

REPORT OF 2012 EXPEDITION TO ST. MATTHEW AND OTHER BERING SEA ISLANDS



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INTRODUCTION

The St. Matthew Islands (St. Matthew, Hall, and Pinnacle) are part of the Alaska Maritime National Wildlife Refuge. These islands are widely considered the most remote wilderness in Alaska, and one of the most remote locations in the U.S. Fish and Wildlife Service's (USFWS) National Wildlife Refuge System. The Alaska Maritime National Wildlife Refuge (AMNWR) has conducted intermittent ecological monitoring at the St. Matthew Islands since 1983 (Byrd and Early 1985, Murphy et al. 1987, Mendenhall 1991, Renner and Sows 2005, Renner and Jones 2005, Romano and Renner 2012). The objective of this monitoring effort is to collect baseline status and trend information for a suite of seabird species that serve as indicators of ecosystem health. Data also provide a basis for directing management and research actions, and in assessing effects of management. During late July and early August 2012, AMNWR staff visited the St. Matthew Islands aboard the USFWS vessel R/V *Tigla*. As part of the Refuge's seabird monitoring program, counts of ledge-nesting seabirds were conducted on long-term population monitoring plots on Hall Island.

Due to broad interest in the region across a variety of disciplines, a team of scientists from a wide range of fields was invited to accompany AMNWR staff to the St. Matthew Islands to carry out a wide suite of research and monitoring projects. Here we summarize the major field accomplishments for each of the projects. The results from this diverse group of projects will help managers understand how the natural and cultural resources of the St. Matthew Islands may be impacted by the physical and biological changes that are occurring in the Bering Sea due to climate change and other forces. Similar trips throughout the refuge will likely become more prevalent as a way to leverage opportunities to offset costs while addressing pressing interdisciplinary questions.

In addition to the trip to the St. Matthew Islands, the R/V *Tigla* conducted surveys in other portions of the Bering Sea Unit, including Neragon Island, near the mouth of Scammon Bay on 2 August, and Sledge Island on 3 August, located near the mouth of Norton Sound. Unfortunately Neragon Island was completely underwater when the survey was conducted on 2 August due to a storm-driven tide. A satellite image taken on 8 August, 2012 indicated at least a portion of the island was above water on that date. In addition, at-sea transects were conducted throughout the entire expedition for addition to the North Pacific Pelagic Seabird Database.

STUDY AREA

St. Matthew Island (60°24'N, 172°42'W) and Hall Island (60°41'N, 173°05'W) are part of the Bering Sea Unit of AMNWR, and are both designated wilderness. They are both uninhabited and make up (along with Pinnacle Island) an isolated island group in the northcentral Bering Sea. These islands are volcanic in origin and located in a roughly central position between the coasts of Russia and Alaska (Fig. 1). As a result of their position in the Bering Sea, the islands support a mixture of northern Palearctic and Nearctic avifaunas.

The St. Matthew Islands are located on the Bering Sea shelf which is among the most productive marine ecosystems in the world. However, the shelf ecosystem has changed in recent decades, both physically and biologically. These changes are expected to continue and intensify in light of predictions of warming waters and a reduction in the shelf's seasonal ice cover. Because of the remote location of these islands, refuge staff are not able to visit them annually, so the goal of the refuge is to visit these islands every 5 years.

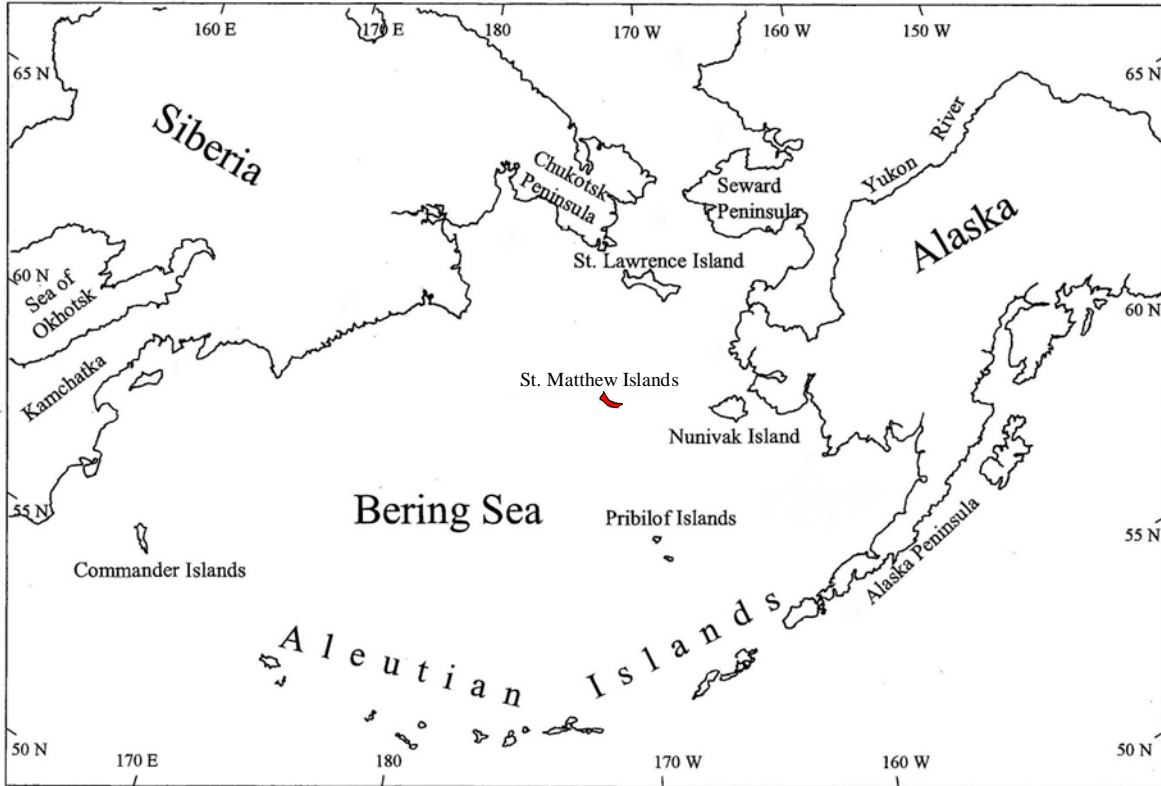


Figure 1. The location of the St. Matthew Islands (in red) in the northcentral Bering Sea, in relation to mainland Alaska, Siberia, and the Aleutian Islands.

PROJECTS

MARINE BIRD POPULATION AND PRODUCTIVITY SURVEYS

Project Lead: Marc Romano

The Alaska Maritime National Wildlife Refuge monitors seabirds throughout the Refuge because marine predators can signal physical and biological oscillations in the marine environment. Seabird monitoring plots on Hall Island and St. Matthew Island were established in 1983 and 1985, and they have been revisited and counted multiple times since then. During the recent trip ledge-nesting seabirds were counted on 32 Hall Island plots and one St. Matthew Island plot. Hall Island counts were conducted by Marc Romano, Marianne Aplin, and Aaron Poe on four days from 1-4 August (partial counts of plots on 1-3 August and a full count of all plots on 4 August). The count of plot N-2 on St. Matthew Island was conducted on 2 August by Tony DeGange, Rich Kleinleder, and Steve Delehanty. In addition, productivity was estimated (using a “boom or bust” methodology) for black-legged kittiwakes (*Rissa tridactyla*), and pelagic cormorants (*Phalacrocorax pelagicus*) on Hall Island.

The specific monitoring goals in 2012 were: 1) conduct population counts of ledge-nesting seabirds in all Hall Island plots. Target species included pelagic cormorants, common and thick-billed murres (*Uria aalge* and *U. lomvia*), black-legged kittiwakes, and northern fulmars (*Fulmarus glacialis*); 2) estimate productivity for pelagic cormorants and black-legged kittiwakes on Hall Island; 3) conduct population counts of ledge-nesting seabirds for as many population monitoring plots on the north side of St. Matthew Island as time would allow; 4) document the avifauna present on both islands.

Results of the 2012 monitoring are contained in a separate report which is available from the AMNWR headquarters in Homer, Alaska (Romano and Renner 2012).

MARSH SEDIMENT CORING AND SOIL PROFILE SAMPLING

Project Leads: David Klein, Miriam Jones, and Richard Kleinleder

This project was developed by David Klein (Univ. of Alaska, Fairbanks) in close collaboration with Miriam Jones (U.S. Geological Survey, Reston, Virginia). Richard (Rich) Kleinleder (URS inc.) and Ned Rozell (Univ. of Alaska, Geophysical Institute) assisted in the field with sediment and soil collections. Miriam Jones will conduct the analysis of the samples collected and will be involved with the associated interpretive work.

A likely suitable soil coring location on St. Matthew Island was identified from a combination of 1948 Navy aerial photos and high resolution satellite imagery (taken in 2008) provided through the Aleutian and Bering Sea Islands Landscape Conservation Cooperative (ABSI-LCC). The general soil coring location identified from the photos and satellite images was tested for a specific coring site using a soil probe to find an area free of annual frost which was still present in much of the area during the field visit. On August 2nd a sediment sample was successfully retrieved totaling 139cm (inclusive of the 22cm top vegetative root plug cut with a bread knife), two 50cm core sections, and the basal core section of 17cm. Vegetation at the coring site was dominated by *Carex aquatilis* and included *Caltha palustris*, *Ranunculus* spp., *Sphagnum* sp. and other mosses. The core will provide a reliable archive of the vegetative changes, associated climates, and related geological and stochastic events, hopefully back to at least the Last Glacial Maximum (approximately 20,000 years ago) when St. Matthew Island was part of continental Beringia.

Soil profile samples were later collected at a large earth slump on the NW coast of St. Matthew Island. The slump, about two miles in length, provides habitat for a very large auklet colony at its western end adjacent to Pterodactyl Point. This colony was mapped in 2005 by Ian Jones (Renner and Jones 2005) of Memorial University.

COASTAL EROSION AND SEABIRD NESTING

Project Lead: Dr. David R. Klein

This project was already under way in 2005 through monitoring and mapping of auklet colonies on northern St. Matthew Island (Renner and Jones 2005), and establishment of permanent plots in the large auklet colony on the southwest coast of Hall Island. Current research focuses on influences in rate of coastal erosion resulting from climate warming, including sea level rise, and longer seasonal absence of sea ice extending the ice-free period later into winter when storm frequency and severity increases. Additionally, this research addresses how the density, hardness, stratification, and other characteristics of the coastal bedrock varies throughout the St. Matthew Islands and how rock types may differentially vary in their vulnerability to coastal erosion. Surveys of the beaches north and south of the 2012 field camp on St. Matthew Island were conducted to document present, active coastal erosion in relation to rock types, and to collect representative rock types. An additional trip to Pinnacle Island was conducted to collect rock samples for this project. However, visibility was poor at the time of the visit to Pinnacle Island and a complete survey of the island was not possible. High-resolution satellite imagery of Hall Island and the

northwestern portion of St. Matthew Island (provided by the ABSI-LCC), were of considerable value for comparison with 1948 U.S. Navy stereo aerial photos of the St. Matthew.

David Klein plans to seek assistance from Susi Thomich, a PhD student in Geology at the University of Alaska, Fairbanks. She will determine the hardness of the rock samples related to the volcanic history of St. Matthew Island and the vulnerability of the island to coastal erosion. Rock samples were collected from the northeastern and northwestern coasts of St. Matthew; from the Bull Seal base camp; and near Big Lake, on the southern portion of St. Matthew Island (Figure 2). In addition, rock samples were collected from Pinnacle Island, which will be helpful in the study of coastal erosion in relation to seabird nesting habitat.

STATUS OF THE RED FOX AND ITS EFFECT ON THE ARCTIC FOX

Project Leads: Dr. David R. Klein, Heather M. Renner

The presence and abundance of arctic foxes (*Alopex lagopus*) on the St Matthew Islands has been noted by several authors (Sauer 1802, Elliott 1882, Hannah 1920, Rausch and Rausch 1968, McRroy et al. 1971, Guthrie 1976). In contrast, there are few historic records of red foxes (*Vulpes vulpes*) from St. Matthew Island, with the exception of Sauer (1802 p. 236), who reported that during a 1791 visit to St. Matthew Island “foxes were numerous, of the black, red, and white (or arctic) species.” More contemporary records of red foxes are hard to find, until the late 1990’s when red foxes were observed to be present and breeding there. During the Refuge’s 2005 expedition to the St. Matthew Islands numerous red foxes, as well as several of their active maternal dens, were observed on St. Matthew. Large litters of young were noted at several of the dens. Only a few arctic foxes were seen on St. Matthew and no active maternal dens were found. On Hall Island, by contrast, arctic foxes remained abundant around the large auklet colony, on the southwest portion of the island, which was the primary focus of investigations by the Refuge team camped on the island (Renner and Jones 2005), while only one potential red fox was briefly noted.

On the Pribilof Islands the winter of 2011-12 was one of the most severe on record, with sea ice extending around St. Paul and reaching St. George. It is assumed that both arctic and red foxes present on the St. Matthew Islands would have been stressed by the severity of the 2011-12 winter, though perhaps stress would have affected the two species differently. Arctic foxes have evolved adaptations for life in the Arctic whereas red foxes appear to be adapted for life in the boreal and temperate forests. Despite the severe winter, however, the red fox population on St. Matthew was breeding well with large litters observed at active dens on both the northern and southern portions of St. Matthew. No arctic foxes were seen on St. Matthew in 2012, which was somewhat surprising since arctic foxes, were still present in 2005. More surprising, however, was the apparent absence of red foxes on Hall Island in 2012 although arctic foxes were still common on Hall Island. Vole populations were moderately high on both St. Matthew and Hall islands in 2012, which was most likely of primary importance to both fox species, as voles (and any cached food items) are the only vertebrate prey item available to the foxes during the winter.

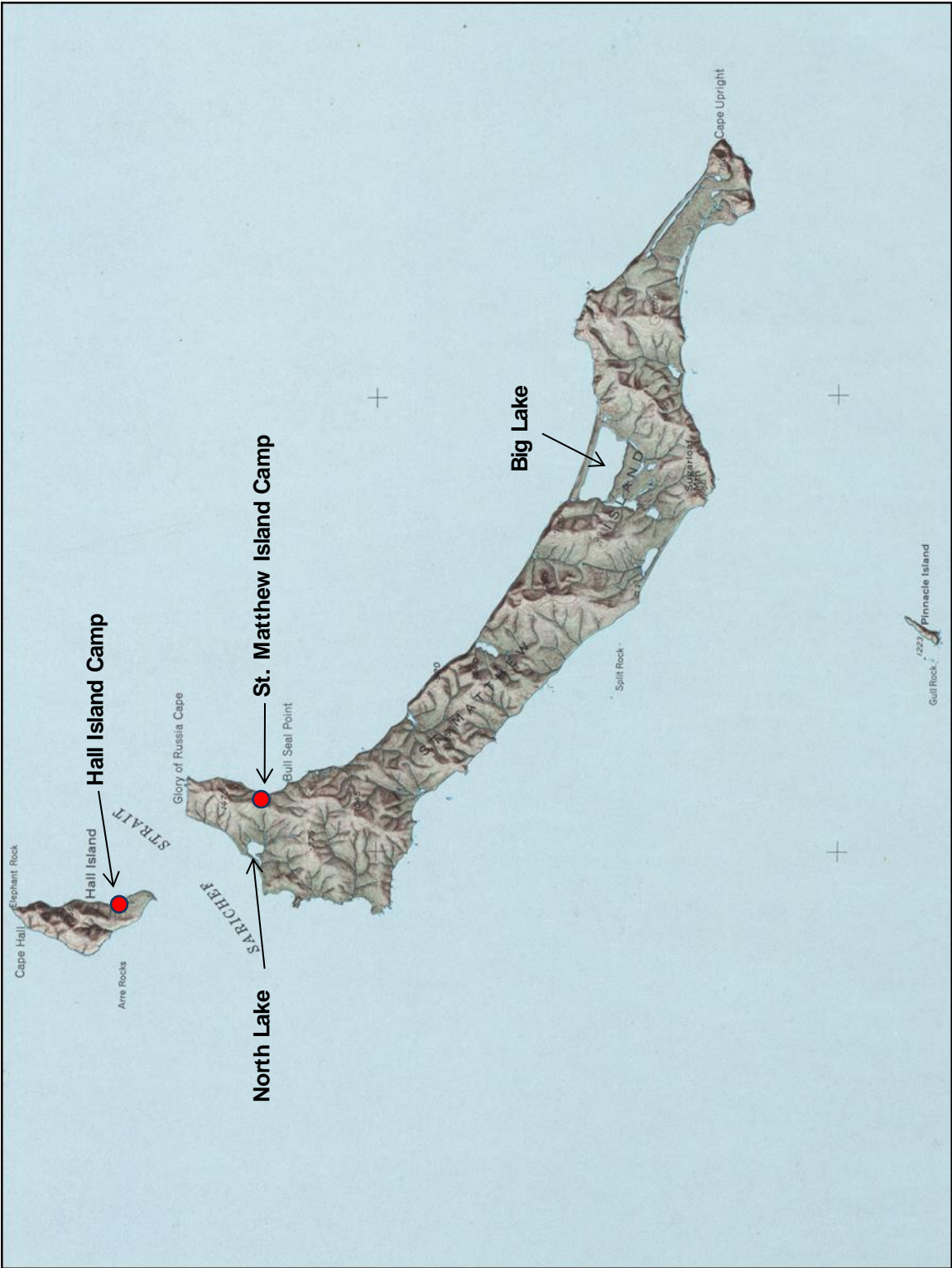


Figure 2. Map of St. Matthew Island and Hall Island, Alaska

It is apparent that red foxes have not been able to reach Hall Island in sufficient numbers to establish a breeding population there and suppress the arctic foxes, as they have on St. Matthew Island. The narrow Sarichef Strait that separates the two islands is noted for strong currents and rough seas which would presumably produce moving and highly fractured sea ice there in winter. This would likely be more of an obstacle to movement between the two islands for red foxes than for the ice-adapted arctic foxes.

Fresh scats were collected at two of the active red fox maternal dens on St. Matthew. These will be placed in the frozen tissues collection of the Museum of the North at University of Alaska Fairbanks for possible DNA extraction to assess genetic diversity in the St. Matthew red foxes. Preparation of a manuscript on the status of the red and arctic foxes on the St. Matthew Islands has begun (Klein, Renner, and SOWLS in review). The manuscript will include an assessment and comparison of differential predation pressure that each fox species will be expected to exert on cliff, crevice, and ground nesting birds, including the McKay's bunting (*Plectrophenax nivalis*), as well as on the endemic St. Matthew Island singing vole (*Microtus abbreviatus*).

ST. MATTHEW AND HALL ISLAND PLANT COLLECTIONS

Project Lead: Monte Garrouette

Botanical work was conducted by Monte Garrouette (University of Alaska, Fairbanks, Graduate Student) during the 2012 expedition. 227 voucher specimens were collected across St. Matthew and Hall Island. The bulk of the collections were from the northern end of St. Matthew Island (between Glory of Russia Cape and Bull Seal Point). Each voucher was geo-referenced with a handheld GPS unit with 3-5m accuracy. A single day of collecting on Hall Island resulted in approximately 75 collections, which greatly increases the number of collections made on the island (a recent search for Hall Island in the University of Alaska museum database (ARCTOS) reveals a single plant collection from the island). Along with voucher specimens, population samples for the purposes of genetic analysis were collected in silica gel from 13 species of plants, including rare species, endemic species, and species of biogeographic interest, such as *Artemisia globularia* var. *lutea*, *Claytonia escholtzii*, and *Oxytropis bryophila*. The population samples were requested by the University of Alaska Museum Herbarium, the Royal British Columbia Museum Herbarium, and the National Museum of Nature and Science in Japan.

A new record for the island, preliminarily identified as *Iris setosa*, was collected along the western shore of North Lake on St. Matthew Island (Fig. 2). It appeared that the species had been on the island for several years, but only a large group collected at the lakeshore and one small non-flowering group were found on the island. It is unknown what the source was for the species' introduction, and there is no evidence to call the species invasive. A DNA voucher was also collected from the population.

Thirty-seven vegetation plots were described on St. Matthew Island, 33 of which followed a transect across the northern end of the island and were correlated with terrestrial arthropod collections. In addition, 10 vegetation plots were described on Hall Island across a transect line of increasing elevation.

The plant species list created from the collections from St. Matthew Island will be combined with past collections to create a definitive species list for the island. This list will be published along with a description of the character of the regional flora, and possibly the history of botanical work on the island,

TERRESTRIAL ARTHROPOD SAMPLING

Project Lead: Dr. Derek Sikes

The goal of this project was to sample macroinvertebrates on St. Matthew and Hall islands between 31 July – 6 Aug 2012. Although the focus was on collecting non-marine arthropods, terrestrial mollusks and annelids were also collected. As part of this project, all known prior records of terrestrial macroinvertebrate collections from Hall and St. Matthew islands (based on publications or specimens) will be summarized.

Arthropod trapping methods used for this project included sweep nets, aspirators, forceps, pitfall traps, flight intercept trap (FIT) - Malaise trap hybrids, colored (pollinator) traps, and Winkler extractors. A transect of 33 pitfall traps with 2 pollinator traps at each end was set, spacing traps 100m apart through the interior sedge-marsh lowland from the NE coast of St. Matthew Island to the NW coast. A Malaise / FIT trap was set at either end of the transect with a third Malaise / FIT trap set in the middle. A grid of 15 large yellow pollinator bowls was set around the NW coast Malaise / FIT trap.

Several discrete habitats were sampled including: 1) littoral - beach drift and vegetation, rock outcrops (0-15m elevation); 2) interior sedge-marsh lowland (10-60m elevation) with willow hummocks, and 3) interior upland (60-150m elevation) meadows and streams.

Collection effort was concentrated on the north end of the island between Bull Seal Point on the NE coast and a small lake on the NW coast. The island is approximately 3 miles wide between these sites (e.g. 60.56504°N, 172.95976°W +/- 2km). Additional collection areas included two on the south end of the island (60.38036°N, 172.50139°W; 60.37816°N, 172.38133°W) and one on Hall Island (60.67879°N, 173.06880°W).

Among 58 collection events (an 'event' being 1 collection method used at 1 place on 1 date or date range), the littoral habitats were the most thoroughly sampled, the interior lowlands were the second-most thoroughly sampled, and the interior upland meadows were the least well sampled.

A number of littoral, beach-drift taxa that are relatively common on the Pribilof and Aleutian Islands were not found on St. Matthew Island. These include cybaeid spiders, bristletails, pseudoscorpions, *Nebria metallica*, *Aegialites*, *Hypolithus littoralis*, and centipedes. Strikingly absent from the island were pardosid (wolf) spiders, which are particularly common on both mainland Alaska from the Arctic to the southeast, and among the Aleutian archipelago. A large bumblebee, *Bombus balteatus*, was active on the warmest day. This species is known from mainland Alaska in alpine zones and the arctic.

Higher taxa collected include: Arachnida: Acari, Araneae, Opiliones; Insecta: Collembola, Plecoptera, Hemiptera, Trichoptera, Coleoptera, Lepidoptera, Hymenoptera, Diptera; Annelida: Lumbricidae, Enchytraeidae, and Mollusca: Gastropoda. Samples are currently being processed in the Entomology Preparation Lab at the University of Alaska Museum. A detailed report will follow once the samples have all been processed.

FRESHWATER AQUATIC MACROINVERTEBRATE AND DIATOM SAMPLING

Project Leads: Daniel Bogan, Daniel Rinella, Marc Romano

Little is known regarding the freshwater diatoms and aquatic invertebrates of St. Matthew Island. Very few surveys for either group have been conducted there, so one of the goals of this project was to sample a variety of aquatic habitats to document species presence. Daniel Bogan and Daniel Rinella (Alaska Natural Heritage Program, University of Alaska Anchorage) designed the sampling protocols used for this

project and are identifying the freshwater diatom and invertebrate samples at the time of this report. Field collections were conducted primarily by Anthony DeGange and Steve Delehanty.

Macroinvertebrate Sampling: The sampling protocol was designed to guide the collection of qualitative macroinvertebrate and diatom samples from selected aquatic habitats on St. Matthew Island. The intent was to provide a quick field protocol in order to capture the abundant taxa at a given site.

Macroinvertebrates were sampled from 9 different sites on St. Matthew Island, including streams, ponds, and wetlands. Sampling was concentrated in two major areas of the island: 1) the area around North Lake, on the northern end of the island, including ponds and streams near the field camp; and 2) the area around Big Lake, on the southern end of the island (Figure 2). All nine sites were sampled using the same general approach. At each site, a D-frame net was used to collect 5 samples from a mix of stable habitat types (e.g., cobble/gravel substrates, undercut banks). Sand and fine sediment harbor relatively few macroinvertebrate species, so these habitats were sampled only when others were absent or rare.

In streams, samples were collected by positioning the net just downstream of the targeted habitat and disturbing approximately 2 square feet of the habitat with a gloved hand or boot. The current then carried the macroinvertebrates, along with debris, into the net. The habitat was disturbed for approximately 30 seconds to ensure all macroinvertebrates were dislodged. In ponds and wetlands (and stream reaches with slow current) about 2 square feet of the habitat was disturbed (with a hand, boot, or D-net) to suspend the macroinvertebrates and then the net was swept back and forth to capture the sample. Once samples were collected, the collected material was washed down into the collecting cup by running clean water through the net. All macroinvertebrate samples collected at a given site were combined into a single composite sample. Samples with large amounts of sand (or silt or gravel) were elutriated in the field to reduce the sample volume.

At all sampling sites observers recorded GPS coordinates; described the types of habitats sampled for macroinvertebrates and diatoms; and measured water temperature, dissolved oxygen, and pH.

Diatom Sampling: Diatom sampling is conceptually similar to macroinvertebrate sampling and was conducted at the same nine sites. To sample diatoms a manageable piece of substrate (e.g. large cobble) was removed from the stream and scrubbed, from an area approximately equal to ~4 square inches, with a toothbrush to release the sample. A wash bottle (a soda bottle with a small hole in the cap) and funnel were used to rinse the scrubbed diatoms into a centrifuge tube. This process took about 30 seconds, until the area sampled felt coarse and slime-free. To sample from sand or fine sediment, a syringe was used to vacuum the thin biofilm layer from ~4 square inches of sediment and then the sample was ejected from the syringe directly into the centrifuge tube.

At each sampling area a total of 5 samples were collected from a mix of habitat types. All 5 diatom samples collected at a given area were combined into a single composite sample in one (or more) plastic centrifuge tubes. Three drops of Lugol's iodine solution were added to each centrifuge tube containing a composite sample. Site name, date, time, and collector(s) initials were recorded on the centrifuge tube. When more than one container was needed for a sample, each container label contained all the information for the sample and was numbered consecutively (i.e., 1 of 2, 2 of 2). At all sampling sites GPS coordinates were recorded; habitat sampled for macroinvertebrates and diatoms was described; and the water temperature, dissolved oxygen, and pH was measured.

FRESHATER FISH SAMPLING

Project Lead: Leah Kenney

The aim of this project is to collect freshwater fishes from St. Matthew Island and other key locations within the Alaska Maritime National Wildlife Refuge as part of a monitoring and ecotoxicology study. Collected specimens are being used to monitor and inventory freshwater fishes for management purposes, investigate biogeographical patterns of freshwater fishes, and provide fishes for analysis of mercury and organochlorine contamination. Seven individual sites on St. Matthew Island were sampled, including sites located on the north side of island, in the vicinity of North Lake and the Bull Seal Point camp, and on the south side of the island in the vicinity of Big Lake. The sites included both lacustrine (lakes and ponds) and fluviatile (flowing water) habitats. Small fish traps (“minnow traps”) were set, preferentially in areas with cover, and allowed to fish for 12-24 hours. Traps were set either baited (w/ commercially available canned cat food) or unbaited. Hook and line sampling for larger species was also attempted, without success. Freshwater fish samples were identified in the field at the time of collection. Identification was later verified in the lab by Leah Kenney (USFWS), who is also conducting a contaminants analysis on a sub-sample of the fish collected.

There was a higher diversity of fish species collected at St. Matthew than at other Bering Sea and Aleutian Islands, where species richness is usually very low. The fish populations of most Bering Sea and Aleutian Islands are dominated by three-spined stickleback (*Gasterosteus aculeatus*) and Dolly Varden (*Salvelinus malma malma*). However, at least 5 fish species were collected at St. Matthew: three-spined stickleback, ninespine stickleback (*Pungitius pungitius*), Alaska blackfish (*Dallia pectoralis*), coastrange sculpin (*Cottus aleuticus*), and Dolly Varden. With the exception of coastrange sculpin, all of these species were observed by Rausch and Rausch (1968) on St. Matthew Island in 1954.

ARCHAEOLOGICAL EXCAVATION SUMMARY

Project Lead: Dr. Dennis Griffin

Archaeological investigations on St. Matthew and Hall Islands during the 2012 visit focused on attempting to collect data at three island sites: 1) XSM001, the only prehistoric site known to exist on the islands; 2) XSM002, a possible nineteenth-century Russian polar bear fur hunting camp or an early twentieth century fox trapping cabin near Bull Seal Point; and 3) a reported Russian polar bear fur hunting camp on Hall Island. The first two of these sites had been earlier identified by David Klein with limited archaeological testing by Lisa Frink in 1997. The third site was originally reported to consist of the ruins of an old house on Hall Island as seen by Henry Elliot and Lt. W. Maynard in 1874 (Figure 3) and reidentified by Francis Faye and David Klein in 1963. No investigation of this site has ever been conducted. The 2012 investigations were aimed at compiling additional data on each of these locales so that the USFWS will have a better idea of the early occupation of these remote islands, useful both in understanding early human land use activities in the remote Bering Sea and gaining insight on how to protect significant archaeological properties that may exist on their lands. The following information summarizes the initial results of the excavations.

XSM001 – Pottery House Site: The Pottery House site consists of a single semi-subterranean house depression (4m x 3m with 4m long entry) with two associated cache pits located near the entry tunnel. Excavations at the site consisted of a 1m x 1.5m unit within the house depression and two 50cm x 50cm units, one in each of the cache pits. Previous investigations at the site (e.g., Klein 1957; Frink 1997) established a date of occupation (350-430 BP) and the existence of pottery and faunal remains. The 2012 excavations focused on testing near the rear of the house in an attempt to locate a hearth to try and

establish both the longevity of occupation and recover artifacts useful in determining the past land use activities and seasonality. While failing to find any evidence of a hearth, the excavation was successful in recovering a number of tools (stone, bone and ivory) and identifying a possible tool manufacturing area for both bone and ivory materials. While an analysis of the recovered artifacts will not be possible until later in 2013, initial observations support a short-term occupation (perhaps as short as one year). The rear of the house yielded evidence of a wooden ceiling, probably constructed from driftwood logs. Beneath the collapsed ceiling was a very thin layer of bone, stone and ivory artifacts near the center of the unit and an abundance of pottery near the rear of the structure; with all of the artifacts lying directly on the natural clay floor. Earlier test excavations hypothesized the existence of a floor in the north half of the house comprised of flat black stone. No evidence of such a flooring was found in the southern half of the house, which may suggest that the rear of the house served primarily as a work area, while basic living functions (e.g., sleeping, cooking) took place closer to the front. Test units in the associated cache pits revealed faunal remains and a few pieces of pottery in both units. One hypothesis to support a short-term occupation of the site is that a single umiak (skin-covered boat) of Eskimo hunters could have been following the remnant ice, hunting seals. Caught far from their mainland home (wherever such a home was located), they were forced to stay on St. Matthew until the ice pack again formed and they were able to follow it home. The nearest land to St. Matthew Island is Nunivak Island, which is located over 266 kilometers to the east. A large number of pottery shards and faunal remains (e.g., walrus, whale, large sea mammal, fox, and bird) were recovered during the excavations which may add insight as to the season of occupation and provide additional dates to support a single, short-term occupation. The remains of a large whale (likely either blue [*Balaenoptera musculus*] or fin [*Balaenopteraphysalus*]) jaw bone was found near the entrance of the house with other whale bones found in one of the cache pits. An analysis of this whale will be completed to see if it dates to the period of occupation and to see if there is any sign of butchering.

XSM002 – Bull Seal Site: The Bull Seal site is comprised of a single house depression (5m x 2.5m), surrounded by a large earthen berm (9m x 7m), and the partial outlines of a second structure. Recorded initially by Frink in 1997, this site was originally believed to consist of the remains of an early 20th century fox trapping cabin. With the discovery of hand-wrought spikes in 2005 the question about this site's possible connection with the earlier 1809 Russian visit was raised. Work during this summer's field season focused on obtaining information that may substantiate the site's origin.

A 1m x 1m excavation unit was placed inside, near the rear of the house depression. The remains of a heavily timbered roof were discovered throughout the entire unit, which yielded a large number of hand wrought iron spikes, nails, and a single glass fragment. It appears that the structure was burned down, leaving few cultural remains aside from the roof timbers. Throughout the unit, the sterile clay substrate was reached by 23cm. It is not known whether a greater diversity and number of artifacts exist in other parts of the site. A wood sample was collected from the roof in order to determine the species of the wood and whether the wood originated from Russia. Metal fragments will also be analyzed (.xrf analysis) for comparative purposes. A 50cm x 50cm unit was excavated within the second, more ephemeral, structure, with negative results.

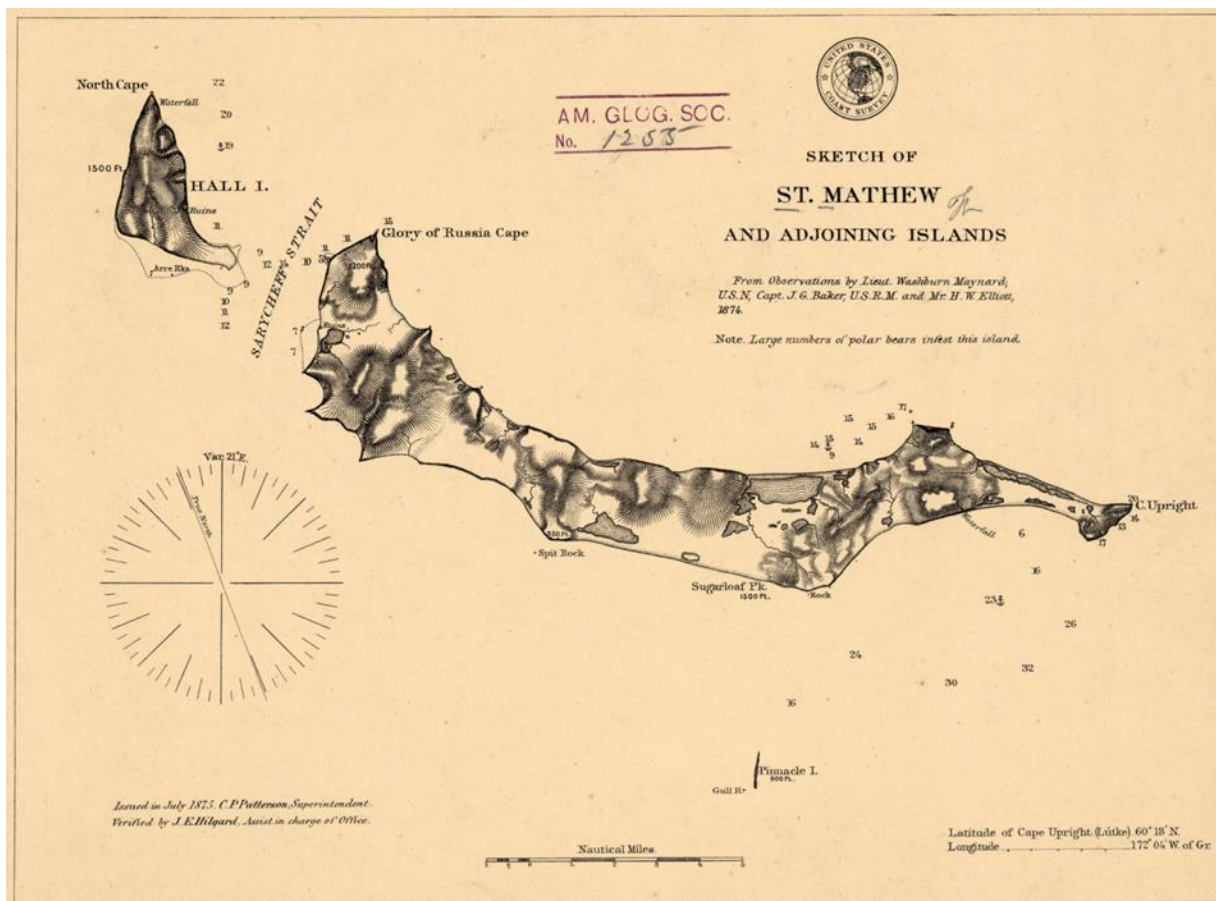


Figure 3: 1875 map of St. Matthew Island with ruins of two sites noted (American Geographical Society Library, Milwaukee)

XSM011– Hall Island: Near the end of the trip five hours was available to locate and test any structure that could be found on Hall Island. The remains of a single house depression (5m x 3.5m), surrounded on three sides by a large earthen berm (9m x 8.5m), was discovered on top of a terrace overlooking a beach area near the southeast corner of the island. A 1m x 1m unit was excavated inside the depression, near the presumed front of the house in order to confirm the age and use of the structure. Fragments of two logs (possible benches?) were found immediately beneath the sod layer. These logs were located on top of what appeared to be a milled wood floor. Thin milled boards covered the entire structure running in a parallel direction. Directly on top of the milled floor, recovered artifacts included a large bone tool, an iron bolt, and a number of polished flat stones (black and green). A 50cm x 50cm unit was excavated through the milled floor to determine if anything existed beneath it. A second layer of floor board, also constructed from milled wood, was discovered directly beneath, with boards running perpendicular to the upper level. A single white glass trade bead was recovered between these two layers. Chemical analysis of the iron bolt, species identification of the milled floor boards, and an analysis of the recovered glass trade bead will be conducted in 2013. This structure appears to be related to the Russian expedition of 1809 and a comparison with the Bull Seal Point site may substantiate the relationship between these two sites. Given the excellent state of preservation found at this site and the number of artifacts found in such a small area, this site has great potential for telling us more about the important period in early contact between Natives and non-natives in Alaska.

Possible House Depression – Big Lake, St. Matthew Island: Identification of a possible house depression near Big Lake on St. Matthew Island was also attempted. David Klein identified a possible house depression during a visit to the island in 1985. During the visit in 2012 he accompanied Dennis Griffin to the area of his 1985 sighting but no evidence of a house site could be found. The level of Big Lake was much higher in 2012 than in 1985 and the vegetation and shoreline did not appear to be very hospitable for human habitation. Future survey investigations in other parts of the island may yet reveal other human habitation sites. A complete report detailing the results of the 2012 excavations is expected to be completed by June 2013.

SLEDGE ISLAND, NORTON SOUND

Project Lead: Heather M. Renner

Sledge Island is a small (2.4x1.6 km) island about 40 km west of Nome, Alaska, and 10 km off the coast of the Seward Peninsula. It is a steep-sided and flat-topped rocky island (Figure 4), with high (~200m) basaltic cliffs at the south end and a small sand spit at the north end (which hosts a US Coast Guard navigation light, Figure 5). The vegetation is maritime tundra comprised of willows, dwarf birch, and crowberry – with wet grassy/mossy low slopes and drier rocky crustose-lichen tundra higher up. A cabin (Figure 6) and historic village site (abandoned about 1910; Figure 7) are located on the east side, as is a small airplane wreck (Figure 8), apparently from about 1989. Sledge has been infrequently visited by Refuge staff (see Byrd 1984 for most recent visit) or other ornithologists (Cade 1952) but is regularly visited by people from Nome.



Figure 4. Sledge Island viewed from the west side.



Figure 5. The sand spit at the North end of Sledge Island, showing the Coast Guard navigation light

Sledge Island was visited on 3 August 2012, with the crew arriving aboard the *R/V Tiġlaġ*. Winds were 20-25 kt from the southwest and the entire island was free of fog at most times. The island was circumnavigated with an inflatable skiff (0815-0930 hrs) and all wildlife observed was recorded (Table 1), but seas were very rough on the south side of the island and precluded good counts of the kittiwake and murre colonies. Sledge hosts a small but regionally-significant concentration of kittiwakes and murre colonies on the south side – the entire colony is shown in Figure 9. Both common and thick-billed murre were present but could not be counted or identified to species due to poor observation conditions. Pelagic cormorants nested around the entire island but especially on the east and south sides, on high rock spires (Figure 10). No wildlife concentrations were noted elsewhere.



Figure 6. The cabin above the historic village site on the east side of Sledge Island.



Figure 7. The old village site on the east side of Sledge Island (left). A midden is actively eroding out of the bank (right).



Figure 8. Airplane wreck from August 1989 – just above the village site.

Following the skiff survey, the survey crew spent a few hours ashore at both the sand spit on the north end of the island and at the historic village site on the east side (see RK Harritt and Associates 2010 for ethnohistorical information). The only landbirds observed were 4 savannah sparrows on the beach – with no evidence of Lapland longspurs or snow buntings (although the crew did not climb to the top of the island). No mammals were observed, although one old fox scat was found next to a murre egg near the village site.

Table 1. Birds observed on nearshore boat survey of Sledge Island, 3 August 2012.

Species	Count
Common eider	1
White-winged scoter	1
Pacific / arctic loon	2
Pelagic cormorant	83
Black-legged kittiwake	~1000
Glaucous gull	27
Parasitic jaeger	2
Murre <i>spp.</i>	~1000
Horned puffin	4
Tufted puffin	3
Pigeon guillemot	7



Figure 9. Kittiwake and murre colony at the south end of Sledge Island. Almost the entire colony is within the view of this photo.

According to the State of Alaska's on-line database of land records, the State has issued suction dredge placer mining permits (5-year term) for all of the sections surrounding Sledge Island. On this visit the survey crew observed corner-post marker stakes on the coast for 4 offshore gold mining claims. Besides the sand spit at the north end, there are few good landing or camping sites; though the crew were able to land on the beach at the historic village site.



Figure 10. Spires surrounding Sledge Island (mostly on east side) contain hundreds of nesting pelagic cormorants.

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Appendix 1. History of recent biological visits to the St. Matthew Islands, Alaska.

Year	Dates	Type of work	Personnel	Sources
2012	29 Jul-4 Aug	Refuge monitoring, Interdisciplinary studies	Marc Romano, Heather Renner, Marianne Aplin, Aaron Poe, Tony DeGange, Steve Delehanty, David Klein, Rich Kleinleder, Ned Rozell, Derek Sikes, Monte Garroute, Casey Bickford	1,2
2005	20-29 July	Refuge monitoring Auklet Mapping	Heather Renner, Ian Jones, Alexander Kitaysky, Evie Witten, Anne Morkill, Randy Hagerstein, Art Sowls, Michael Schultz, Mike Boylan, Margret Williams	3,4
2003	May 26 – July 8	Sandpiper surveys, McKay's bunting surveys	Steve Matsuoka, Jim Johnson, Dan Ruthrauf, Mike Lltzow	5,6,7
2002	July 21 – August 1	Seabird Monitoring Archaeology	Alexander Kitaysky, Dennis Griffin, Anne Morkill, Art Sowls, Paula White, Scott Hatch, Debbie Steen	8
1997	July 18-26	Refuge Monitoring, Archaeology	Sandra Talbot, Stephen Talbot, Tony DeGange, Art Sowls, Michael Schwitters, Jay Nelson, Dave Murray, Doug Causey, Lisa Frink	9, 10
1991	June 26-July 18	Refuge Monitoring	Jay Nelson, Jim Gove, Carolyn Gove, Art Sowls	11
1986	July 7 - Aug19	Seabird Monitoring	Edward Murphy, Brian Cooper, Philip Martin, Brian Lawhead, Alan Springer, Dana Thomas, Max Hoberg, Peggy Klein, Richard Rohleder, Jackie Martin, Rick Johnson	12
1985	July 6-17	Seabird Monitoring	Vern Byrd, Tom Ealry, Carolyn Fleshman, Steve Kirkhorn, Dave Klein, Gary Lyons	13
1985	July 2-Aug 20	Seabird Monitoring	Edward Murphy, Brian Cooper, Philip Martin, Brian Lawhead, Alan Springer, Dana Thomas, Max Hoberg, Peggy Klein, Richard Rohleder, Jackie Martin	12
1984	June 1 – July 24	Seabird Monitoring	Vern Byrd, Bob Angell, Carolyn Fleshman, Laura Hoffman, Valerie Hironaka, Art Sowls	14
1983	June 1 – Aug 10	Seabird Monitoring	David Irons, Art Sowls, Dave Roseneau	15
1982	May 20 – Aug 7	Seabird Monitoring	Art Sowls, Maurice Ward, Roberta Ward, Dave Irons, Steve Morrell, Daria Carle, Elaine Rhode, Shelli Vacca	
1977	June 26 – July 27	Seabird Monitoring	Art Sowls, Tony DeGange	16
1976	July 23-31	Mammal Inventory Archaeology	E. James Dixon, Russel Guthrie, Sam Stoker	17

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