulard, **S.A. Hatch**, and E. Danchin. 2010. Sustained increase in food supplies reduces broodmate aggression in black-legged kittiwakes. ***Anim. Behav***. 79: 1095-1100.

Satterthwaite, W.H., Kitaysky, A.S., **Hatch, S.A.**, Piatt, J.F., and Mangel, M. 2010. Unifying quantitative life history theory and field endocrinology to assess prudent parenthood in a long-lived seabird, *Rissa tridactyla*. ***Evol. Ecol. Res.*** 12: 779-792.

Hatch, S.A. 2010. A world seabird organization and seabirds.net: meeting the challenge of the new paradigm. ***Mar. Ornithol.*** 38: 69-77.

Phillips, E.M., H.M. Nevins, **S.A. Hatch**, A.M. Ramey, M.A. Miller, and J.T. Harvey. 2010. Seabird bycatch in Alaska demersal longline fishery trials: a demographic summary. ***Mar. Ornithol.*** 38: 111-117.

Hatch, S.A., V.A. Gill, and D.M. Mulcahy. 2011. Migration and wintering areas of glaucous-winged gulls from south-central Alaska. ***Condor*** 113: 340-351.

Leclaire, S., T. Merkling, C. Raynaud, G. Giacinti, J.-M. Bessière, **S.A. Hatch** and É. Danchin. 2011. An individual and a gender odour signature in kittiwakes? Study of the semiochemical composition of preen secretion and preen down feathers. ***Naturwissenschaften*** 98: 615-624.

Hatch, S.A., V.A. Gill, and D.M. Mulcahy. 2011. Wintering areas of adult and juvenile pelagic cormorants determined by satellite telemetry. ***J. Field Ornithol.*** 82: 269-278.

Leclaire, S., R.H. Wagner, V. Bourret, **S.A. Hatch**, F. Helfenstein, O. Chastel, F. Karadas, and E. Danchin. Submitted. Flexibility in parental effort: effects of handicapping males on parental investment and siblicide in the black-legged kittiwake. ***Behav. Ecol.***

Leclaire, S., T. Merkling, C. Raynaud, H. Mulard, J.-M. Bessière, E. Lhuillier, **S.A. Hatch** and Étienne Danchin. Submitted. Semiochemical compounds of preen secretion signal genetic make-up in a seabird species: the black-legged kittiwake. ***Proc. Roy. Soc. Lond. B.***

Leclaire, S., J. White, M. Battude, R.H. Wagner, **S.A. Hatch**, and E. Danchin. Submitted. Integument coloration signals gender and individual quality in the black-legged kittiwake *Rissa tridactyla*. ***Behav. Ecol.***

Benowitz-Fredericks, Z.M., A.S. Kitaysky, J. Welcker and **S.A. Hatch**. Submitted. Context-dependent effects of food availability on yolk androgen deposition in a seabird with facultative brood reduction. ***Anim. Behav.***

Merkling, T., S. Leclaire, E. Danchin, E. Lhuillier, R.H. Wagner, J.White, **S.A. Hatch** and P. Blanchard. Submitted. Food availability and offspring sex in a genetically monogamous seabird: insights from an experimental approach. ***Behav. Ecol.***

RÉSUMÉ

William J. Sydeman

ADDRESS

Farallon Institute for Advanced Ecosystem Research, P.O. Box 750756, Petaluma, CA 94975. Phone: 707-478-1381 (mobile); email: wsydeman@comcast.net

EDUCATION

Ph.D., Ecology, University of California, Davis, *Climate Change and Seabirds of the California Current Marine Ecosystem* (1999)

APPOINTMENTS

Research Associate, Bodega Marine Laboratory, UC Davis (2008 – present)

Research Associate, Scripps Institution of Oceanography, UC San Diego (2000 – present)

Instructor (Biological Oceanography), Department of Biology, Sonoma State University (2008)

President/Senior Scientist, Farallon Institute (July 2007 – present)

Director, Marine Ecology Division, PRBO Conservation Science (1992 – 2007)

Acting Executive Director, PRBO Conservation Science (1999)

Staff Biologist/Program Manager, PRBO (March 1986 – 1992)

PROFESSIONAL EXPERTISE

- Conceptualization and implementation of long-term integrated ocean observing and ecological research programs (integration of physical and biological oceanography)
- Design and synthesis of studies on fishing and climate change; coastal food webs, predator-prey interactions, marine fish and top predator population dynamics
- Advanced time series analyses and interpretations/statistical analyses
- Strategic planning/annual work-plan development/organizational development

- Design and development of interdisciplinary research programs
- Writing and editing for peer-review journals/implementation of special volumes
- Supervision of staff/interns (50+), including Ph.D. level scientists
- Mentoring of students and other trainees (M.S., Ph.D. students; post-doctoral RAs –10)
- Fundraising experience and expertise (~$8M in grants and contracts over ~20 years)
- Extensive publication record in the peer-reviewed literature (90+) (written communication skills)
- Translation of science to non-technical audiences/outreach/policy (oral communication skills)
- Work in policy arena/outreach to legislators (State of California, U.S. national)
- Work in international marine science arena (North Pacific Marine Science Organization, ICES)

CURRENT RESEARCH INTERESTS

- Multi-species marine ecosystem and fishery management: integrated ecosystem assessment; ecosystem status reports; ocean observing and marine ecosystem monitoring; forage fish and zooplankton (euphausiids) fluctuations; oceanic conditions affecting marine fish (rocktish, herring, salmonids) recruitment, condition, and return rates.
- Identification of habitat "hotspots" in continental shelf and pelagic marine systems: design and monitoring criteria for Marine Protected Areas.
- Pollutants: chronic and catastrophic oil pollution; natural resource damage assessment; restoration ecology ofmarine birds; dynamics of trace metal accumulation in marine food webs.

SYNERGISTIC ACTIVITIES

- COMPASS Working Group: Climate, Marine Ecosystems and IPCC ARS (2009-present)

- NCEAS Working Group: Climate and Marine Ecosystems (2009 - 2011)
- NCEAS Working Group: Ocean-Estuarine Interactions (2008 - 2010)
- Editorial Board/Contributing Editor, Aquatic Biology (2008 - present)
- Guest Editor/Contributing Editor, Marine Ecology Progress Series (2007 - present)
- Chair, Task Team, Bolinas Marine Laboratory, College of Marin (2007)
- Co-chair, Advisory Panel - Marine Birds and Mammals, PICES (2003 - present)
- Governing Board. NOAA/Pacific Coast Ocean Observing System (PaCOOS) (2003 - 2008)
- MLPA Science Advisory Team (central coast), CA Department of Fish and Game (2005 - 2006)
- U.S. Delegate, MONITOR Technical Committee, PICES (2000 - 2006)
- Eco-regional Planning Team, Baja to Pt. Conception, Nature Conservancy (2003)
- Ecosystem Monitoring, California NOAA/National Marine Sanctuaries (2003)
- Krill Harvesting Group, NOAA/Monterey Bay National Marine Sanctuary (2003)
- Special Marine Reserves, NOAA/Monterey Bay National Marine Sanctuary (2003)
- Scientific Steering Committee, North American Waterbird Conservation Plan (2000 - 2003)
- Squid Research Scientific Committee, California Department of Fish and Game (1998 - 2002)
- Research Activity Panel, Monterey Bay National Marine Sanctuary (1999 - 2004)
- Seabird Monitoring Committee, Pacific Seabird Group (1996 - present)
- Chair, Seabird Restoration Committee, Pacific Seabird Group (1997 -1999)

TEACHING EXPERIENCE

1/2008-6/2008. Biological Oceanography (BIO 322 –30 students). Biology Department, Sonoma State University, Rohnert Park. Student evaluations available upon request.

SPECIAL ISSUES IN THE PRIMARY LITERATURE (Coordination and Guest Editing)

- Sydeman, W.J. (Editor). 2009. Special Theme Section: *Marine Ecosystems, Climate, and Phenology: Impacts on Top Predators*. Marine Ecology Progress Series Volume 393.

- Sydeman, W.J., J.F. Piatt, and H. Browman (Guest Editors). 2007. Special Theme Section: *Seabirds as Indictors of Marine Ecosystems*. Marine Ecology Progress Series Volume 352.

- Sydeman, W.J., R.D. Brodeur, A. Bychkov, C. Grimes, and S. McKinnell (Guest Editors). 2006. Special Volume: *Marine Habitat"Hotspots" and Their Use by Migratory Species and Top Predators in the North Pacific Ocean*. Deep Sea Research II Volume 53.

RECENT PUBLICATIONS

W.J. Sydeman, Santora, J.A., S. Ralston, J.C. Field. Re-distribution of krill causes a spatial mismatch for predators during a period of anomalous ocean conditions. Target: ***Ecology Letters*** (in prep)

Suryan. R.M., **W.J. Sydeman**, and J.A. Santora. Chlorophyll persistence depicts "hotspots" of productivity in the open ocean. Target: ***Marine Ecology Progress Series*** (in prep).

Wolf S.G., M.A. Snyder, **W.J. Sydeman**, and D.A. Croll. 2010. Predicting population consequences of ocean climate change for an ecosystem sentinel, the seabird Cassin's aukiet. ***Global Change Biology*** (in press).

Santora, J.A., S. Ralston, and **W.J. Sydeman**. 2010. Spatial organization of krill and krill predators in the California Current. ***ICES J. Marine Science*** (in press).

Sydeman, W.J., K.L. Mills, J.A., Santora. S.A. Thompson, D.F. Bertram. K.H. Morgan, M.A. Hipfner, B.K. Wells, and S.G. Wolf. 2009. Seabirds and climate in the California Current—a synthesis of change. ***California Cooperative Fisheries Investigation Report*** 52: 82-104.

Black. B.A., I.D. Schroeder, **W.J. Sydeman**, S.J. Bograd, and F.B. Schwing. 2010. Wintertime ocean conditions synchronize seabird reproduction and rockfish growth. ***Canadian Journal of Fisheries and Aquatic Sciences*** 67: 1149-1158.

Schroeder, I.D., **W.J. Sydeman**, N. Sarkar, S.J. Bograd, and F.B. Schwing. 2009. Winter pre-conditioning of seabird phenology in the California Current. ***Marine Ecology Progress Series*** 393: 211-223.

Bograd, S.J., I. Schroeder, N. Sarkar, X. Qui, **W.J. Sydeman**, and F.B. Schwing. 2009. Phenology of coastal upwelling in the California Current. ***Geophysical Research Letters*** 36. L01602. doi: 10.1 029/2008GL03 5933.

Wolf, S., **W.J. Sydeman**, C.L. Abraham, J.M. Hipfner, B. Tershy, and D. Croll. 2009. Range-wide reproductive consequences of climate variability for the seabird Cassin's auklet *Ptychoramphus aleuticus*. ***Ecology*** 90: 742-753.

Lee, D. and **W.J. Sydeman**. 2009. North Pacific climate mediates sex-ratio in northern elephant seals. ***Journal of Mammalogy*** 90: 1-8.

RÉSUMÉ

G. Vernon Byrd

ADDRESS

Alaska Maritime National Wildlife Refuge (retired), 95 Sterling Hwy., Suite 1, Homer, Alaska 99603; email: byrdv2@gmail.com

EDUCATION

B.S.	Wildlife Management, University of Georgia, 1968
Grad credits	Wildlife Biology, University of Alaska, 1975-1976
M.S.	Wildlife Biology, University of Idaho, 1989

APPOINTMENTS

Supervisory Wildlife Biologist, Alaska Maritime National Wildlife Refuge, 1992-2011
Wildlife Biologist, Aleutian Islands Unit, Alaska Maritime National Wildlife Refuge, 1988-1992
Wildlife Biologist, Bering and Chukchi Sea Units, Alaska Maritime National Wildlife Refuge, 1984-1992
Wildlife Biologist, Yukon Delta National Wildlife Refuge, 1980-1984
Wildlife Biologist and Refuge Manager, Hawaiian Islands National Wildlife Refuge 1977-1980
Wildlife Biologist and Refuge Manager, Aleutian Islands National Wildlife Refuge, 1972-1977
Biological Technician, Izembek National Wildlife Refuge, 1971-1972

SYNERGISTIC ACTIVITIES

Member of North Pacific Fishery Management Council's Fishery Ecosystem Plan Team for Aleutian Islands
Member of Steller Sea Lion Recovery Team
Team Leader, Aleutian Goose Recovery Team
Coordinator of Science Program on Alaska Maritime National Wildlife Refuge
Member of the team that wrote the vision statement for the National Wildlife Refuge System, Fulfilling the Promise (1997)
Member of the North American Waterbird Conservation Council
Member of Scientific Advisory Board for the Alaska SeaLife Center

SELECTED RECENT COLLABORATORS

Yuri Artukhin, Pacific Inst. of Geography, Petropovlovsk, Kamchatka
Douglas Causey, University of Alaska, Anchorage
Daniel Gibson, University of Alaska Museum of the North
Alexander Kataysky, University of Alaska, Fairbanks
Nikolai Konyukhov, Russian Academy of Sciences, Moscow
Ian Jones, Memorial University, Newfoundland
Shoshiro Minobe, Hokkaido University
Steve Maclean, The Nature Conservancy, Anchorage
Ed Murphy, Univ. of Alaska, Fairbanks
Scott Hatch, U.S.Geological Survey, Alaska Science Center
John Piatt, U.S. Geological Survey, Alaska Science Center
Dan Roby, Oregon State University
Alan Springer, Inst. of Marine Science, University of Alaska, Fairbanks
Beth Sinclair, National Marine Mammal Lab., Seattle
William Sydeman, Farallon Institute for Advanced Ecosystem Research
Bruce Wright, Aleutian Pribilof Islands Association
Phillip Zavadil, Tribal Government, St. Paul Island
Sergey Zagrebelny, Science Director, Commander Islands Nature Reserve, Bering Island

RECENT PUBLICATIONS (selected from more than 70 published papers)

Byrd, G.V., W.J. Sydeman, H.M.Renner, S. Minobe. 2008. Responses of Piscivorous Seabirds at the Pribilof Islands to Ocean Climate. ***Deep Sea Research II***

Byrd, G.V., J.A. Schmutz, and H.M. Renner. 2008. Contrasting population trends of piscivorous seabirds in the Pribilof Islands: A 30-year perspective. ***Deep Sea Research II***.

Sydeman, W.J., C.L. Abraham, and **G.V. Byrd**. 2008. Seabird-sockeye salmon co-variation in the eastern Bering Sea: phenology as an ecosystem indicator and salmonid predictor? ***Deep Sea Research II***

Sinclair, E.H., L.S. Vlietstra, D.S. Johnson, T.K. Zeppelin, **G.V. Byrd**, A.M. Springer, R.R. Ream, and G.L. Hunt, Jr. 2008. Patterns in prey use among marine mammals and birds in the Pribilof Islands. ***Deep Sea Research II***.

Springer, A.M., **G.V. Byrd**, and S.J. Iverson. 2007. Hot oceanography: planktivorous seabirds indicate ecosystem responses to warming of the Bering Sea. ***Marine Ecology Progress Series*** 352: 289-297.

Gibson, D.D. and **G.V. Byrd**. 2007. Birds of the Aleutian Islands, Alaska. ***Series in Ornithology No. 1***. Nuttall Ornith. Club and Am. Ornith. Union.

Piatt, J.F., J. Wetzel, K. Bell, A.R. DeGange, G.R. Balogh, G.S. Drew, T. Geernaert, C. Ladd, and **G.V. Byrd**. 2006. Predictable hotspots and foraging habitat of the endangered short-tailed albatross (*Phoebastria albatrus*) in the North Pacific: Implications for conservation. ***Deep-Sea Research II*** 53: 387-398.

Byrd, G.V., Renner, H.M., and Renner, M. 2005. Distribution patterns and population trends of breeding seabirds in the Aleutian Islands. ***Fisheries Oceanography*** 14: 139-159.

Major, H.L., I.L. Jones, **G.V. Byrd**, and J.C. Williams. 2006. Assessing the affects of introduced Norway rats (*Rattus norvigicus*) on survival and productivity of least auklets (*Aethia pusilla*). ***Auk*** 123: 681-694.

Croll, D.A., J.L. Moran, J.E. Estes, E.M. Danner, and **G.V. Byrd**. 2005. Introduced predators transform subarctic islands from grasslands to tundra. ***Science*** 307:1959-1961.