ALASKA LANDBIRD MONITORING SURVEY

ALASKA PENINSULA / BECHAROF NATIONAL WILDLIFE REFUGE

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By:

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ABSTRACT

The Alaska Landbird Monitoring Survey (ALMS) is a statewide effort designed to monitor long-term trends in Alaska landbird breeding populations. The Alaska Peninsula/Becharof National Wildlife Refuge, located along the eastern portion of the Alaska Peninsula, participated in ALMS for the first time in 2004. The refuge surveyed six blocks assigned by USGS personnel, as well as an additional block to broaden the monitoring effort. The blocks surveyed extend nearly 180 miles along the Alaska Peninsula, from just south of King Salmon to Chignik Lake, although the surveyed blocks are concentrated in the northern portion of the refuge. From 9 – 28 June 2004, refuge personnel recorded 1,954 birds of 49 species during the surveys and recorded an additional 25 species while present at the blocks. Savannah sparrow was the most abundant and widespread passerine on the Alaska Peninsula, detected at 89% of all points and composing 19% of all the birds recorded. In addition to the avian data, extensive data on the habitat were collected, including data on disturbance, soil moisture and habitat classifications. Although this project provided valuable information about species distribution and abundance in Alaska and on the Alaska Peninsula, this project is very costly. The average cost for each point surveyed is $435, due primarily to the remoteness of the refuge and the need for helicopters to access these areas. Future participation in the ALMS program is expected in 2006, but dependent on adequate funding.

INTRODUCTION

The Alaska Landbird Monitoring Survey (ALMS) is a statewide effort designed to monitor long-term trends in Alaska landbird breeding populations. The Alaska Peninsula/Becharof National Wildlife Refuge participated in ALMS for the first time in 2004. The series of points surveyed in 2004 will be revisited every two years to monitor changes in bird populations over time. This monitoring effort expands prior road-based efforts (Breeding Bird Survey) and Off-road Point Counts to include randomly-selected blocks throughout Alaska. The sampling universe for this effort includes all federal lands in Alaska (i.e., USFWS, NPS, BLM, USFS, DOD) with the exception of the Aleutian Islands and some Bering Sea islands. Primary objectives include measuring avian population sizes and monitoring rates of population change. This information will also be useful to managers seeking information about distribution and habitat associations of landbirds in Alaska. The explicit goal for ALMS is to be able to detect a 50% change in population size over 25-year period (3% per year) and to have a 90% probability of detecting that change if it occurs.

The Alaska Peninsula/Becharof National Wildlife Refuge was assigned six blocks to survey. In 2004, these six blocks were completed and an additional block was added to broaden the monitoring effort. Although the ALMS protocol recommends surveying half of the assigned blocks in even years and half in alternate years, we surveyed all blocks in 2004 to maximize efficiency with staffing and transportation costs. If budget allows, all blocks will be surveyed every two years, consistent with the ALMS protocol.

STUDY AREA

The study was conducted in the Alaska Peninsula/Becharof National Wildlife Refuge. The refuge is a land of towering mountains, active volcanoes, broad valleys, fjords, tundra and glacially formed lakes. The Bristol Bay side of the Refuge consists primarily of flat to rolling tundra, lakes and wetlands. From these coastal lowlands, the land rises to steep glaciated mountains, forming the spine of the Refuge, and then plunges to steep cliffs interrupted by beaches on the Pacific side.

USGS personnel from the Alaska Science Center randomly selected six blocks on the refuge from a statewide sampling grid of 10-km by 10-km blocks. The six blocks are as follows: block 12714 Chignik Lake, 14878 Dog Salmon River, 17035 North King Salmon River, 14882 Ugashik/Deer Mountain, 14645 Wide Bay, and 11994 Kametolook River. Of the original six, Kametolook River was eliminated due to the following logistical constraints: 1) it was difficult to access although it could have been done via helicopter, 2) the refuge could not obtain permission from the Oceanside Native Corporation after attempting for three months, and 3) there were safety concerns due to several minor eruptions of Mt. Veniaminof this summer. This block was substituted with an alternate, block 16321 Gertrude Creek. We added block 15125 South Becharof Lake/Bear Creek as an additional site. Table 1 shows a summary of all blocks assigned to the refuge and decisions made concerning their selection for survey. See Figure 1 for a map of the blocks.

METHODS

Staffing and Logistics

Five observers participated in collecting landbird data: Biological Technicians Erik Andersen, Robb Kaler, Gretchen Jehle, and Kristin Sesser and Refuge Wildlife Biologist Susan Savage. All observers were capable of identifying local birds by sight, song, and call and were familiar with the characteristics of less common species (see Appendix 1 for details on observer experience). One intern, Jessica Eyster, and one Biological Technician, Sarah Schuster, assisted with collection of habitat data.

Transportation to field sites was provided by fixed-wing aircraft and helicopters, depending on access. Most sites required the use of helicopters, as few were located near suitable landing areas for fixed-wing aircraft (Table 2). When a wheeled airplane was required, we used the refuge's Aviat Huskey or Birchwood Air's Cessna 185 on wheels. For water landings, we used the refuge's Cessna 206 on floats. For sites without suitable landing areas for fixed-wing aircraft, we chartered Egli Air-Haul's Bell JetRanger III or Pollux Aviation Ltd.'s Robinson-44 helicopter.

Camp facilities and survey equipment included: North Face VE-25 tents, 10 x 40 Zeiss and 10 x 42 Leica binoculars, Garmin GPSMAP 76S GPS units, Pentax Optio 43WR digital cameras, Timex Ironman W-39 and Robic Sports SC-707 timers, and one laser rangefinder per team, either a Leica LRF 800 or a Tasco 800. Safety equipment

included: two VHF radios, two Iridium satellite phones, two Mini B2 personal EPIRB units, signaling mirrors, and a first-aid kit. Specialized equipment for bear safety included an electric fence, one 12 gauge shotgun per person with rifled slugs and bear hazing supplies (cracker shells and rubber slugs), air horns, and bear-proof food storage drums. An Incept Marine Ltd. inflatable canoe was employed to cross the Dog Salmon River.

Training

All biologists underwent extensive training in regard to safety, bird identification, distance estimation, and ALMS protocols. Safety training included sessions focusing on first aid, CPR, bear behavior, firearm use, aircraft safety, communications, and watercraft safety.

All bird observers arrived early in April and began visiting local birding sites in King Salmon and Naknek, Alaska, to learn the local birds. All observers participated in International Migratory Bird Day on 8 May, 2004, and had the opportunity to visit sites with local experts. Observers completed additional training in measuring and estimating distances to birds prior to the start of official surveys. Instruction was provided on distance sampling and the ALMS protocol. These methods were practiced at several local sites. Observers also practiced distance estimation during shorebird surveys in May (Kaler 2005). Laser rangefinders were used to improve distance estimates where habitat allowed.

Data Collection

The ALMS methods are outlined in the Alaska Landbird Monitoring Survey: Protocol for Setting Up and Conducting Point Count Surveys (Handel and Cady 2004). We completed seven ALMS blocks during 9 – 28 June 2004. Six of these random blocks had been assigned by USGS personnel; the seventh block was an additional alternate block included to broaden the monitoring effort. An eighth block was planned but not completed due to time and budget constraints. Each block was visited once for ALMS data collection, although the fixed-wing accessible sites were revisited by the refuge later in the season for a small mammal inventory (Andersen 2005).

Within each block, a grid of 25 points was systematically placed in a 5 x 5 array. At each block, a minimum of 15 and a maximum of 25 points were surveyed. We attempted to survey all points in all blocks but were limited by time, weather, topography, and bear safety constraints. At a minimum, the points surveyed in 2004 should be resurveyed in future years; additional points may be added if factors allow. Point spacing was set at 500 meters for all blocks because the Alaska Peninsula/Becharof National Wildlife Refuge is primarily composed of open habitat. Although some of the blocks contained a mosaic of open and closed habitats, we used 500 meter spacing in all blocks to maintain a consistent protocol. Survey points were marked with brightly-colored wooden stakes (orange or yellow). When the point was located in dense vegetation, flagging was also used to increase visibility of the point location.

Photographs were taken at all surveyed points following the ALMS protocol. One assistant stood at the point holding a sign to identify the block, point, date, and direction. In bright sunlight or downpours it was difficult to read or edit this sign. We began to photograph the sign or the GPS unit immediately prior to completing the photographs. The four cardinal directions were photographed sequentially N, E, S, W, for a total of five photographs per point. These photographs are stored electronically and named with the block, point number, and direction.

At each block, avian surveys were conducted by one or two biologists (Table 2). When conducting the avian surveys, observers rotated between points at all blocks except Dog Salmon River and one day at Gertrude Creek. At the Dog Salmon River, one qualified observer was accompanied by the refuge intern, so the observer performed all surveys. On one day at Gertrude Creek, the observers switched between a dawn and late morning shift to enable the extra assistants to follow and learn the avian survey protocol. Laser rangefinders were used at all points to improve precision of distance estimates. At two blocks (Gertrude Creek and South Becharof Lake), exact distances were recorded to birds when possible because these additional data were requested from USGS staff. For all other detections, distances were recorded in bands as outlined in the ALMS protocol. All avian species were included at all surveyed points. A list of the bird species included in this report including common and scientific names, and AOU codes can be found in Appendix 2. We did not have any instance in which it was necessary to exclude abundant species (i.e., flocks or communally nesting birds). Species detected only between points were included in the bird and mammal summary checklist for each block. These will also be summarized in a separate report. When nests were found, a GPS location was recorded and a photograph was taken when possible.

Habitat data were collected at all points surveyed for birds and always within a 50 meter radius of the point. Habitat data included non-vegetative and vegetative characteristics. The non-vegetative habitat data included environmental disturbance, coarse woody debris, and the topography and soil moisture at the site. The vegetative data included classifying each type of habitat using three different systems and reporting its percentage of the circle. Wetland habitats were classified according to the National Wetland Inventory (NWI) classification (Cowardin et al. 1979). Vegetated habitats were classified under NWI, if a wetland, and also classified according to The Alaska Vegetation Classification (Viereck et al. 1992). All habitats were classified according to Kessel's (1979) avian habitat classification. A detailed description of these classification systems are located in the Appendices 3, 4, and 5 and were provided by the ALMS protocol. We employed a slightly different scheme for coding Viereck classifications, and we went to Level III, although level IV may be inferred at some points using the species specific data collected. We recorded the plant species making up the dominant vegetation components at most points except Wide Bay. It will be important to collect those habitat data at Wide Bay the next year the points are surveyed. A list of the plant species recorded during habitat surveys can be found in Appendix 6.

After completion of the surveys and returning from the field, a visit summary was written for each of the blocks describing several different aspects of the site. Items addressed include the topography, time required, camp location, grid route, skipped points, access and any notes on water crossings or wildlife encounters (Appendices 7 – 13).

Data Analysis

Species abundance can be compared by several measures. One way is to look at the frequency of detection for each species, both at block and study area levels. Detection frequency is found by dividing the number of points at which a species is detected by the total number of points surveyed. This measures how often a species is detected, but does not address the numbers of individuals observed. We can also look at the average occurrence per point, both at the block and study area level. The average occurrence per point equals the number of individuals detected per species divided by the number of points surveyed. This gives us an index of abundance. To rank landbird species by abundance across the study area, we can look at the proportion each species comprises of the total detections. The proportion of total detections is found by dividing the number of birds detected during a point count for each species by the total number of birds detected for all species.

The above summaries provide a relative measure of bird abundances. However, none of these account for differences in the probability of detection among observers or among habitats. All of the above summaries are based on the assumption that different observers are able to detect all bird species in all habitats with the same probability of detection. These data will be further analyzed by staff of the Alaska Science Center. They use the program Distance in which detection probabilities are calculated using avian detections and the distances to those detections. With these data and the associated detection probabilities, it is possible to estimate the density of birds in a given area. The detection frequencies presented in this report are not the same as the detection probability calculated using the program Distance.

In order to evaluate the different habitats surveyed, we produced a sum of the percent of circle values for each habitat type. We summarized these values for each block and across all blocks and presented these data with pie charts, emphasizing the proportion of the area surveyed that each habitat type represented.

RESULTS AND DISCUSSION

Costs

Costs for this project were sizeable with a grand total in 2004 coming to just under $57,000 (Table 3 and Figure 2). Costs associated with the first year of the project, such as equipment, are expected to decrease. The safety and camping gear were not included in the equipment costs. These items are supplied by the refuge and the costs are shared with other projects. The costs for supplies and food per diem are $1,475 and $1,334

respectively. These costs are unlikely to change between years unless there is a decreased effort, as they need to be replenished for each ALMS season. The salaries totaled $36,295. This cost will vary depending on the GS levels hired. In 2004, the refuge had two GS-7, one GS-6, one GS-5, and one volunteer. Due to expected future budgets cuts, staff will likely include two technicians and two volunteers instead of four technicians, reducing salary costs. The costs related to travel to the field sites are likely to increase; aircraft charges usually increase each year, and as fuel increases these will surely increase. For Gertrude Creek the costs of having an additional two crew members on site were not included.

Timing at Blocks

The time required to complete blocks ranged from four to seven days with an average of 5.3 days per block with most variation due to weather-related delays (Table 2). This includes days for transportation and camp set-up and break down. Travel to and from sites often took a good portion of a day. Time involved in setting up or breaking down camp was approximately three hours each. Avian surveys were completed in two to three mornings with an average of 2.4 mornings per block. We summarized the time between individual avian point counts (Table 4). The times include the ten minute avian point count, travel between points, loading or unloading gear at each point, and for some points, time to complete the habitat surveys started during the avian point count by the second observer. The average overall time between start of avian point counts was 37 minutes. The fastest time was at South Becharof Lake at 21 minutes and the slowest time of 1 hour 25 minutes was at Ugashik/Deer Mountain. Habitat surveys required between 15 and 40 minutes per point, depending on the heterogeneity of the vegetation and observer fatigue. Physical travel between points required between 11 minutes and approximately one hour depending on the terrain and on whether the observers had previously scouted the points. In some locations, route finding was a challenge.

Three tasks were needed for the survey at each point: 1) set up, which involved navigating to the point, recording location data and marking the site, 2) the avian survey, and 3) the habitat survey. Avian surveys required good weather: light winds, good visibility and little to no rain; these constraints often dictated the survey schedule. On days when there was too much wind or rain to survey birds, habitat data were collected.

There were several different scenarios in which the surveys were completed. The most optimal and most common method was to set up the point and complete the habitat survey on the first visit to each point. The second visit to the point would be for an avian survey on a subsequent morning. Avian survey days were most efficient when the point locations had been previously scouted and marked. Another scenario was to complete all the tasks on the first and only visit to the point. Two blocks, South Becharof Lake and Ugashik/Deer Mountain were surveyed in this way. The terrain at these blocks was particularly challenging and a subset of points (15 and 12 respectively) was surveyed for habitat and birds during the only visit to the point. While the point count was being conducted, the second observer started collecting habitat data. Habitat surveys usually take more than ten minutes, so this method resulted in prolonged time intervals of

approximately 5 – 20 minutes between points. This maximized the efficiency of travel but decreased the number of avian surveys that could be completed on a given day. For a few points at many of the blocks, the set up and avian surveys were completed on the initial visit to the point because of good weather, and the habitat survey was completed at a later time. Occasionally, points were visited three times, once to initially scout and set up the point, a second time to survey the birds and a third visit to survey the habitat. This most often occurred when arrival at the block was late enough in the day that the crew only had time to scout some of the points.

Avian Observations

Observation Data

During the 2004 ALMS effort, 15-25 point counts were conducted within each of the seven blocks averaging 18.7 points per block. At each point, 6-21 detections were recorded with an average of 13.7 detections per point (Figure 3). North King Salmon River had the highest average number of detections per point (15.6) while Chignik Lake had the lowest (12). Some detections include more than one bird, so we can also look at the average number of birds detected per point. Throughout the study area, the average number of birds per point was 14.9, Dog Salmon River had the highest number of birds per point (16.9) and Gertrude Creek had the lowest (12.9). Chignik Lake had the largest difference between the number of detections and the number of birds, because one detection consisted of 50 mew gulls flying over.

We recorded nine different types of behavior within our detections (Figure 4). While the bird may have exhibited several behaviors, we recorded only the behavior that best indicated the age and sex of the bird. The most commonly recorded detection was Song, making up 65% of all the detections. The next most common detection was Call, making up 11% of the detections. Visual detections with sex unknown were close with 10% of the detections.

With most point counts, most birds are detected in the earlier stages of the count. The distribution of detections for each time interval is what we would expect for a 10 minute count. The number of detections doesn't continue to decline, it levels off and is the same for the last 5 minutes (Figure 5). One of the assumptions for distance sampling is that distances to birds are estimated correctly. We summarized our detections and the distance intervals in which they were placed, for all detections and all observers (Figure 6). These intervals were not corrected for the area of the band. Overall our detection distribution is as expected; most detections are within 100m of the point, with the numbers dropping off as the distances increase as our ability to detect some birds decreases. Our most noticeable aberration is the spike in detections for the 70-80m interval and the corresponding dip in detections in the 80-90m interval. Our observers had a tendency to use the 80m interval rather than the 90m, giving a skewed distribution.

Species Distribution and Abundance

A total of 49 species (plus one genus and one family) were detected during point counts, with 17 to 27 species recorded at a single block (Table 5). Species recorded during point counts at all seven blocks included: Wilson's snipe, orange-crowned warbler, Wilson's warbler, savannah sparrow, and common redpoll. Species recorded at six blocks included: least sandpiper and yellow warbler.

We used three different methods to evaluate the species abundances. First we examined the detection frequency of each species (Table 6). Savannah sparrows had the highest average detection frequency (0.89), followed by common redpoll (0.71), Wilson's warbler (0.60), golden-crowned sparrow (0.54) and orange-crowned warbler (0.53).

We also examined the average occurrence per point for each species (Table 5). Savannah sparrows had the highest overall average occurrence per point with almost three birds per point (2.82) across the entire study area. Gertrude Creek averaged 4.76 while S. Becharof Lake had only 1.50 savannah sparrows per point. Golden-crowned sparrows were the next most abundant with an average of 1.34 birds per point for the overall study area. They averaged 3.50 birds per point at S. Becharof Lake but only 0.16 birds per point at Gertrude Creek, while being absent entirely from Dog Salmon River and N. King Salmon River. This was the inverse of savannah sparrows. Common redpolls averaged 1.24 birds per point, Wilson's warbler averaged 1.11 birds per point and American tree sparrows averaged 1.10 birds per point. Wilson's warbler and American tree sparrow have similar averages but Wilson's warbler was detected at all blocks with a larger range in average occurrence per point while American tree sparrow was detected at only four blocks. American tree sparrows were common only where Wilson's warblers were uncommon except for Chignik Lake where the values were similar.

Next we examined the proportion of the total detections (n=1,954) for each species (Table 5). Savannah sparrows made up the highest proportion (0.189), followed by golden-crowned sparrows (0.090), common redpolls (0.083), American tree sparrows and Wilson's Warblers (0.074), hermit thrushes (0.064), Lapland longspurs (0.059), and orange-crowned warblers (0.053).

Within all three measures of abundance, savannah sparrow was the most commonly detected species, making them one of the most widespread and abundant passerines on the Alaska Peninsula. In contrast, some species were observed at only one site. Alder flycatcher was detected at only one point at Ugashik/Deer Mountain and during the 9-10 minute count interval. Marbled godwit and dunlin were also recorded at only one block (Dog Salmon River) and within this block they were fairly common, detected at 81 and 75 percent of the points respectively. Some species were absent from a few sites yet abundant at others. Golden-crowned sparrow, for example, was absent or rare at three blocks, and then abundant at the other four blocks. This species made up the second highest proportion of total detections, yet was nearly absent from the wet, open blocks.

Interestingly, white-crowned sparrows were detected on point counts at only two sites and they were the two blocks where golden-crowned sparrows were entirely absent. American tree sparrow and hermit thrush are also examples of species found to be either common or absent entirely at a site. American tree sparrows were detected at only four blocks, yet at those blocks, they were detected at 70% or more of the points surveyed. Hermit thrushes were also detected at only four blocks, and at three of those blocks were detected at 85% or more of the points surveyed.

Incidental Bird and Mammal Observations

A total of 74 species of bird were observed at all sites during our 2004 visit to the ALMS blocks (Table 7). Of these, 25 were observed only outside the point counts. On average, 33 species were observed at each block. Wide Bay had the most species with 40. This includes several species of seabirds not observed elsewhere. Gertrude Creek had the fewest with 24 species observed and this was our most homogeneous block with respect to habitat.

We observed evidence of 17 species of mammals during our visits (Table 8). Four species of marine mammal were observed only at Wide Bay. We had visual observations of brown bears and evidence for caribou and moose at six of the seven blocks.

Nests

Nests of 18 species were found during the June visits to the ALMS blocks (Table 7). Two new species were found to be breeding on the Alaska Peninsula during the 2004 season: pacific golden-plovers and black-bellied plovers (Savage and Johnson, *in preparation*). Both of these species were previously thought to be migrants on the Alaska Peninsula.

Habitat Observations

Non-vegetative Habitat Characteristics

Habitat data collection involved recording environmental disturbance, coarse woody debris, and topographic data at each point. Disturbance was recorded in four blocks and at nine points. Beaver ponds and flooding were the most common disturbances. Disturbance was a minor driver for succession at six of the nine points. Flooding damage resulted in widespread secondary succession at three points: one at S. Becharof Lake and two at Ugashik/Deer Mountain (in river or stream beds). Coarse woody debris was detected at few sites, most likely because of the lack of trees on the Alaska Peninsula. The sprawling nature of the shrubs also made woody debris hard to detect, if present. Within each grid of points, elevation differed from seven meters at Dog Salmon River to 235 meters at Ugashik/Deer Mountain (Table 9). With regard to slope, all blocks had some level points. At several blocks, some points had steep slopes, from 40 degrees at Chignik Lake and Wide Bay to 30 degrees at Ugashik/Deer Mountain and S. Becharof

Lake, while other blocks were uniformly flat such as Dog Salmon River and Gertrude Creek (Table 9).

Soil Moisture

The habitat questionnaire focused on soil moisture. The first question focused on the presence of water bodies (Figure 7). Blocks contained four to eight points with water bodies, averaging 6.3 points per block. As few as one or as many as all of those water bodies were greater than ten meters wide. Gertrude Creek, which has wetlands present at 23 of 25 points, has very few water bodies and only one that was greater than ten meters wide. Chignik Lake and Dog Salmon River had half or a third of their points respectively containing water bodies and all of them in the form of lakes or rivers.

The next question focused on wetland habitats which are defined as those where saturation with water is the dominant factor in determining soil development and plant community (Figure 8). Blocks contained two to 23 points with wetland habitats present, averaging 9.6 per block. Dog Salmon River had wetland habitats at every point surveyed (16 of 16). Contrast this with S. Becharof Lake where only two of 20 points had wetland habitats present. The proportion varied widely.

The fourth question focused on dry, upland habitats which are defined as those where the soil is very well drained, unable to hold moisture long after precipitation, and dry most of the year (Figure 9). Blocks contained zero to 12 points with dry habitats present, averaging three per block. N. King Salmon River is the only block with a high proportion of dry habitats present (12 of 19). The other blocks had zero to four points with dry habitats present. Dog Salmon River and Gertrude Creek had no points with dry habitats.

Habitat Vegetation Classification

The habitats surveyed were classified into five broad habitat categories (Figure 10). Over half (53%) of our habitats were classified as non-wetland habitats with greater than two percent vegetation cover. Vegetated wetlands without an open water body composed the next largest habitat at 43% of those surveyed. Three percent of remaining habitats were water bodies with no floating or emergent vegetation, usually rivers, streams or small ponds. The remaining 1% were water bodies with greater than two percent vegetation cover (ponds with aquatic vegetation) or non-wetlands with less than two percent vegetation (alluvial or glacial deposits).

For each habitat classification system used, the proportions of each habitat type surveyed in 2004 are graphed in Figures 11, 12 and 13. Of the 47% of the habitats classified as wetlands with NWI, the majority (28% of the total) were some form of Scrub-shrub Wetland where the shrub cover was greater than or equal to 30% of the area. The other large component of wetland habitats (15% of total habitats) were classified as Emergent Wetlands where the emergent vegetation cover was greater than or equal to 30% and dominated by graminoids or forbs. Rivers composed 3% of all habitats surveyed and

lakes less than 30% vegetated, composed the remaining 1% of all habitats surveyed. The Aquatic Bed habitat class described as having vegetation submerged or floating on surface of water was surveyed only at one point at Dog Salmon River.

The Kessel avian habitat classification classifies all habitats used by birds, including near and inshore waters, vegetated and unvegetated substrates. Eleven different Kessel habitats were found. Fresh water habitats made up 4% of habitats, which agrees with the NWI classifications. Lakes or ponds made up 1% while rivers and streams made up 3% of the total. Only one unvegetated substrate, alluvial or glacial deposit, was surveyed and made up only 1% of all habitats surveyed. The remaining 95% of habitats included Meadows (41%) and Shrubbery (54%). The types of Meadow habitats present were as follows: Wet meadow (14%) including small ponds and vegetated pond margins, Dwarf shrub meadow (25%) which is a mesic habitat with shrubs less than 0.4 meters, Grass meadow (2%) which is relatively dry with mostly graminoids, and Tall forb meadow (0%) with forbs greater than or equal to 0.4 meters. The types of Shrubbery present were as follows: Dwarf shrub mat (17%) which is dry and shrubs less than 0.4 meters dominate, Low shrub thicket (6%) with shrubs 0.4 – 1.1 meters, Medium Shrub thicket (25%) with shrubs 1.2 – 2.4 meters, and Tall shrub thicket (6%) with shrubs 2.5 – 4.9 meters. Marine waters, Forests and woodlands, and Artificial habitats were not found at any surveyed points.

The similarity between the 53% shrubbery of the Kessel classification and the 53% non-wetland habitats described by NWI are coincidental. Each classification system has its own criteria and is not necessarily broken down the same as other systems. For example, some habitats classified as low shrub thicket with Kessel were also classified as wetlands with NWI.

The Alaska Vegetation Classification (Viereck, *et al.* 1992) classifies only vegetated substrates, so the 4% open water that the other schemes picked up are represented as NA. Using Viereck we classified 80% of all the habitats as scrub (where the vegetation had at least 25% cover of shrubs) and 16% as herbaceous, where the vegetation was terrestrial, or if growing in the water, dominated by emergent vegetation. Breaking Viereck classification down a bit further, of our habitats surveyed, 28% were tall scrub (shrubs more than 1.5 meters tall), 24% were low scrub (shrubs 0.2 – 1.5 meters tall), and 28% dwarf scrub (shrubs under 0.2 meters tall). The herbaceous habitats were primarily dominated by graminoids at 14% with only 2% dominated by forbs. There were no forested habitats surveyed. The 80% shrub found here was similar to the 79% shrubs classified by Kessel. Beyond that, the classifications between Kessel and Viereck are different because of varying vegetation height and abundance classes.

Miscellaneous

One factor affecting the habitat data collected was differing opinions on what constituted a mosaic of habitats. In some instances, observers were more likely to use separate habitat categories than to lump in mosaics as suggested in the protocol. As this was the first field trial of the new habitat protocol, more guidance may be forthcoming.

Avian Habitat Patterns

Habitat data were collected within a 50 meter radius of the point. Many of our blocks consisted of primarily open habitats. As a result, less than a quarter (23.8%) of our avian detections consisted of birds inside the circle of habitat surveyed (Figure 6).

Examining each block individually, we find that habitat varied greatly across the Alaska Peninsula. Some blocks had as little as 4% wetland while others were dominated by wetlands. Some blocks were dominated by shrubs while others by graminoids. What follows is a short summary of the terrestrial habitats at each block along with the dominant avian species detected there. For the purposes of this summary, we included all avian detections, including those outside of the habitats surveyed.

Block 17214 Chignik Lake (Figures 14 – 15). Wetlands composed 46% of the habitats surveyed at this block. Graminoids dominated most of these wetland areas with a few points having forbs dominant. The remainder of the terrestrial vegetation was dominated by shrubs, tall (35%) or low (15%). The Wilson's warbler was the most commonly detected species at 87% of points surveyed. Savannah sparrow and golden-crowned sparrow were detected at 80% of points. American tree sparrow and common redpoll were also frequently observed.

Block 14878 Dog Salmon River (Figures 16 – 17). Wetland composed this entire block. About 21% was dominated by graminoids and 15% by low and tall shrubs. Dwarf scrub (mostly ericaceous shrubs but some willow) dominated the remaining area at 60%. Savannah sparrow was detected at all 16 points with Lapland longspur detected at 88% of points. Two shorebird species, marbled godwit and dunlin made up the next two dominant species, further demonstrating that this was a very wet site indicative of suitable shorebird breeding habitat.

Block 16321 Gertrude Creek (Figures 18 – 19). Although not indicated on the topographical map, this block was also dominated by wetlands, where they make up 92% of the area surveyed. Shrub-dominated wetland made up 78% of the area. Most of these (66%) were dwarf birch (*Betula nana*) with some dwarf willow (*Salix sp*.). Graminoid and forb wetlands composed 13% of the area. Savannah sparrow was detected at all 25 points in the grid. Other commonly detected species were American tree sparrow (96%), common redpoll (84%), and Lapland longspur (76%). There was a thin band of open tall willow scrub (*Salix sp*.) along Gertrude Creek (4%) which was enough to bring in warblers and golden-crowned sparrows.

Block 17035 North King Salmon River (Figures 20 – 21). Wetlands composed 31% of this block; half of those being dominated by graminoids and the other half by dwarf scrub (mostly ericaceous shrubs but some willow). The remaining habitats were dominated by low and dwarf scrub. Dwarf birch and willow dominated in the low scrub while ericaceous shrubs dominated in the dwarf scrub. American tree sparrow and savannah sparrow were most dominant, being detected at 95% of the points surveyed.

Other commonly detected species were Lapland longspur (89%) and Wilson's snipe (79%).

Block 15125 South Becharof Lake/Bear Creek (Figures 22 – 23). Wetlands composed only 4% of the habitats surveyed; this is the smallest amount at any of our blocks. About 48% of the area surveyed was composed of closed tall alder (*Alnus viridus*) thickets, while another 43% was ericaceous dwarf scrub. Three percent of the habitats were unvegetated substrates of alluvia and glacial deposits. Hermit thrush and golden-crowned sparrow were detected at all 20 points. Other commonly detected species were Wilson's warbler (90%) and savannah sparrow (70%).

Block 14882 Ugashik/Deer Mountain (Figures 24 – 25). This block was composed of 31% wetlands, two thirds of which were dominated by ericaceous dwarf scrub and dwarf birch and one third dominated by graminoids. The remaining 70% of habitats surveyed were dominated by tall scrub of alder and willow with some low scrub of willow. These habitats were mostly open (80%) with some closed (11%). Golden-crowned sparrow was detected at all 19 points surveyed. Other commonly detected species were Wilson's warbler (90% of points surveyed), hermit thrush (85%), and yellow warbler (80%).

Block 14645 Wide Bay (Figures 26 – 27). This block was composed of 18% wetlands. Those wetlands were dominated equally by ericaceous and willow shrubs or graminoids. About 54% of the area surveyed was low (14%) or tall (40%) scrub (most tall was composed of alder). Another 31% was dwarf scrub, mostly ericaceous (27%) but with some willow (4%), and graminoids dominated at 15% of the area surveyed. Savannah sparrow and Wilson's warbler were detected at all 16 points. Other commonly detected species were golden-crowned sparrow (94% of points surveyed), orange-crowned warbler (88%) and hermit thrush (88%).

CONCLUSION

Although the ALMS project was quite costly, the randomized plot selection resulted in a different picture of avian composition and abundance than demonstrated by previous landbird studies on the refuge. Previous studies include Monitoring Avian Productivity and Survivorship (MAPS) at Mother Goose Lake (1994 – 2001), non-randomly selected off-road point counts (ORPC) at Mother Goose Lake (1996 – 2001), migration banding at Mother Goose Lake (1994 – 2001), migration banding at Yantarni Bay (1996), and migration banding at Bible Camp (1996 – 1998). Comparisons were made by ranking the refuge banding totals or species detection frequencies for ORPC (Egan and Adler 2001) and ALMS. Wilson's warbler abundance ranked number one for all studies except Bible Camp migration banding and ALMS where it was ranked third. The top ranked species for ALMS (savannah sparrow) ranked third, fourth, and eighth respectively for Yantarni, Bible Camp, and Mother Goose migration banding, and was not in the top ten for Mother Goose ORPC or the Mother Goose MAPS station. Common redpoll ranked second for ALMS and in the top seven species for the other studies. Of the top ten ranking species for ALMS, each of these previous studies had six to eight of these species in their top ten list with Mother Goose migration banding being the most similar

having eight species. Lapland longspur and Wilson's snipe ranked eighth and tenth respectively in ALMS while not detected in the banding studies or the ORPC.

These differences in species abundance reflect both different methods and varying habitats in which the work was conducted. Most of the banding studies and the ORPC were conducted in forested habitats or tall shrub. Banding studies tend to capture birds in the immediate vicinity of the banding station therefore are restricted to birds using those habitats. Exceptions occur during migration when some species modify their habitat use and are generally more mobile. In addition, some larger birds such as Wilson's snipe are often not captured in mist nets designed for smaller birds. It is likely that the ALMS randomized plot selection is more representative of refuge habitats in general; eighty percent of the habitats sampled in ALMS were open habitats. Therefore it is also likely the ALMS avian species abundance patterns better represent the avian fauna of the refuge.

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Table 1. Summary of ALMS blocks assigned to Alaska Peninsula/Becharof NWR including alternates for each refuge and reasons for not surveying in 2004.

Block #	Block Name	GPS Code	Land Unit	Surveyed 2004	Reasons for not surveying
Originals *- generated by USGS*					
17035	North King Salmon River	KING	Becharof NWR	Y	
14882	Ugashik/Deer Mountain	UGAS	Alaska Peninsula NWR	Y	
14878	Dog Salmon River	DOGS	Alaska Peninsula NWR	Y	
14645	Wide Bay/Coal Point	WIDE	Alaska Peninsula NWR	Y	
12714	Chignik Lake	CHIG	Alaska Peninsula NWR	Y	
11994	Kametolook River	KAME	Alaska Peninsula NWR	N	Access through private land difficult, volcanic activity near site
Becharof Alternates *- generated by USGS*					
16321	Gertrude Creek	GERT	Becharof NWR	Y	
15125	South Becharof Lk/Bear Creek	SBEC	Becharof NWR	Y	
15844	NE Becharof Lk/Marie Creek	MARI	Becharof NWR	N	Terrain too steep
16317			Becharof NWR	N	Block in Becharof Lake
16318			Becharof NWR	N	Block in Becharof Lake
16078			Becharof NWR	N	Block in Becharof Lake
Alaska Peninsula Alternates *- generated by USGS*					
13192	Black Lake	BLAC	Alaska Peninsula NWR	N	Private land
13435	Meshik River	MESH	Alaska Peninsula NWR	N	Unable to access 15 points without a boat
13686	Port Wrangell		Alaska Peninsula NWR	N	There are not 15 points on land
11985			Alaska Peninsula NWR	N	Pavlof Unit (Management responsibility of Izembek NWR)
11504			Alaska Peninsula NWR	N	Pavlof Unit (Management responsibility of Izembek NWR)
11265			Alaska Peninsula NWR	N	Pavlof Unit (Management responsibility of Izembek NWR)
11258			Alaska Peninsula NWR	N	Pavlof Unit (Management responsibility of Izembek NWR)
Other Alternates *- generated by refuge staff*					
12951	Blueberry Creek	BLUE	Alaska Peninsula NWR	N	Need coordinates of points

Table 2. Logistical summary for each ALMS block surveyed in 2004.

GPS Code	Block #	Block Name	Start date	End date	# Points completed	# Days Avian Surveys	# Days to complete block*	Hours **	Observer Initials	Access
CHIG	12714	Chignik Lake	19-Jun	25-Jun	15	2	7	45	RSAK, EMA	Helicopter
DOGS	14878	Dog Salmon River	16-Jun	20-Jun	16	2	5	25	SES, JAE	C-206 floats
GERT	16321	Gertrude Creek	23-Jun	26-Jun	25	2	4	40	GJ, KAS, JAE, SMS	Helicopter
KING	17035	North King Salmon River	9-Jun	14-Jun	19	3	6	38	KAS, RSAK	Helicopter
SBEC	15125	South Becharof Lake	25-Jun	28-Jun	20	3	4	28	EMA, RSAK	Helicopter
UGAS	14882	Ugashik/Deer Mountain	19-Jun	23-Jun	20	3	5	35	GJ, KAS	Helicopter
WIDE	14645	Wide Bay	9-Jun	14-Jun	16	2	6	38	EMA, GJ, JAE	C-185 & Huskey wheels

* Number of days to complete plot includes 2 travel days, one at each end of block visit and all days at block conducting avian and habitat surveys.
** Hours for a team of 2 observers to complete the plot.

Table 3. Summary of costs associated with the first year of ALMS in Alaska Peninsula/Becharof NWR.

Equipment	**Cost**
Cameras & Accessories	846.10
Rangefinders (2)	1,100.00
Stop Watches (4)	210.00
Tape measures	134.20
Books: reference	100.00
Wooden Stakes	220.00
Safety Gear: Shotguns, Ammunition, Communications	Not Included
Camping Gear: Tents, Sleeping bags, Stoves, Cook Kits, Electric fence	Not Included
Boats	Not Included
subtotal	**2,390.30**
Supplies	
Raingear, Boots, Chest Waders (5 staff)	1,175.00
Miscellaneous	300.00
subtotal	**1,475.00**
Field Food/Per Diem	
Food: 78 field days x $14 / day	1,100.00
Per Diem: 78 days field x $3/day	234.00
subtotal	**1,334.00**
Salaries	
Wildlife Biologist - Supervisor, planning - 6 wks, field time - 1 wk	Not Included
Summary - 3 pay periods (1GS5,1GS7)	8,225.00
Surveys - 2 pay periods (1GS5,1GS6,2GS7) + Overtime	16,250.00
Training - 2 pay periods (1GS5,1GS6,2GS7)	10,715.00
Volunteer Airfare: (Half)	580.00
Volunteer in town per diem - training/btw surveys	525.00
subtotal	**36,295.00**
Travel to Field Sites	
Chignik Lk and S. Becharof Lk/Bear Ck, Helicopter - R44	6,400.00
Dog Salmon River, Refuge - Floats	700.00
North King Salmon River, Helicopter - Bell Jet Ranger	1,580.00
Ugashik/Deer Mtn and Gertrude Creek, Helicopter - R44	3,830.00
Wide Bay - Refuge, Commercial - Wheels	1,750.00
PenAir - Transport fuel (helicopter)	625.00
Delta Western - AvGas (R-44 helicopter)	600.00
subtotal	**15,485.00**
Total for ALMS 2004	**56,979.30**

Table 4. Summary of time between avian point counts. Time includes one 10 minute point count, travel between points, loading and unloading gear and in some instances, time to complete habitat surveys.

	CHIG 12714	DOGS 14878	GERT 16321	KING 17035	SBEC 15125	UGAS 14882	WIDE 14645	Totals
Total number points surveyed	15	16	25	19	20	20	16	131
Number of days avian surveys	2	2	2	3	3	3	2	17
	Time between avian point counts (hours:minutes)							
Mean	0:33	0:32	0:29	0:36	0:39	0:54	0:37	0:37
Maximum	0:49	0:42	0:35	1:04	1:03	1:55 *	0:57	1:25
Minimum	0:28	0:26	0:25	0:26	0:21	0:31	0:26	0:21
Median								0:33
Mode								0:29
Standard Deviation								0:11

* The maximum time for block 14882 Ugashik/Deer Mtn. (1:55) has been excluded from the calculations for block average and Overall statistics because the observers conducted that point out of sequence and it is not an accurate representation of time between point counts.

Note: Blocks 15125 South Becharof Lake and 14882 Ugashik/Deer Mountain had a subset of points (15 and 12 respectively) that were surveyed for habitat and birds during the same visit to the point, thus resulting in prolonged time intervals of 5 – 20 minutes between points.

Table 5. Average occurrence per point and proportion of total detections by species (49 species) for birds detected during ALMS in 2004. Average occurrence per point is the average number of individual birds detected per point with n = number of birds detected during point counts. Proportion of total detections equals the number of birds detected by species divided by the total number of birds detected of all species. Species with the greatest number of detections are in **bold**. Total detections less than 10 individuals indicated by '-'.

Rank	ALMS Block	CHIG 12714		DOGS 14878		GERT 16321		KING 17035		SBEC 15125		UGAS 14882		WIDE 14645		Overall		Proportion of total observations (total = 1,954)
	Number of points surveyed	15		16		25		19		20		20		16		131		
	Species - Common Name	n	occ.	n	occ.	n	occ.	n	occ.	n	occ.	n	occ.	n	occ.	n	occ.	
	Tundra Swan	6	0.40	4	0.25			8	0.42							18	0.14	0.009
	American Wigeon			2	0.13											2	0.02	-
	Mallard	1	0.07	1	0.06			1	0.05							3	0.02	-
	Northern Pintail					1	0.04									1	0.01	-
	Green-winged Teal	2	0.13													2	0.02	-
	Greater Scaup			1	0.06							1	0.05			2	0.02	-
	White-winged Scoter			2	0.13							2	0.10			4	0.03	-
	Black Scoter			2	0.13			3	0.16							5	0.04	-
	Common Merganser					2	0.08			1	0.05					3	0.02	-
	Willow Ptarmigan							3	0.16							3	0.02	-
	Common Loon			2	0.13			1	0.05							3	0.02	-
	Red-necked Grebe	1	0.07	1	0.06			3	0.16							5	0.04	-
	Bald Eagle	1	0.07													1	0.01	-
	Northern Harrier					1	0.04									1	0.01	-
	Sandhill Crane			17	1.06	19	0.76	2	0.11							38	0.29	0.019
	Black-bellied Plover							2	0.11							2	0.02	-
	Pacific Golden-Plover							22	1.16							22	0.17	0.011
	Semipalmated Plover											3	0.15	4	0.25	7	0.05	-
	Greater Yellowlegs	2	0.13	1	0.06	5	0.20	4	0.21	4	0.20					16	0.12	0.008
	Marbled Godwit			24	1.50											24	0.18	0.012
	Least Sandpiper			12	0.75	16	0.64	13	0.68	4	0.20	5	0.25	6	0.38	56	0.43	0.029
	Dunlin			17	1.06											17	0.13	0.009
	Short-billed Dowitcher			1	0.06	1	0.04	3	0.16							5	0.04	-
10	Wilson's Snipe	14	0.93	12	0.75	9	0.36	26	1.37	1	0.05	2	0.10	1	0.06	65	0.50	0.033
	Red-necked Phalarope							4	0.21							4	0.03	-
	Parasitic Jaeger			3	0.19			1	0.05							4	0.03	-

Table 5, continued. Average occurrence per point and proportion of total detections by species (49 species) for birds detected during ALMS in 2004.

Rank	ALMS Block	CHIG		DOGS		GERT		KING		SBEC		UGAS		WIDE		Overall		Proportion of total observations (total = 1,954)
	Number of points surveyed	15		16		25		19		20		20		16		131		
	Species - Common Name	n	occ.	n	occ.	n	occ.	n	occ.	n	occ.	n	occ.	n	occ.	n	occ.	
	Long-tailed Jaeger					3	0.12	16	0.84							19	0.15	0.010
9	Mew Gull	57	3.80	7	0.44			3	0.16							67	0.51	0.034
	Glaucous-winged Gull			1	0.06			1	0.05					1	0.06	3	0.02	-
	Arctic Tern			2	0.13											2	0.02	-
	Alder Flycatcher											1	0.05			1	0.01	-
	Black-billed Magpie	2	0.13							6	0.30	5	0.25	11	0.69	24	0.18	0.012
	Common Raven	1	0.07	1	0.06					1	0.05	1	0.05	1	0.06	5	0.04	-
	Tree Swallow			4	0.25											4	0.03	-
	Bank Swallow	1	0.07							2	0.10					3	0.02	-
	Gray-cheeked Thrush	1	0.07							11	0.55					12	0.09	0.006
6	Hermit Thrush	12	0.80							49	2.45	43	2.15	21	1.31	125	0.95	0.064
	American Robin							6	0.32	10	0.50	3	0.15	1	0.06	20	0.15	0.010
	American Pipit									4	0.20	3	0.15	2	0.13	9	0.07	-
8	Orange-crowned Warbler	8	0.53	3	0.19	16	0.64	17	0.89	13	0.65	23	1.15	23	1.44	103	0.79	0.053
	Yellow Warbler	11	0.73	4	0.25	1	0.04			16	0.80	17	0.85	10	0.63	59	0.45	0.030
4	**Wilson's Warbler**	**20**	**1.33**	**3**	**0.19**	**9**	**0.36**	**4**	**0.21**	**41**	**2.05**	**38**	**1.90**	**30**	**1.88**	**145**	**1.11**	**0.074**
5	**American Tree Sparrow**	**19**	**1.27**	**26**	**1.63**	**49**	**1.96**	**50**	**2.63**							**144**	**1.10**	**0.074**
1	**Savannah Sparrow**	**36**	**2.40**	**65**	**4.06**	**119**	**4.76**	**48**	**2.53**	**30**	**1.50**	**36**	**1.80**	**36**	**2.25**	**370**	**2.82**	**0.189**
	Fox Sparrow	3	0.20							14	0.70	17	0.85	15	0.94	49	0.37	0.025
	White-crowned Sparrow			1	0.06			23	1.21							24	0.18	0.012
2	**Golden-crowned Sparrow**	**22**	**1.47**			**4**	**0.16**			**70**	**3.50**	**43**	**2.15**	**36**	**2.25**	**175**	**1.34**	**0.090**
7	Lapland Longspur			37	2.31	40	1.60	33	1.74	2	0.10	3	0.15			115	0.88	0.059
3	**Common Redpoll**	**26**	**1.73**	**14**	**0.88**	**28**	**1.12**	**15**	**0.79**	**35**	**1.75**	**22**	**1.10**	**23**	**1.44**	**163**	**1.24**	**0.083**

Total number of birds detected on point counts	246	270	323	312	314	268	221	1954
Average number of birds detected per point	16.4	16.9	12.9	16.4	15.7	13.4	13.8	14.9
Total number of species observed per block	21	29	17	26	19	19	16	49

Table 6. Detection frequency of avian species during ALMS, June 2004 in Alaska Peninsula/Becharof NWR. Detection frequency equals the number of points at which a species is detected divided by the number of points surveyed. Species in **bold** had the highest average frequency of detection.

Rank	ALMS Block	CHIG 12714		DOGS 14878		GERT 16321		KING 17035		SBEC 15125		UGAS 14882		WIDE 14645		Overall	
	Number of points surveyed	15		16		25		19		20		20		16		131	
	Species	n	freq	n	freq	n	freq	n	freq	n	freq	n	freq	n	freq	n	freq
	Tundra Swan	3	0.20	3	0.19			4	0.21							10	0.08
	American Wigeon			1	0.06											1	0.01
	Mallard	1	0.07	1	0.06			1	0.05							3	0.02
	Northern Pintail					1	0.04									1	0.01
	Green-winged Teal	1	0.07													1	0.01
	Greater Scaup			1	0.06							1	0.05			2	0.02
	White-winged Scoter			1	0.06							1	0.05			2	0.02
	Black Scoter			1	0.06			3	0.16							4	0.03
	Common Merganser					1	0.04			1	0.05					2	0.02
	Willow Ptarmigan							2	0.11							2	0.02
	Common Loon			2	0.13			1	0.05							3	0.02
	Red-necked Grebe	1	0.07	1	0.06			2	0.11							4	0.03
	Bald Eagle	1	0.07													1	0.01
	Northern Harrier					1	0.04									1	0.01
	Sandhill Crane			8	0.50	12	0.48	1	0.05							21	0.16
	Black-bellied Plover							2	0.11							2	0.02
	Pacific Golden-Plover							12	0.63							12	0.09
	Semipalmated Plover											2	0.10	2	0.13	4	0.03
	Greater Yellowlegs	2	0.13	1	0.06	4	0.16	4	0.21	3	0.15					14	0.11
	Marbled Godwit			13	0.81											13	0.10
	Least Sandpiper			10	0.63	12	0.48	11	0.58	3	0.15	4	0.20	3	0.19	43	0.33
	Dunlin			12	0.75											12	0.09
	Short-billed Dowitcher			1	0.06	1	0.04	3	0.16							5	0.04

Table 6, continued. Detection frequency of avian species during ALMS, June 2004 in Alaska Peninsula/Becharof NWR

Rank	ALMS Block	CHIG		DOGS		GERT		KING		SBEC		UGAS		WIDE		Overall	
	Number of points surveyed	15		16		25		19		20		20		16		131	
	Species	n	freq	n	freq	n	freq	n	freq	n	freq	n	freq	n	freq	n	freq
10	Wilson's Snipe	10	0.67	10	0.63	8	0.32	15	0.79	1	0.05	2	0.10	1	0.06	47	0.36
	Red-necked Phalarope							1	0.05							1	0.01
	Parasitic Jaeger			3	0.19			1	0.05							4	0.03
	Long-tailed Jaeger					2	0.08	9	0.47							11	0.08
	Mew Gull	4	0.27	5	0.31			2	0.11							11	0.08
	Glaucous-winged Gull			1	0.06			1	0.05					1	0.06	3	0.02
	Arctic Tern			1	0.06											1	0.01
	Alder Flycatcher											1	0.05			1	0.01
	Black-billed Magpie	2	0.13							3	0.15	3	0.15	6	0.38	14	0.11
	Common Raven	1	0.07	1	0.06					1	0.05	1	0.05	1	0.06	5	0.04
	Tree Swallow			4	0.25											4	0.03
	Bank Swallow	1	0.07							2	0.10					3	0.02
	Gray-cheeked Thrush	1	0.07							7	0.35					8	0.06
7	Hermit Thrush	7	0.47							20	1.00	17	0.85	14	0.88	58	0.44
	American Robin							5	0.26	8	0.40	3	0.15	1	0.06	17	0.13
	American Pipit									3	0.15	2	0.10	2	0.13	7	0.05
5	**Orange-crowned Warbler**	**6**	**0.40**	**2**	**0.13**	**11**	**0.44**	**13**	**0.68**	**10**	**0.50**	**14**	**0.70**	**14**	**0.88**	**70**	**0.53**
9	Yellow Warbler	9	0.60	3	0.19	1	0.04			13	0.65	16	0.80	7	0.44	49	0.37
3	**Wilson's Warbler**	**13**	**0.87**	**2**	**0.13**	**8**	**0.32**	**4**	**0.21**	**18**	**0.90**	**18**	**0.90**	**16**	**1.00**	**79**	**0.60**
6	American Tree Sparrow	11	0.73	11	0.69	24	0.96	18	0.95							64	0.49
1	**Savannah Sparrow**	**12**	**0.80**	**16**	**1.00**	**25**	**1.00**	**18**	**0.95**	**14**	**0.70**	**15**	**0.75**	**16**	**1.00**	**116**	**0.89**
	Fox Sparrow	3	0.20							10	0.50	13	0.65	10	0.63	36	0.27
	White-crowned Sparrow			1	0.06			13	0.68							14	0.11
4	**Golden-crowned Sparrow**	**12**	**0.80**			**4**	**0.16**			**20**	**1.00**	**20**	**1.00**	**15**	**0.94**	**71**	**0.54**
8	Lapland Longspur			14	0.88	19	0.76	17	0.89	1	0.05	2	0.10			53	0.40
2	**Common Redpoll**	**11**	**0.73**	**10**	**0.63**	**21**	**0.84**	**10**	**0.53**	**13**	**0.65**	**15**	**0.75**	**13**	**0.81**	**93**	**0.71**

Table 7. Summary of all bird observations from June 2004. Species in **bold** are those for which nests or hatch year birds were observed during ALMS data collection.

Common Name	CHIG 12714	DOGS 14878	GERT 16321	KING 17035	SBEC 15125	UGAS 14882	WIDE 14645	# blocks observed
Greater White-fronted Goose ***		Y						1
Tundra Swan	P	N		P			X	4
American Wigeon	P	P		P				3
Mallard	P	H		Y		P		4
Northern Shoveler ***				P				1
Northern Pintail	P		H	H		D		4
Green-winged Teal	P	H			H			3
Greater Scaup	N	P	H	P		X		5
Harlequin Duck ***					H		X	2
Surf Scoter ***							X	1
White-winged Scoter		P				P	X	3
Black Scoter		P		P				2
Common Merganser	X	X	H		X			4
Red-breasted Merganser ***	X						X	2
Willow Ptarmigan		H	S	Y		S	S	5
Red-throated Loon ***		P						1
Common Loon		H		X			X	3
Red-necked Grebe	X	H		B			X	4
Red-faced Cormorant ***							P	1
Bald Eagle	H	X			H	X	P	5
Northern Harrier	H	H	H	H	X	P	X	7
Rough-legged Hawk ***	N							1
Gyrfalcon ***				X			X	2
Peregrine Falcon ***	Y							1
Sandhill Crane		P	P	P				3
Black-bellied Plover +				A				1
Pacific Golden-Plover +			D	N				2
Semipalmated Plover					Y	D	N	3
Greater Yellowlegs	S	H	A	A	H	D	D	7
Spotted Sandpiper ***					H	N		2
Marbled Godwit		P						1
Least Sandpiper	H	S	S	C	Y	A	S	7
Rock Sandpiper ***						Y	X	2
Dunlin		S						1
Short-billed Dowitcher		S	H	H				3
Wilson's snipe	N	D	S	Y	S	S	S	7
Red-necked Phalarope				P				1
Parasitic Jaeger		P		P	X		X	4
Long-tailed Jaeger			H	P				2
Mew Gull	H	H		P	X			4
Glaucous-winged Gull	X	X		X			N	4
Black-legged Kittiwake ***							X	1
Arctic Tern		H	X	H				3

Table 7, continued. Summary of incidental bird observations in June 2004

Common Name	CHIG	DOGS	GERT	KING	SBEC	UGAS	WIDE	# blocks observed
Common Murre***							X	1
Pigeon Guillemot ***							P	1
Kittlitz's Murrelet ***							X	1
Horned Puffin ***							X	1
Great-horned Owl ***	N							1
Short-eared Owl ***	H	H					X	3
Alder Flycatcher						S		1
Northern Shrike ***	N			H				2
Black-billed Magpie	P				H	H	P	4
Common Raven	Y	X	H	H	X	H	F	7
Tree Swallow		X			X		X	3
Violet-green Swallow ***	X							1
Bank Swallow	H		H	P	N	H		5
Black-capped Chickadee ***	N					H	X	3
American Dipper ***					N			1
Gray-cheeked Thrush	S				S			2
Hermit Thrush	S				F	A		3
American Robin				F	F	S	S	4
American Pipit				H	F	N	P	4
Orange-crowned Warbler	S	S	S	S	S	S	S	7
Yellow Warbler	S	S	S	S	S	S	S	7
Wilson's Warbler	S	S	S	S	N	S	S	7
American Tree Sparrow	S	S	S	N				4
Savannah Sparrow	S	N	N	S	S	A	N	7
Fox Sparrow	S				Y	S	S	4
White-crowned Sparrow		S		S				2
Golden-crowned Sparrow	S		F		N	N	N	5
Lapland Longspur		P	F	N	H	C	X	6
Snow Bunting ***						P	X	2
Gray-crowned Rosy-finch ***						H	P	2
Common Redpoll	P	H	X	S	P	S	X	7
Total number of species	36	37	24	38	29	31	41	74

*** indicates species was not detected during a point count period
+ indicates new breeding record

Breeding Bird Evidence:
X = detected, no evidence of breeding
H = observed in possible nesting habitat
P = pair observed in suitable habitat
S = singing male
C = courtship display
B = building or excavating nest
A = alarm call
D = distraction display
N = nest observed
Y = downy or recently fledged young
F = adult with fecal sac or food for young

Table 8. Summary of incidental mammal observations in June 2004.

Common Name	Scientific Name	CHIG 12714	DOGS 14878	GERT 16321	KING 17035	SBEC 15125	UGAS 14882	WIDE 14645
Hare sp.	*Lepus sp.*						S	
Arctic Ground Squirrel	*Spermophilus parryii*			V	V	S	V	V
Beaver	*Castor canadensis*		D			D	D	
Jumping Mouse sp.	*Zapus sp.*					V	V	V
Vole sp.	*Microtus sp.*	V		S				
Harbor Porpoise	*Phocoena phocoena*							V
Humpback Whale	*Megaptera novaeangliae*							V
Wolf	*Canis lupus*	T	T		S	T		T
Red Fox	*Vulpes vulpes*	T			V		V	V
Brown Bear	*Ursus arctos*	V	V	V		V	V	V
Mink	*Mustela vision*	T	S					
River Otter	*Lutra canadensis*	T				T		
Sea Otter	*Enhydra lutris*							V
Steller's Sea Lion	*Eumetopias jubatus*							V
Harbor Seal	*Phoca vitulina*		V					V
Moose	*Alces alces*	T	T		S	S	S	S
Caribou	*Ranifer tarandus*	T	S	S	V		V	V

Mammal evidence: **V** = visual observation; **T** = tracks; **S** = sign; **D** = dam.

Table 9. Summary of elevation and slope data for points surveyed in 2004.

	CHIG 12714	DOGS 14878	GERT 16321	KING 17035	SBEC 15125	UGAS 14882	WIDE 14645	Overall
Elevation								
Mean Elevation	20	3	178	90	81	96	66	84
Min	2	0	167	72	22	23	19	0
Max	83	7	196	85	202	258	177	258
Slope								
Mean Slope	4	0	1	4	10	8	9	5
Min	0	0	0	0	0	0	0	0
Max	38	4	3	10	28	28	40	40

Figure 1. Map of all blocks assigned to Alaska Peninsula/Becharof National Wildlife Refuge, including blocks surveyed in June 2004 and those not surveyed.

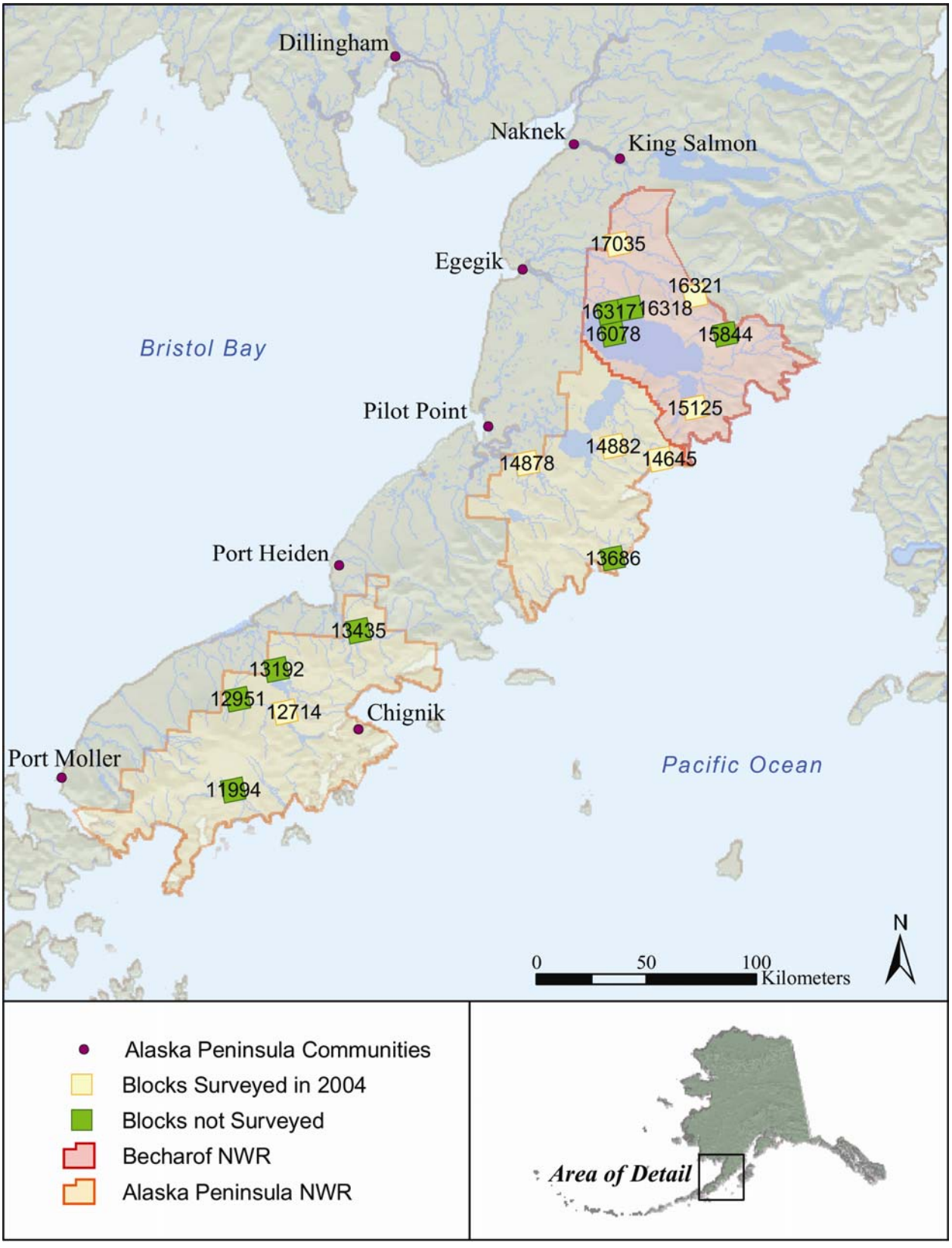


Figure 2. Summary of costs associated with the first year of ALMS in Alaska Peninsula/Becharof NWR.

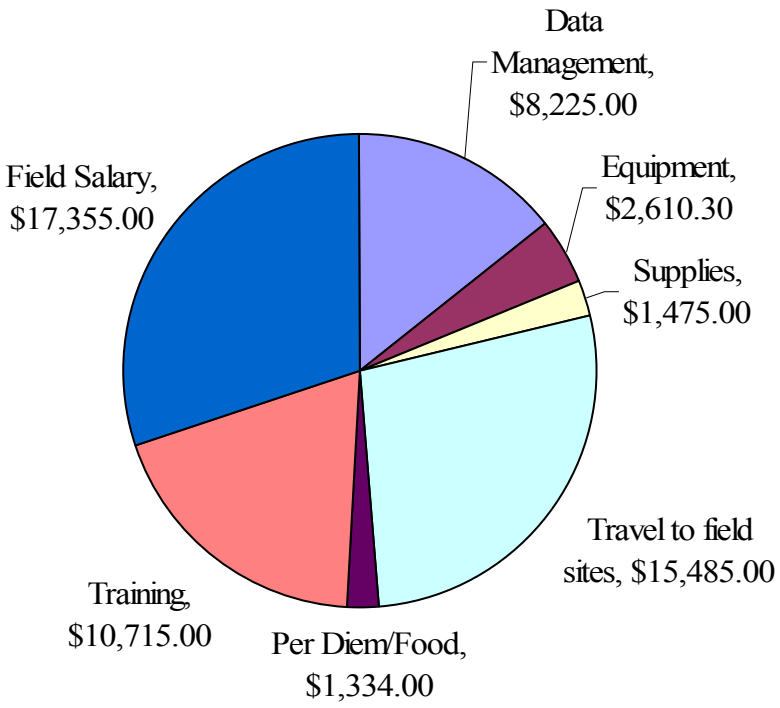


Figure 3. Mean number of detections per point (blue) and birds detected per point (orange) for each block and overall means for all blocks surveyed in 2004.

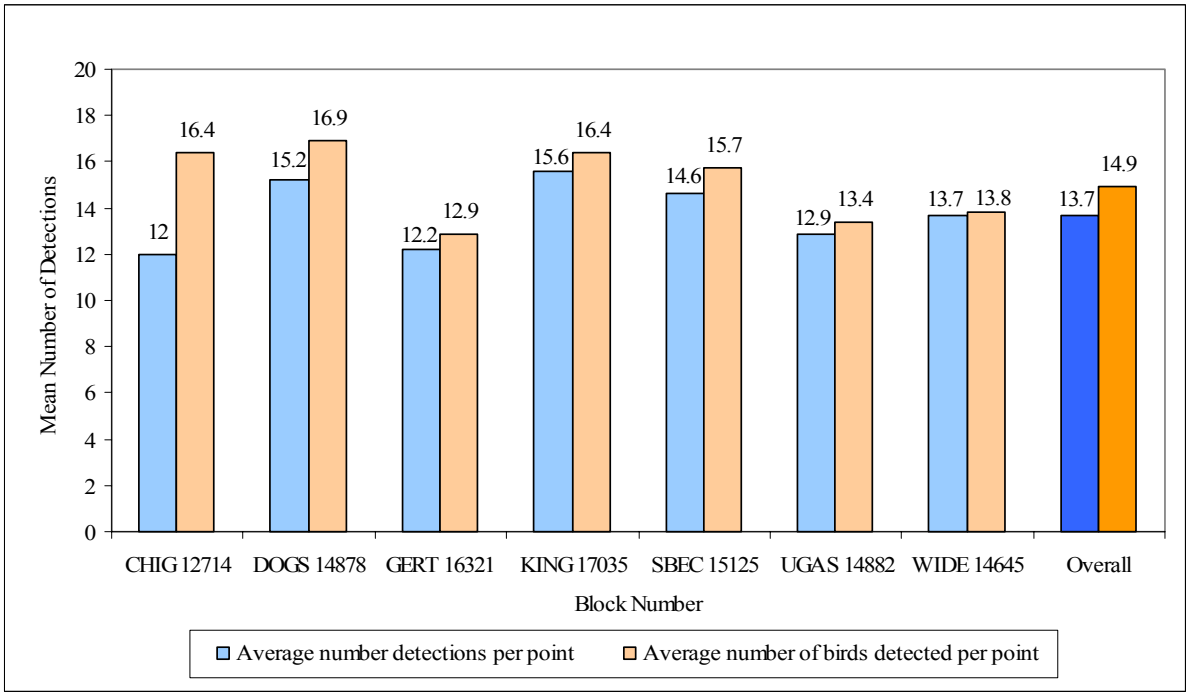


Figure 4. Summary of the different types of detections and behavior codes recorded during ALMS in 2004 in Alaska Peninsula/Becharof NWR. Total detections = 1,791.

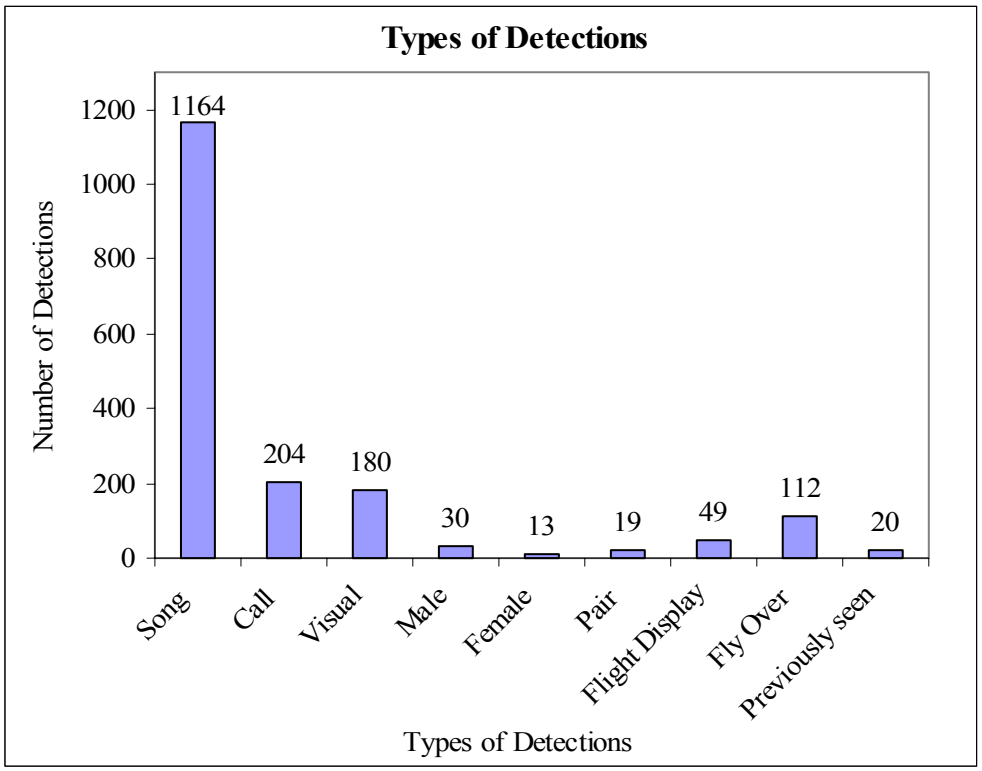


Figure 5. Number of detections (total n = 1,791) recorded per minute for each time interval. Time intervals were recorded in 2 and 3 minute bands.

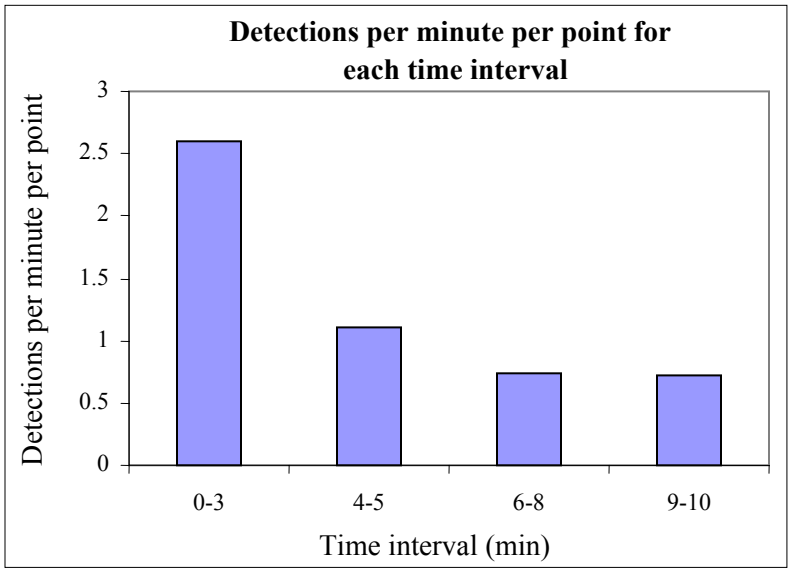


Figure 6. Number of detections (total n = 1,791) recorded for each distance interval for all ALMS blocks surveyed in 2004.

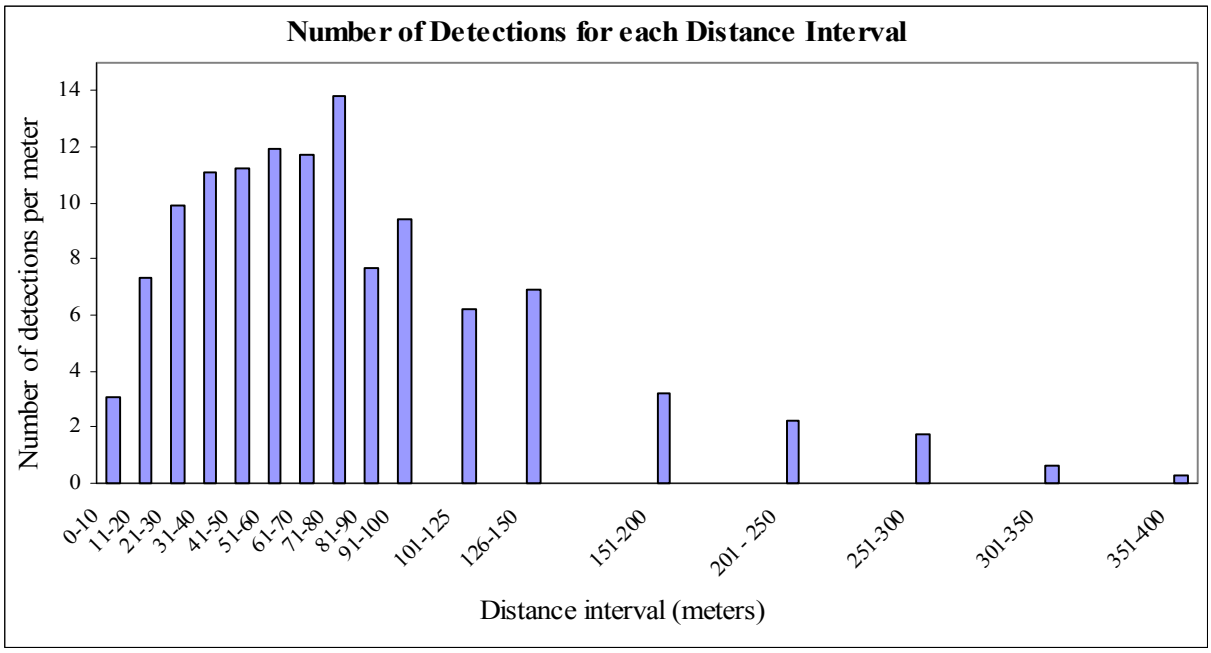


Figure 7. Summary of water body data.

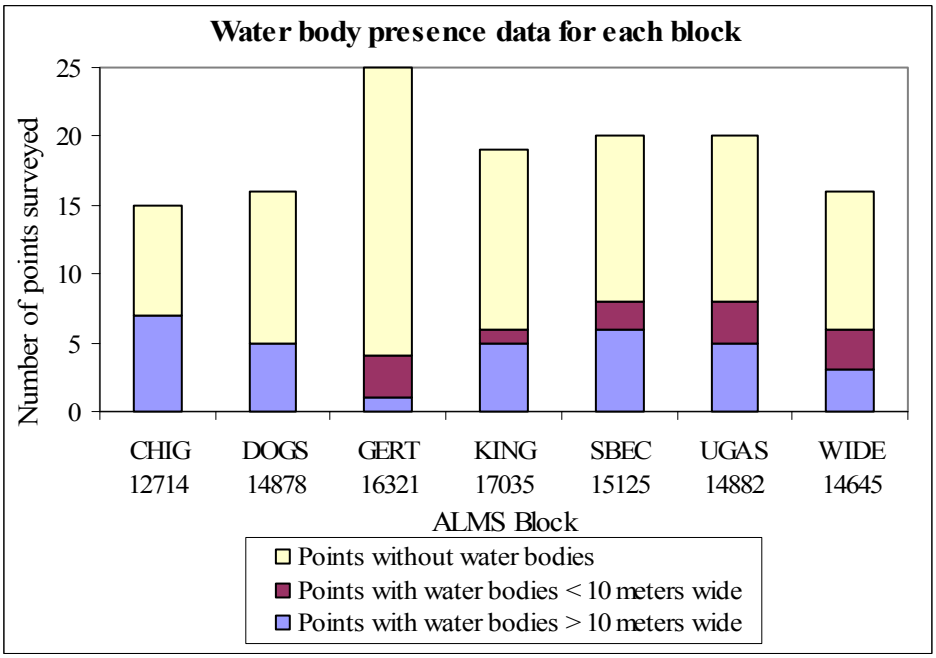


Figure 8. Proportion of points surveyed within each block with wetland habitats present in 2004. A wetland habitat is defined as an area where saturation with water is the dominant factor in determining soil development and plant community. This habitat must occur at least partly within a 50 meter radius of the point and be greater than 10 meters wide.

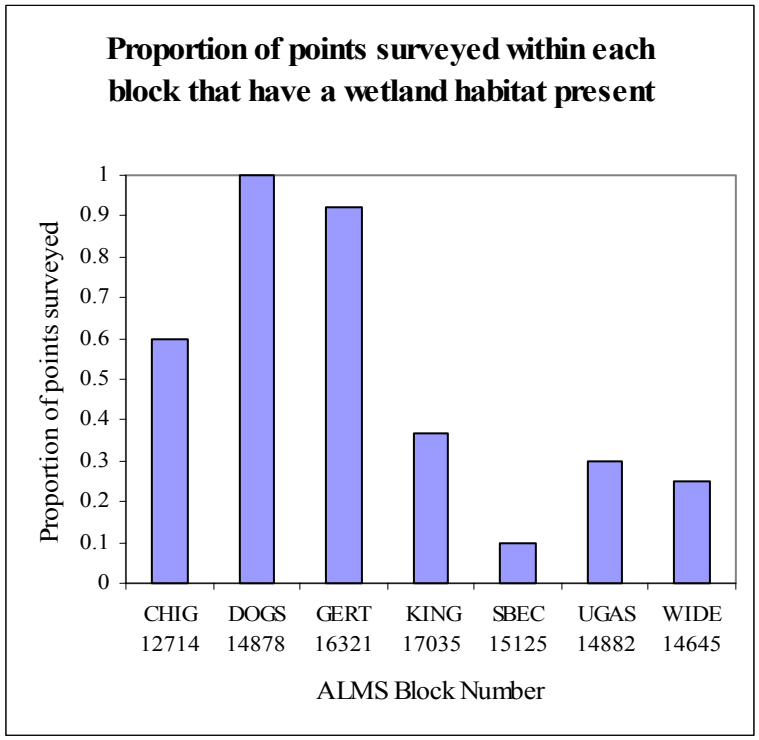


Figure 9. Proportion of points surveyed within each block with dry, upland habitats present in 2004. A dry, upland habitat is defined as a discrete non-wetland habitat where the soil is very well drained, unable to hold moisture long after precipitation, and dry most of the year. This habitat must occur at least partly within a 50 meter radius of the point.

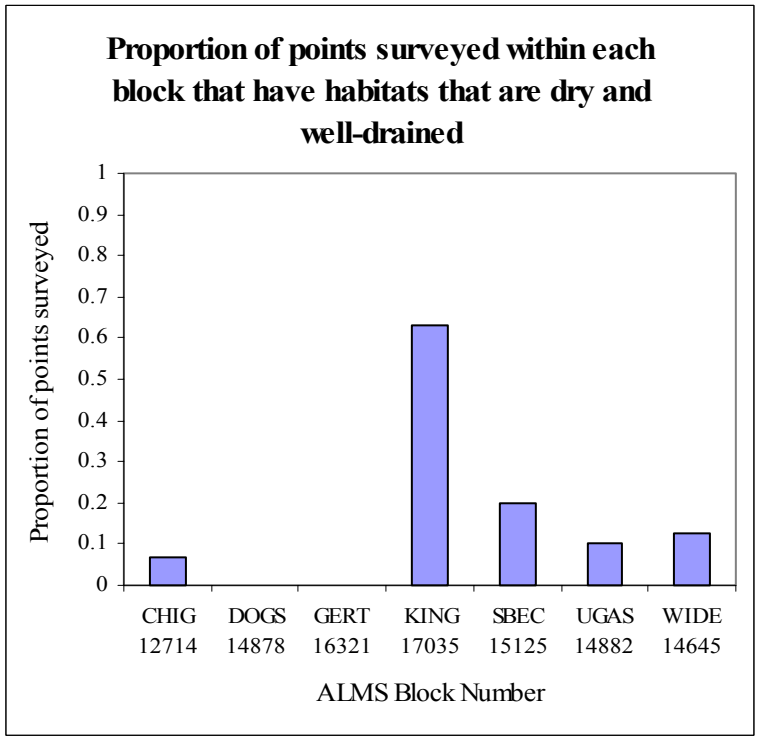


Figure 10. Habitat classification categories surveyed in 2004 in Alaska Peninsula/Becharof NWR.

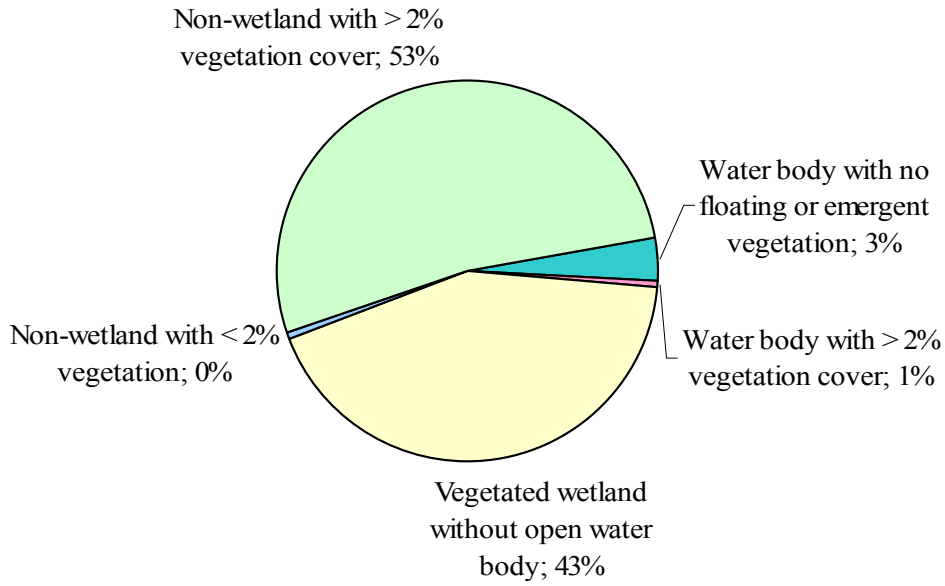


Figure 11. Summary of National Wetlands Inventory classification for all habitats surveyed for ALMS in 2004.

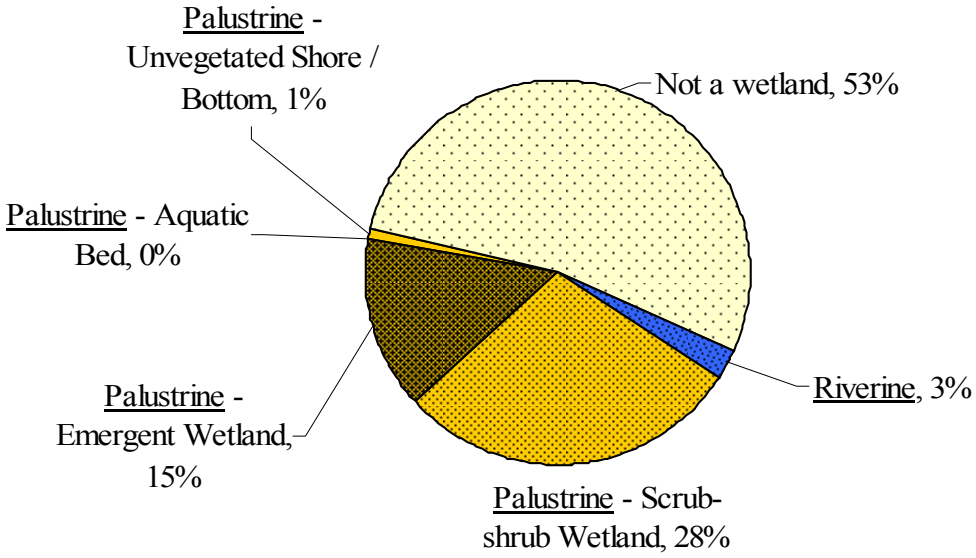
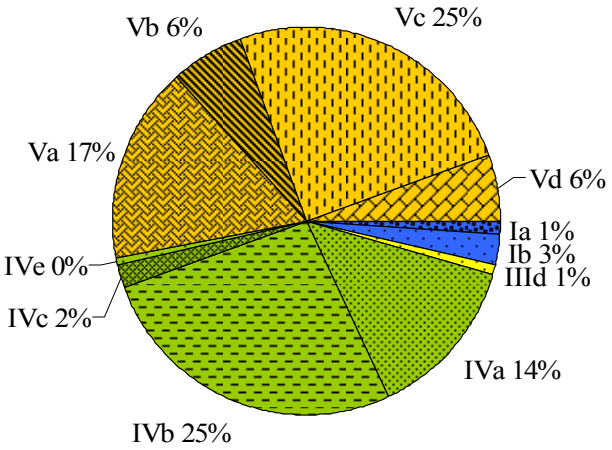


Figure 12. Summary of Kessel's avian habitat classification for all habitats surveyed for ALMS in 2004.



Kessel Habitat Classification

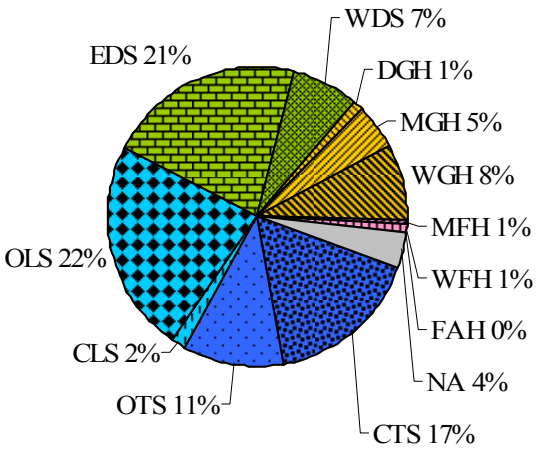
I. Fresh or brackish waters
- a. Lacustrine
- b. Fluviatile

III. Unvegetated substrates
- d. Alluvia and Moraines

IV. Meadows
- a. Wet
- b. Dwarf Shrub
- c. Grass
- e. Tall Forb

V. Shrubbery
- a. Dwarf Shrub Mat
- b. Low Shrub Thicket
- c. Medium Shrub Thicket
- d. Tall Shrub Thicket

Figure 13. Summary of Viereck et al.'s Alaska Vegetation Classification for all habitats surveyed for ALMS in 2004.



Viereck Habitat Classification

CTS	Closed Tall Scrub
OTS	Open Tall Scrub
CLS	Closed Low Scrub
OLS	Open Low Scrub
EDS	Ericaceous Dwarf Scrub
WDS	Willow Dwarf Scrub
DGH	Dry Graminoid Herbaceous
MGH	Mesic Graminoid Herbaceous
WGH	Wet Graminoid Herbaceous
MFH	Mesic Forb Herbaceous
WFH	Wet Forb Herbaceous
FAH	Freshwater Aquatic Herbaceous
NA	Not a vegetated substrate

Figure 14. Topographic map of block 12714 Chignik Lake, Alaska Peninsula National Wildlife Refuge. Surveyed 19 June – 25 June 2004 and accessed by helicopter.

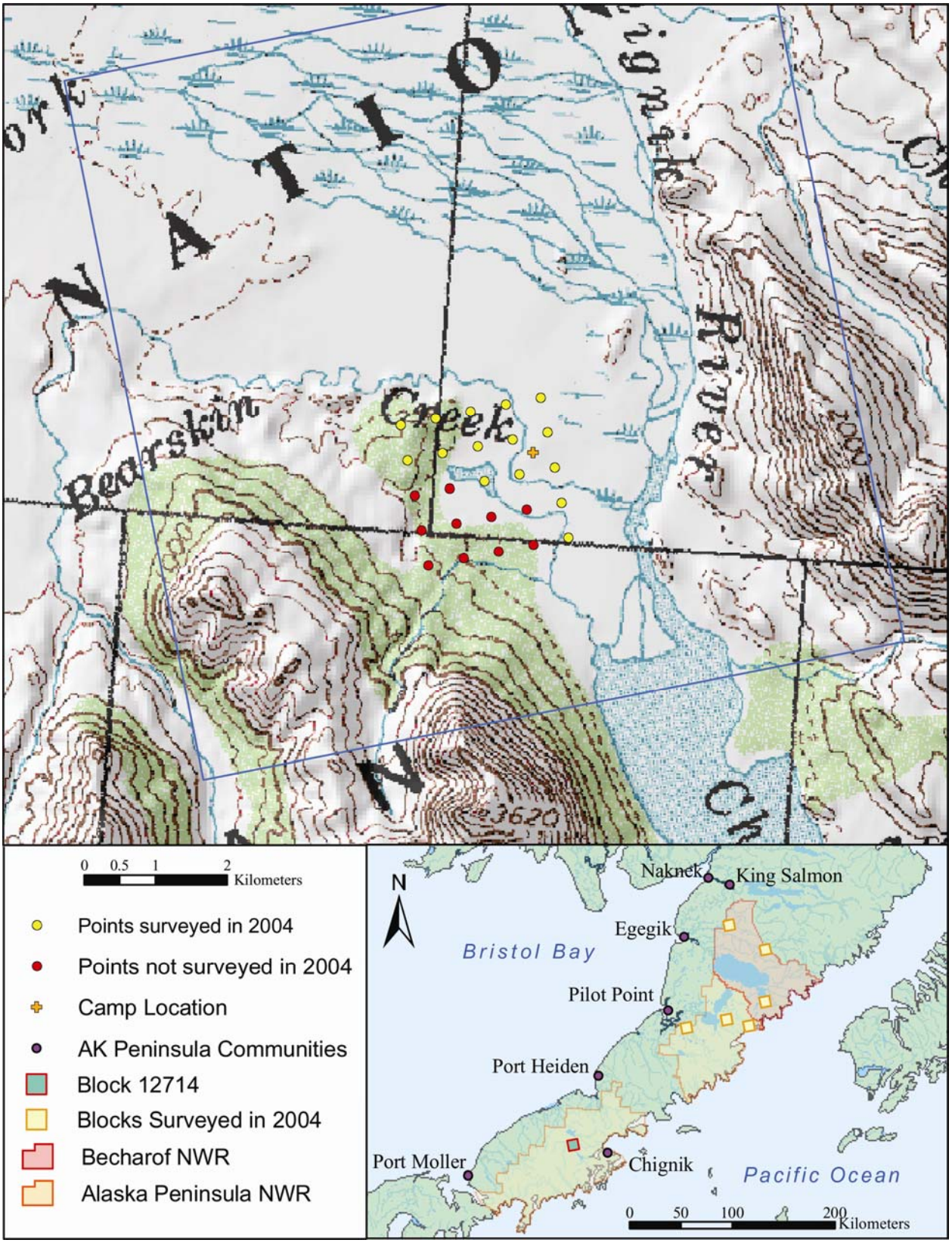


Figure 15. Block 12714 Chignik Lake. Dominant avian species and habitat classification using Viereck, Kessel, and NWI, June 2004 in Alaska Peninsula National Wildlife Refuge.

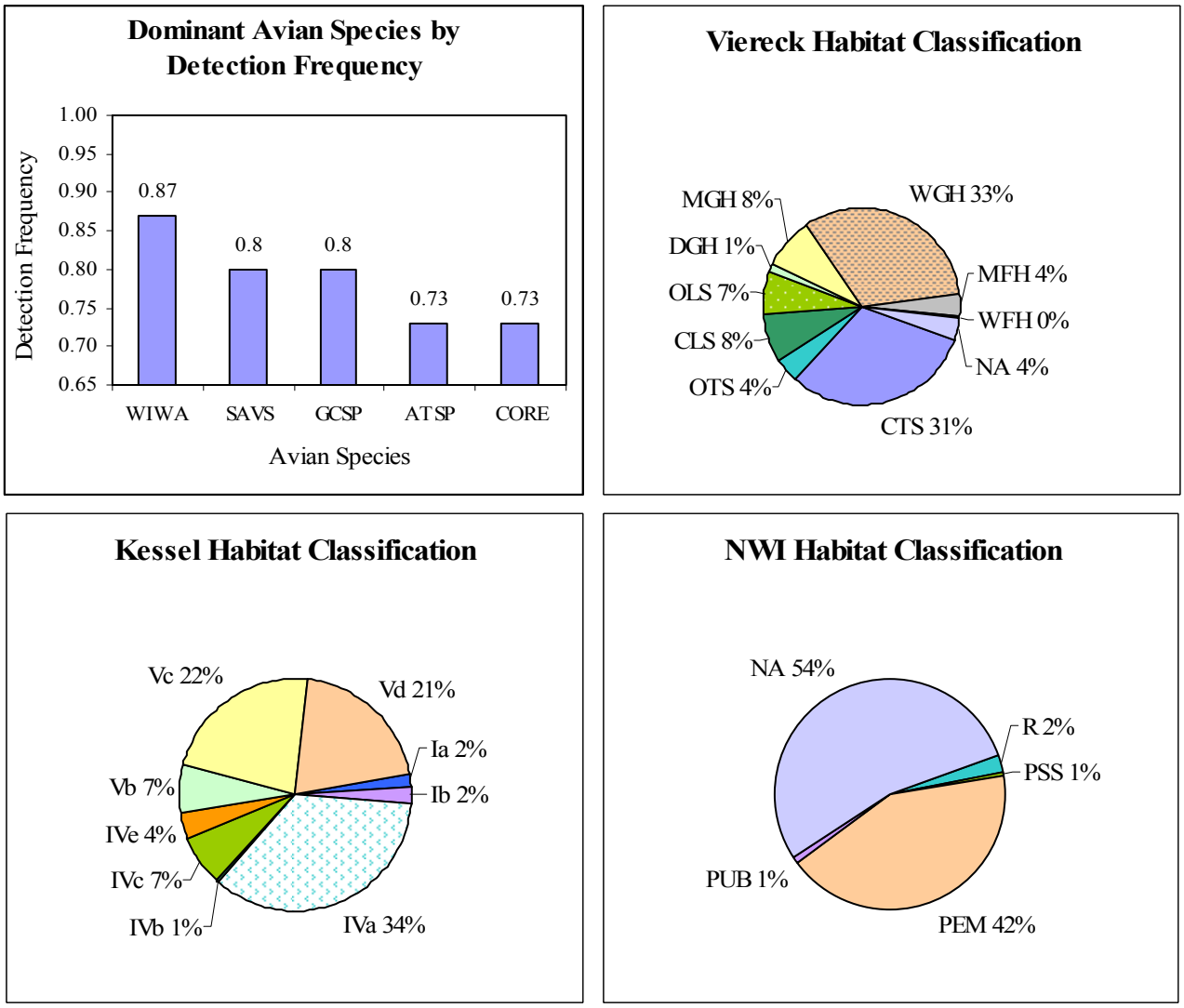


Figure 16. Topographic map of block 14878 Dog Salmon River, Alaska Peninsula National Wildlife Refuge. Surveyed 16 June – 20 June 2004 and accessed via the Dog Salmon River by a Cessna-206 on floats.

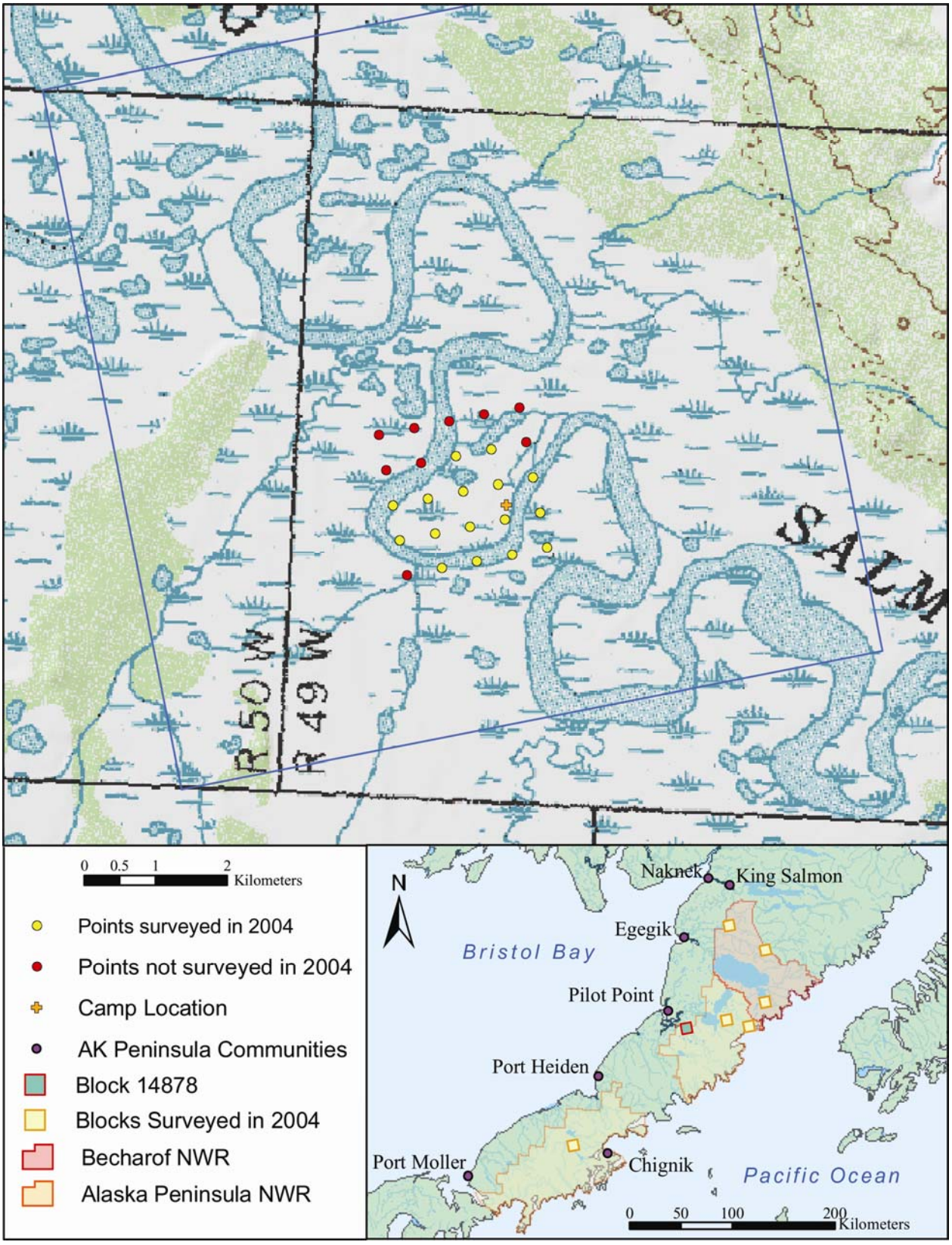
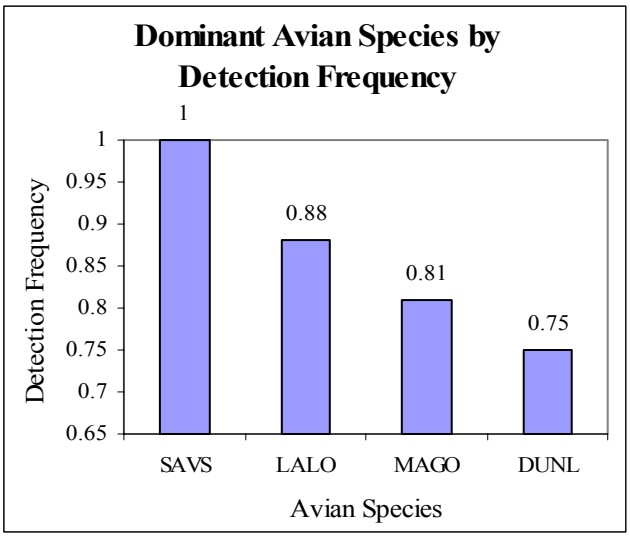
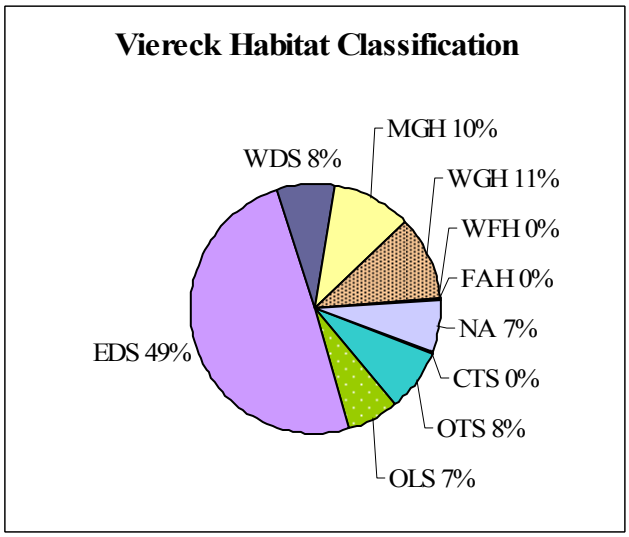
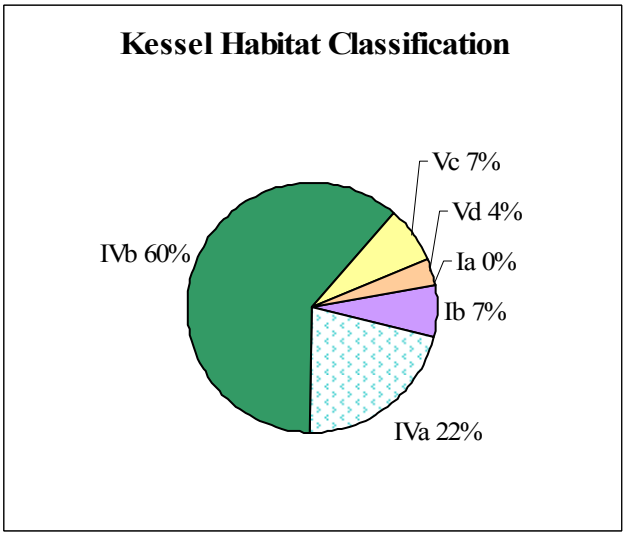


Figure 17. Block 14878 Dog Salmon River. Dominant avian species and habitat classification using Viereck, Kessel, and NWI, June 2004 in Alaska Peninsula National Wildlife Refuge.







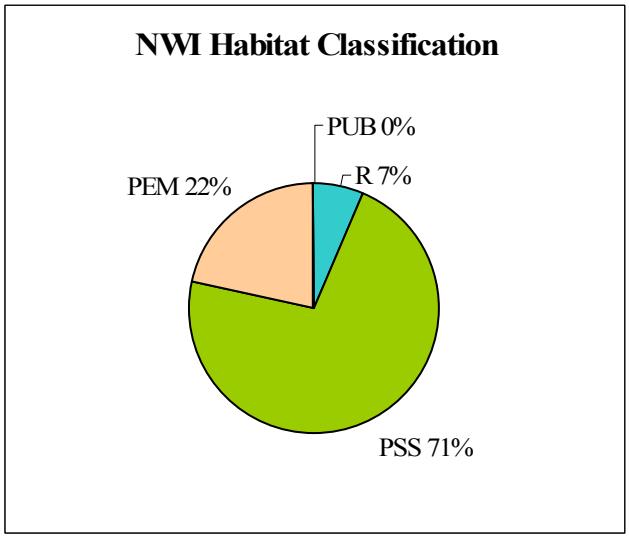


Figure 18. Topographic map of block 16321 Gertrude Creek, Becharof National Wildlife Refuge. Surveyed 23 June – 26 June 2004 and accessed by helicopter.

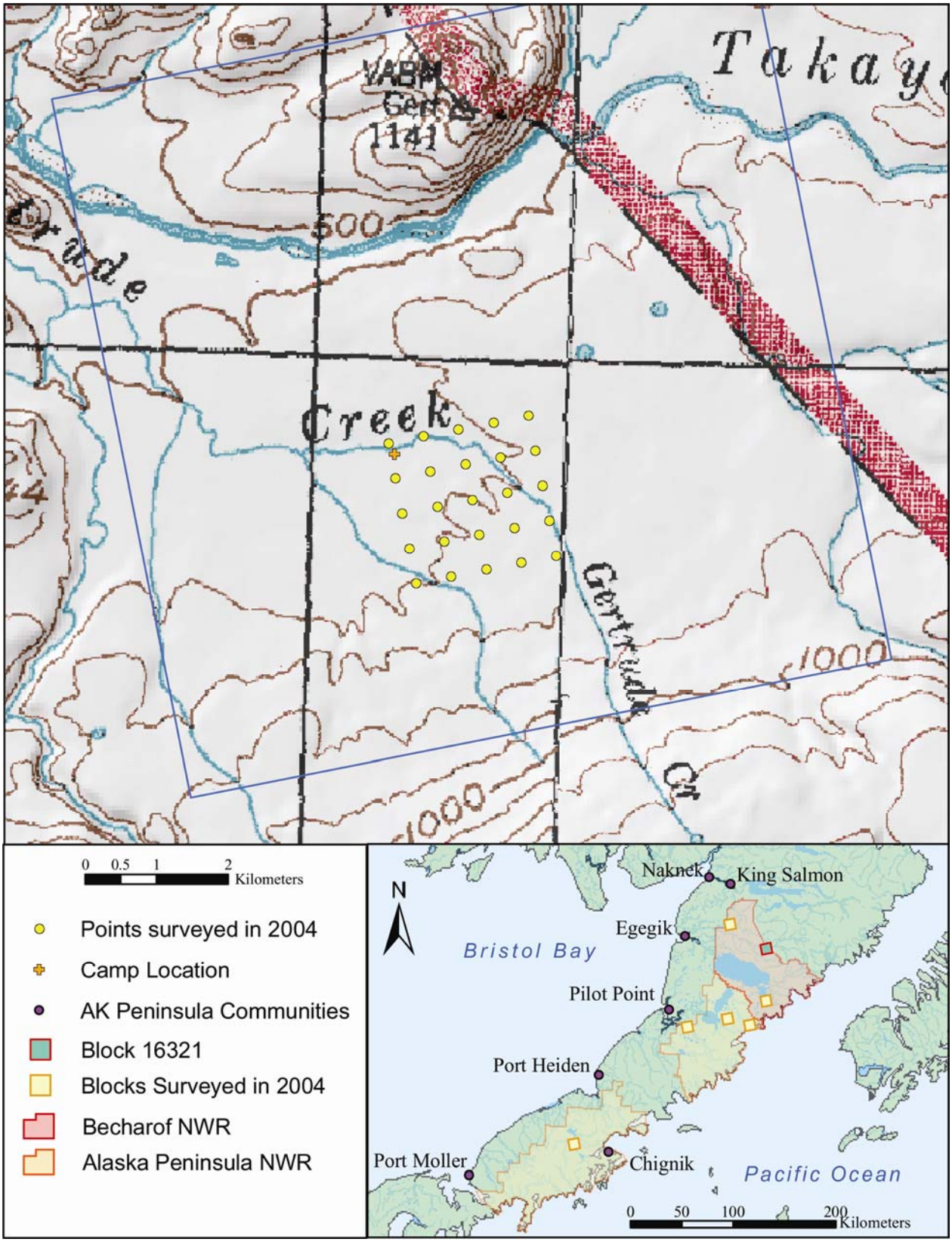
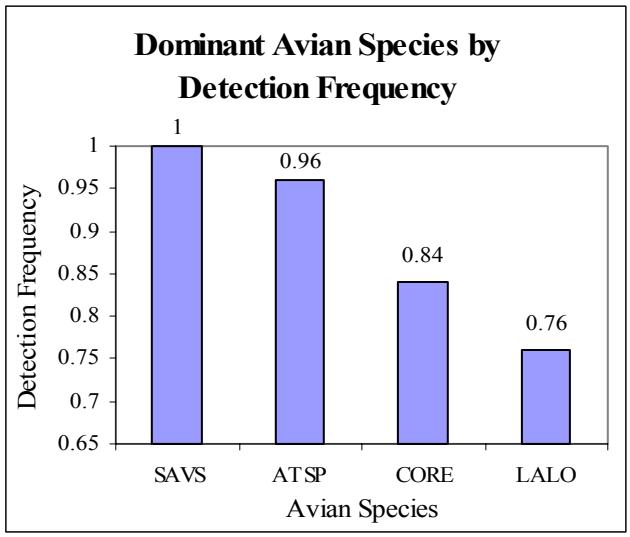
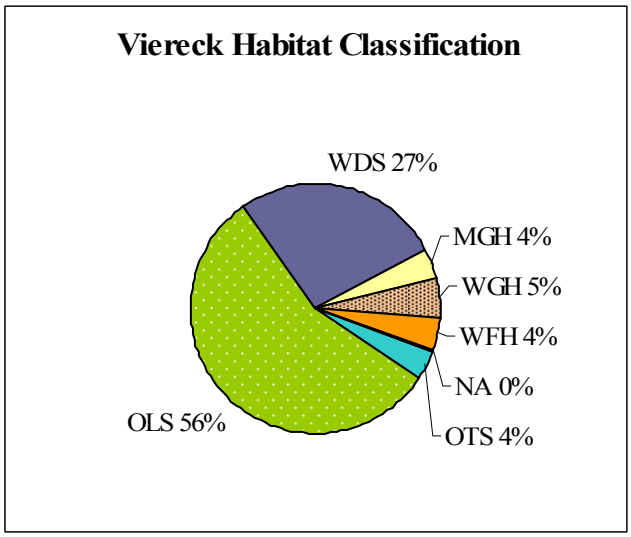
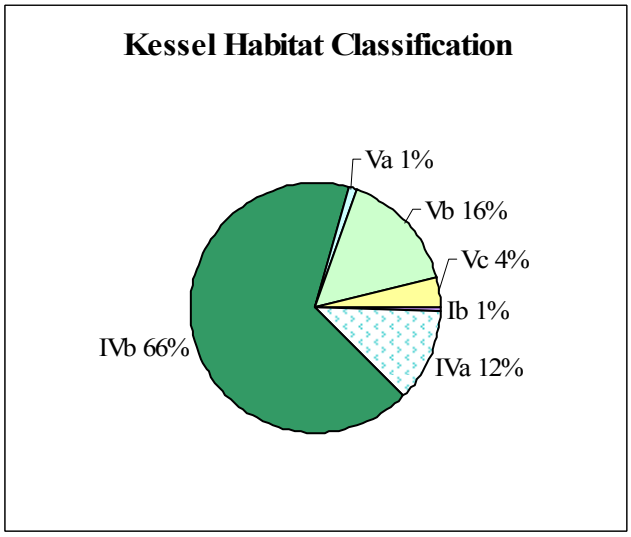


Figure 19. Block 16321 Gertrude Creek. Dominant avian species and habitat classification using Viereck, Kessel, and NWI, June 2004 in Becharof National Wildlife Refuge.







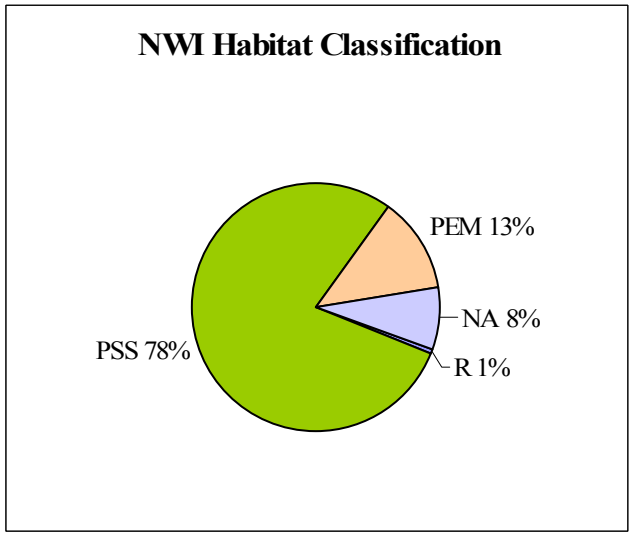


Figure 20. Topographic map of block 17035 North King Salmon River, Becharof National Wildlife Refuge. Surveyed 9 June – 14 June 2004 and accessed by helicopter.

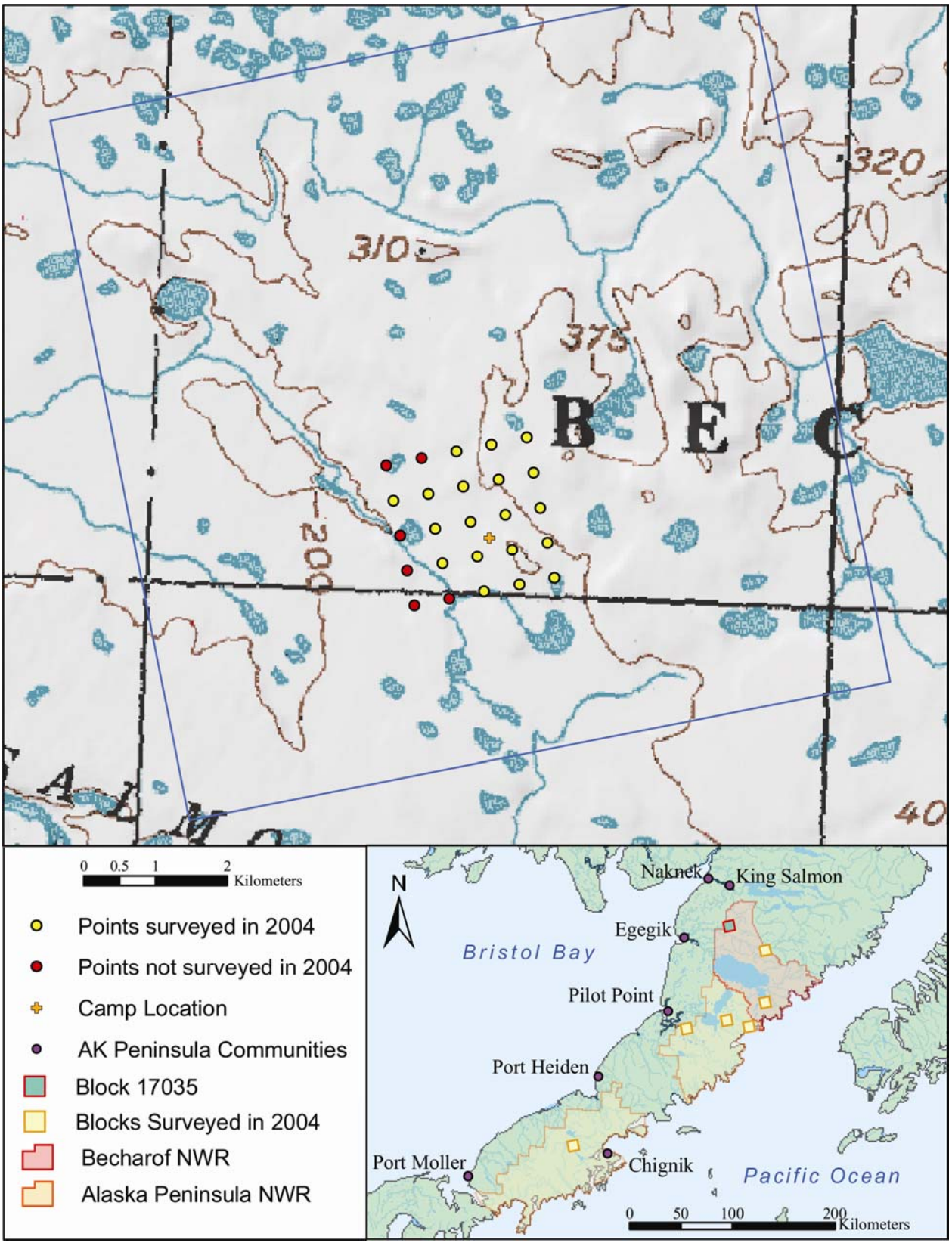
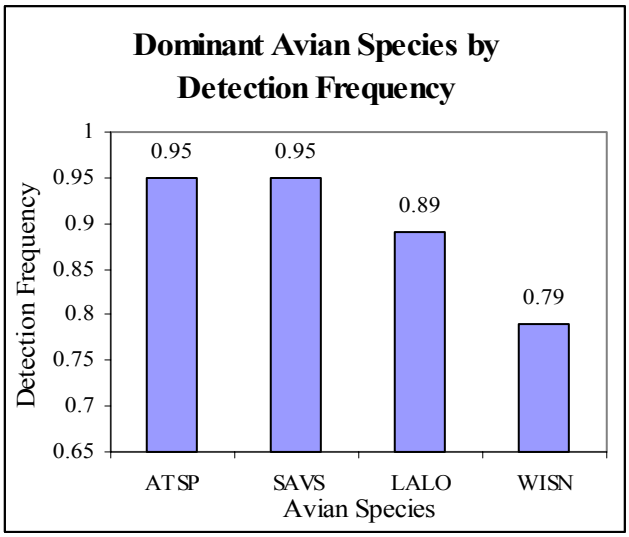
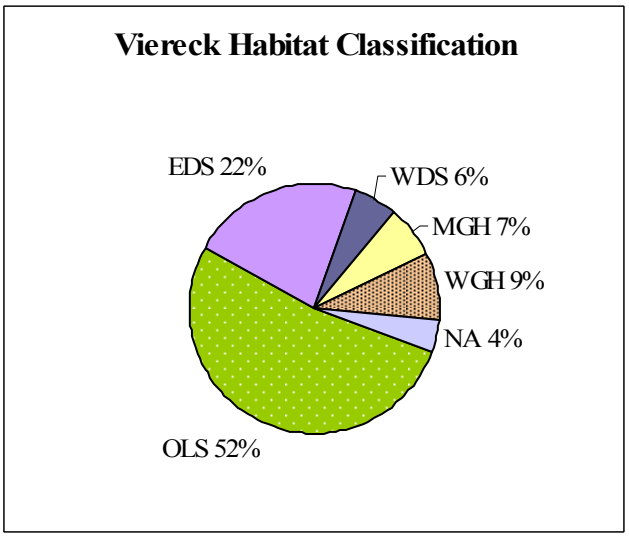
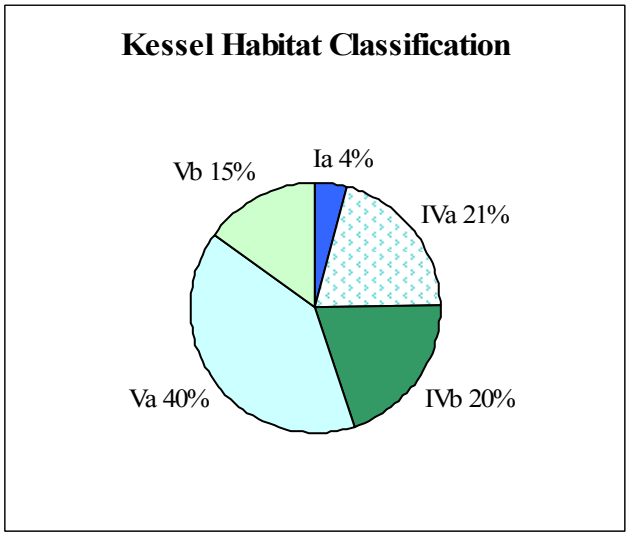


Figure 21. Block 17035 North King Salmon River. Dominant avian species and habitat classification using Viereck, Kessel, and NWI, June 2004 in Becharof National Wildlife Refuge.







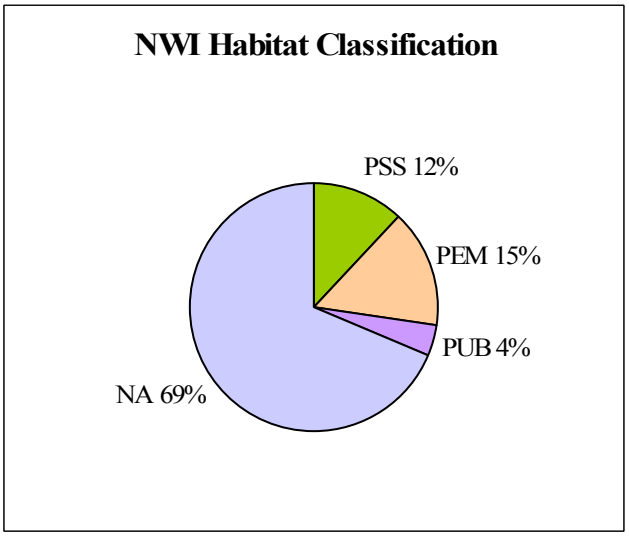


Figure 22. Topographic map of block 15125 South Becharof Lake/Bear Creek, Alaska Peninsula National Wildlife Refuge. Surveyed 25 June – 28 June 2004 and accessed by helicopter.

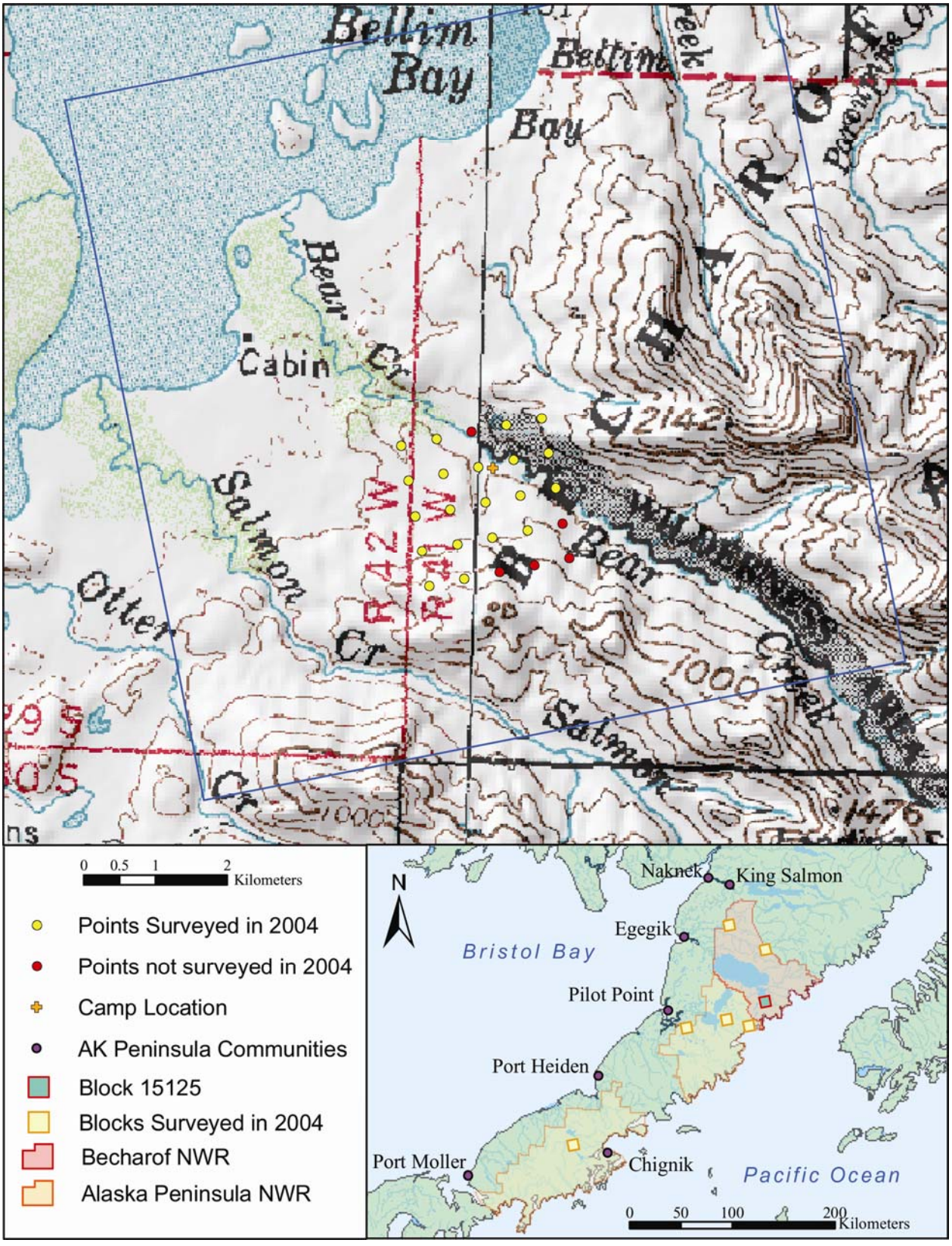


Figure 23. Block 15125 South Becharof Lake. Dominant avian species and habitat classification using Viereck, Kessel, and NWI, June 2004 in Becharof National Wildlife Refuge.

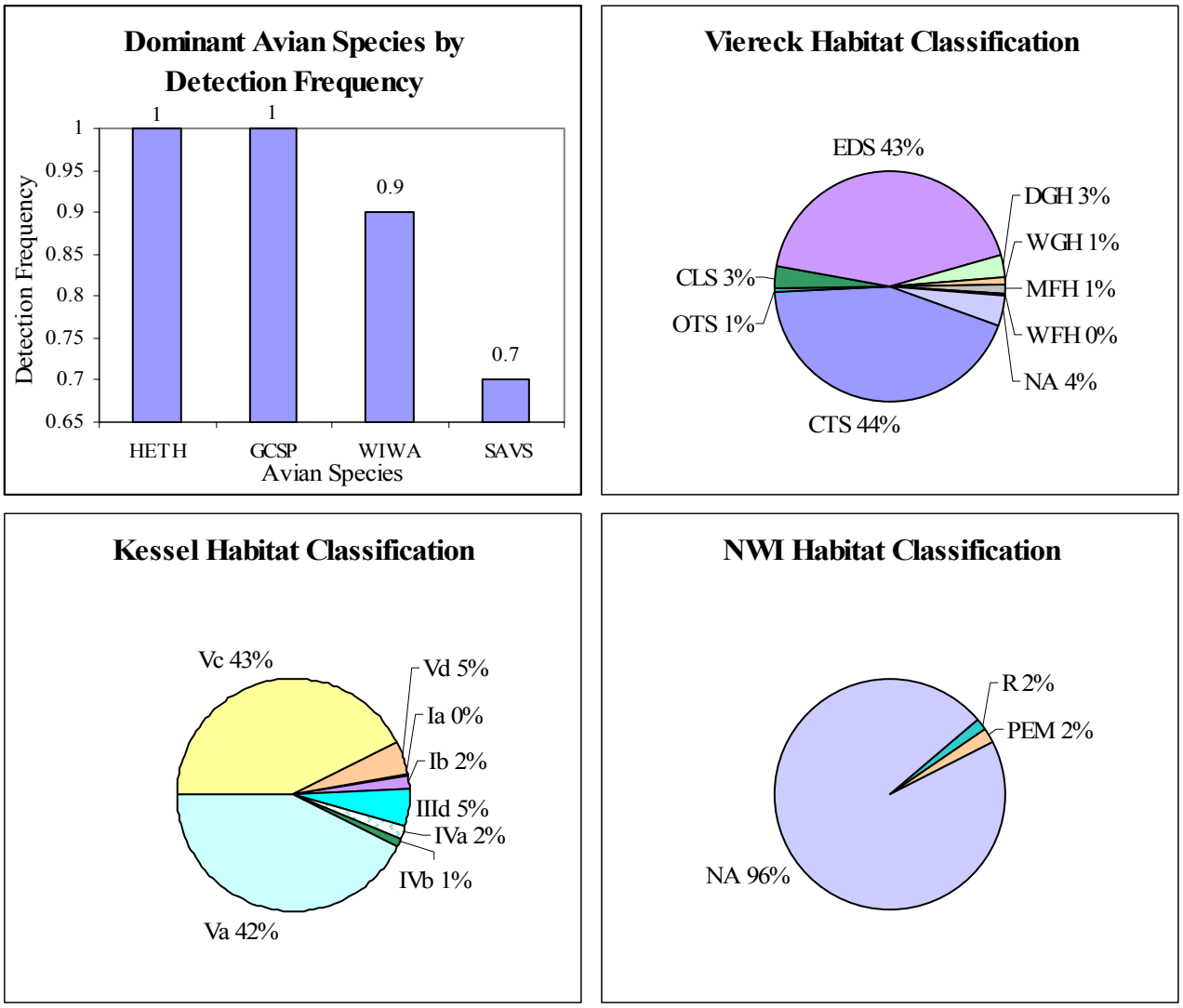


Figure 24. Topographic map of block 14882 Ugashik/Deer Mountain, Alaska Peninsula National Wildlife Refuge. Surveyed 19 June – 23 June 2004 and accessed by helicopter.

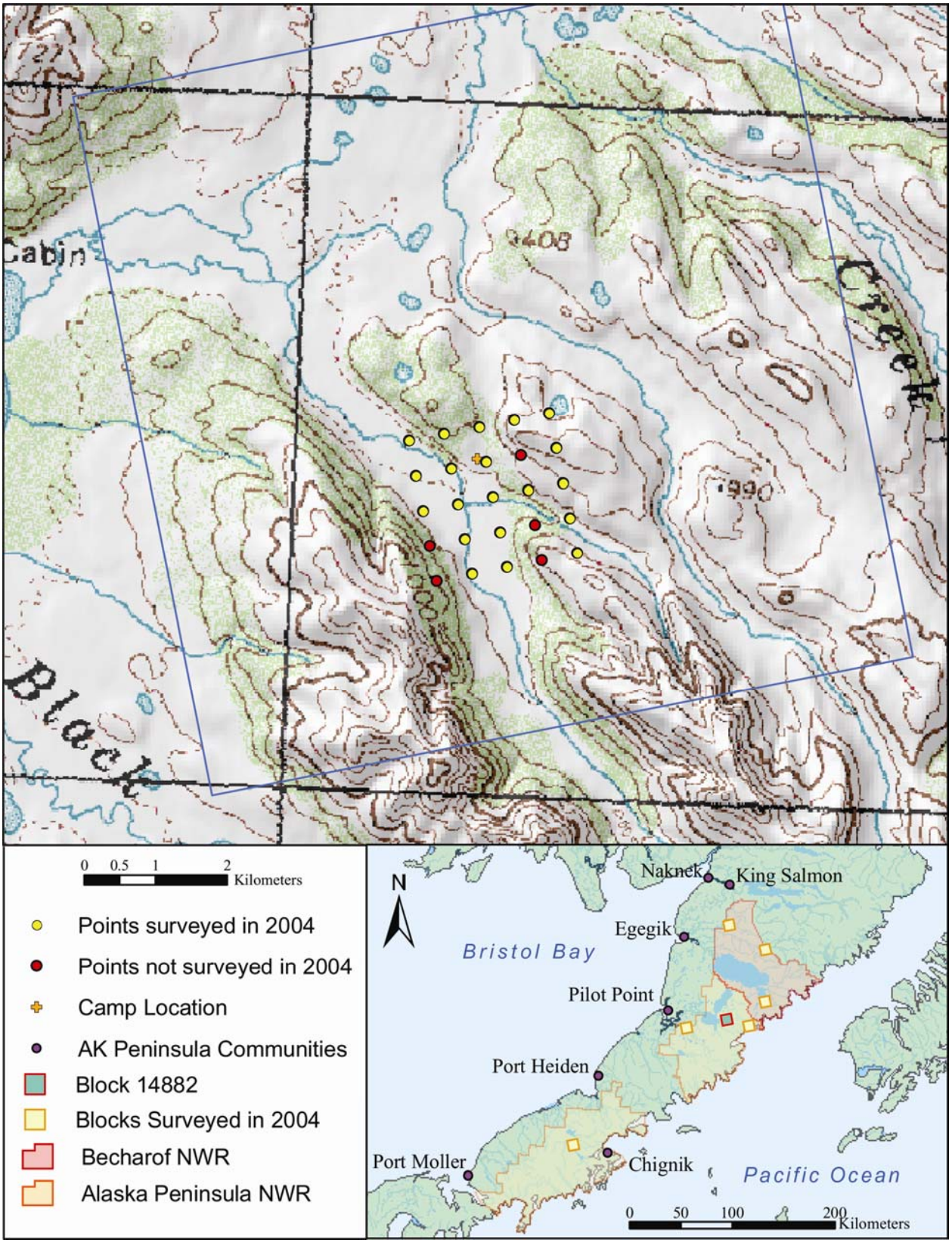


Figure 25. Block 14882 Ugashik/Deer Mountain. Dominant avian species and habitat classification using Viereck, Kessel, and NWI, June 2004 in Alaska Peninsula National Wildlife Refuge.

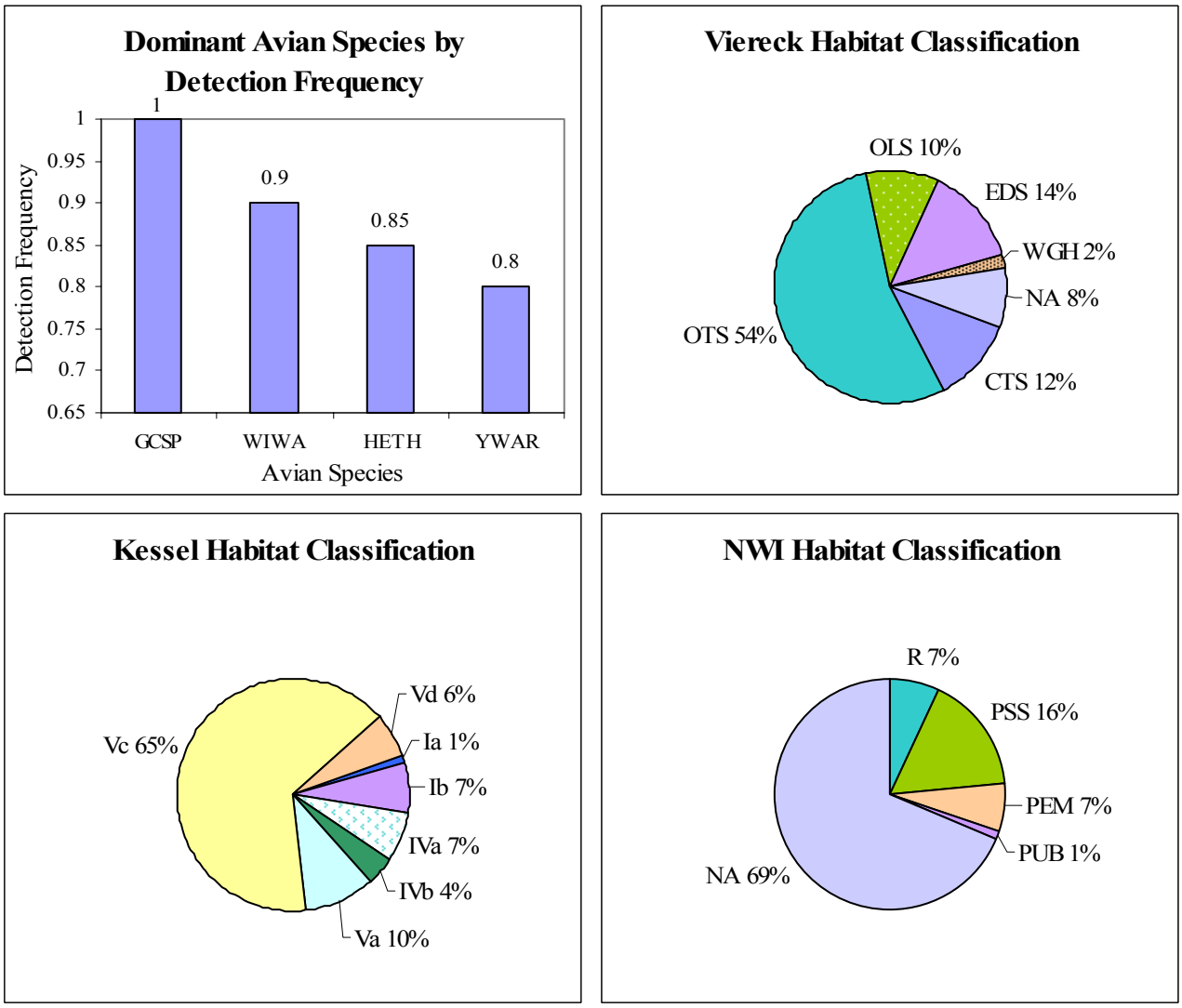


Figure 26. Topographic map of block 14645 Wide Bay, Alaska Peninsula National Wildlife Refuge. Surveyed 9 June – 14 June 2004 and accessed via the beach by Cessna-185 on wheels and Aviat Huskey on wheels.

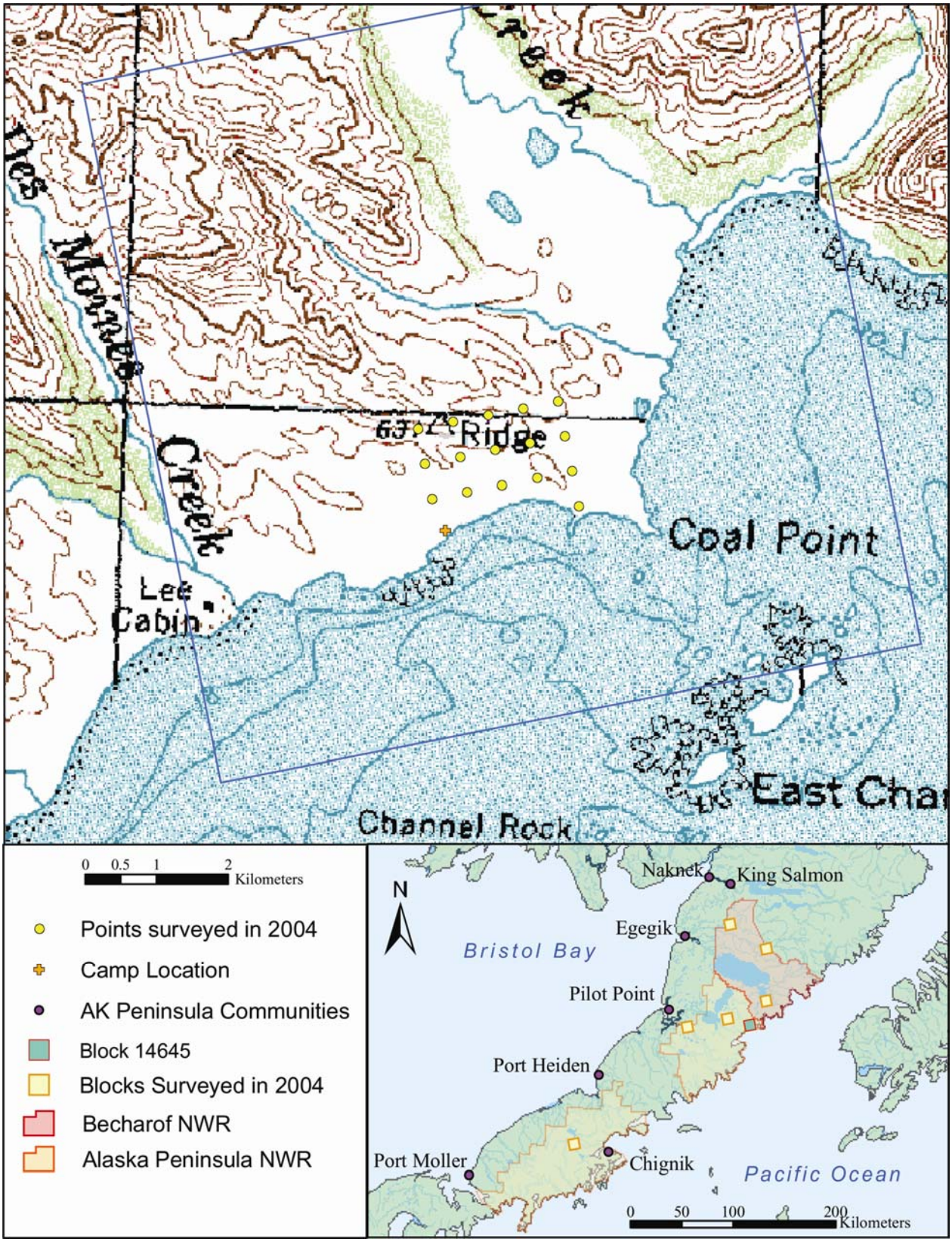
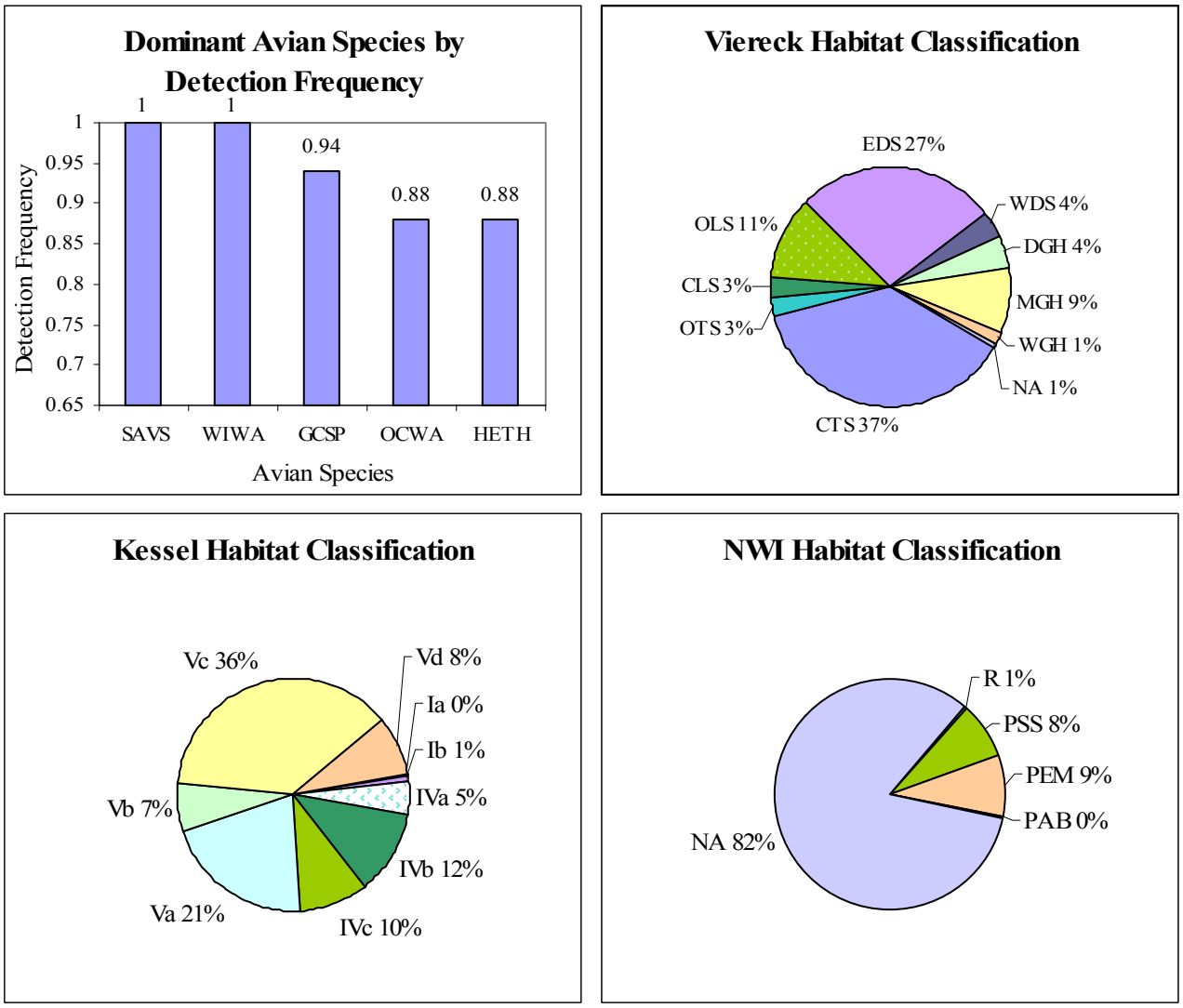


Figure 27. Block 14645 Wide Bay. Dominant avian species and habitat classification using Viereck, Kessel, and NWI, June 2004 in Alaska Peninsula National Wildlife Refuge.



Appendix 1. Experience summary for observers participating in ALMS for Alaska Peninsula/Becharof NWR in 2004.

Name	Bird surveys (years)	Distance estimation (years)	Birding in Alaska (years)
Andersen, Erik	4	3	0
Kaler, Robb	8	3	2
Jehle, Gretchen	6	4	0
Savage, Susan	13	0	14
Sesser, Kristin	3	1	1

Appendix 2. List of bird species included in this report including common and scientific names and the AOU codes.

AOU Code	**Common Name**	**Scientific Name**
GWFG	GREATER WHITE-FRONTED GOOSE	*Anser albifrons*
TUSW	TUNDRA SWAN	*Cygnus columbianus*
AMWI	AMERICAN WIGEON	*Anas americana*
MALL	MALLARD	*Anas platyrhynchos*
NSHO	NORTHERN SHOVELER	*Anas clypeata*
NOPI	NORTHERN PINTAIL	*Anas acuta*
GWTE	GREEN-WINGED TEAL	*Anas crecca*
GRSC	GREATER SCAUP	*Aythya marila*
HARD	HARLEQUIN DUCK	*Histrionicus histrionicus*
SUSC	SURF SCOTER	*Melanitta perspicillata*
WWSC	WHITE-WINGED SCOTER	*Melanitta fusca*
BLSC	BLACK SCOTER	*Melanitta nigra*
COME	COMMON MERGANSER	*Mergus merganser*
RBME	RED-BREASTED MERGANSER	*Mergus serrator*
WIPT	WILLOW PTARMIGAN	*Lagopus lagopus*
RTLO	RED-THROATED LOON	*Gavia stellata*
COLO	COMMON LOON	*Gavia immer*
RNGR	RED-NECKED GREBE	*Podiceps grisegena*
RFCO	RED-FACED CORMORANT	*Phalacrocorax urile*
BAEA	BALD EAGLE	*Haliaeetus leucocephalus*
NOHA	NORTHERN HARRIER	*Circus cyaneus*
RLHA	ROUGH-LEGGED HAWK	*Buteo lagopus*
GYRF	GYRFALCON	*Falco rusticolus*
PEFA	PEREGRINE FALCON	*Falco peregrinus*
SACR	SANDHILL CRANE	*Grus canadensis*
BBPL	BLACK-BELLIED PLOVER	*Pluvialis squatarola*
PAGP	PACIFIC GOLDEN-PLOVER	*Pluvialis fulva*
SEPL	SEMIPALMATED PLOVER	*Charadrius semipalmatus*
GRYE	GREATER YELLOWLEGS	*Tringa melanoleuca*
SPSA	SPOTTED SANDPIPER	*Actitis macularia*
MAGO	MARBLED GODWIT	*Limosa fedoa*

Appendix 2 continued. List of bird species included in this report including common and scientific names and the AOU codes.

AOU Code	Common Name	Scientific Name
LESA	LEAST SANDPIPER	*Calidris minutilla*
ROSA	ROCK SANDPIPER	*Calidris ptilocnemis*
DUNL	DUNLIN	*Calidris alpina*
SBDO	SHORT-BILLED DOWITCHER	*Limnodromus griseus*
WISN	WILSON'S SNIPE	*Gallinago delicata*
RNPH	RED-NECKED PHALAROPE	*Phalaropus lobatus*
PAJA	PARASITIC JAEGER	*Stercorarius parasiticus*
LTJA	LONG-TAILED JAEGER	*Stercorarius longicaudus*
MEGU	MEW GULL	*Larus canus*
GWGU	GLAUCOUS-WINGED GULL	*Larus glaucescens*
BLKI	BLACK-LEGGED KITTIWAKE	*Larus tridactyla*
ARTE	ARCTIC TERN	*Sterna paradisaea*
COMU	COMMON MURRE	*Uria aalge*
PIGU	PIGEON GUILLEMOT	*Cepphus columba*
KIMU	KITTLITZ'S MURRELET	*Brachyramphus brevirostris*
HOPU	HORNED PUFFIN	*Fratercula corniculata*
GHOW	GREAT HORNED OWL	*Bubo virginianus*
SEOW	SHORT-EARED OWL	*Asio flammeus*
ALFL	ALDER FLYCATCHER	*Empidonax alnorum*
NSHR	NORTHERN SHRIKE	*Lanius borealis invictus*
BBMA	BLACK-BILLED MAGPIE	*Pica pica*
CORA	COMMON RAVEN	*Corvus corax*
TRES	TREE SWALLOW	*Tachycineta bicolor*
VGSW	VIOLET-GREEN SWALLOW	*Tachycineta thalassina*
BANS	BANK SWALLOW	*Riparia riparia*
BCCH	BLACK-CAPPED CHICKADEE	*Poecile atricapillus*
AMDI	AMERICAN DIPPER	*Cinclus mexicanus*
GCTH	GRAY-CHEEKED THRUSH	*Catharus minimus*
HETH	HERMIT THRUSH	*Catharus guttatus*
AMRO	AMERICAN ROBIN	*Turdus migratorius*
AMPI	AMERICAN PIPIT	*Anthus rubescens*
OCWA	ORANGE-CROWNED WARBLER	*Vermivora celata*
YWAR	YELLOW WARBLER	*Dendroica petechia*
WIWA	WILSON'S WARBLER	*Wilsonia pusilla*
ATSP	AMERICAN TREE SPARROW	*Spizella arborea*
SAVS	SAVANNAH SPARROW	*Passerculus sandwichensis*
FOSP	FOX SPARROW	*Passerella iliaca*
WCSP	WHITE-CROWNED SPARROW	*Zonotrichia leucophrys*
GCSP	GOLDEN-CROWNED SPARROW	*Zonotrichia atricapilla*
LALO	LAPLAND LONGSPUR	*Calcarius lapponicus*
SNBU	SNOW BUNTING	*Plectrophenax nivalis*
GCRF	GRAY-CROWNED ROSY-FINCH	*Leucosticte tephrocotis*
CORE	COMMON REDPOLL	*Carduelis flammea*

Appendix 3. Description of National Wetlands Inventory (NWI) habitat classifications and codes used in 2004 data collection.

NWI Code	System	Description of Habitat
M	Marine	Saltwater is not substantially diluted by freshwater
E	Estuarine	Saltwater is substantially diluted by freshwater runoff from the land, especially at the mouth of larger streams/rivers
R	Riverine	Water flows and is contained within a channel
L	Lacustrine	Water flows slowly or not at all. Area > 8 ha or water depth > 2 m or wave-formed or bedrock shoreline present
PFO	Forested Wetland	Trees (> 6 m tall) cover >= 30% of area
PSS	Scrub-shrub Wetland	Trees (> 6 m tall) alone cover < 30% of area, but with shrub cover >+ 30% of area
PEM	Emergent Wetland	Emergent vegetation dominated by graminoids or forbs
PML	Moss-Lichen Wetland	Emergent vegetation dominated by mosses or lichens
PAB	Aquatic Bed	Vegetation submerged or floating on surface of water
PUB	Unvegetated Shore/Bottom	Substrate of shore or bottom predominantly covered by rock, stones, organic material, or other unconsolidated matter
NA	Not Applicable	Not a wetland habitat

Appendix 4. Description of Alaska Vegetation Classification by Viereck et al. and codes used in 2004 data collection.

Viereck Code	Description of habitat
CNF	Closed needleleaf forest
ONF	Open needleleaf forest
NW	Needleleaf woodland
CBF	Closed Broadleaf forest
OBF	Open Broadleaf forest
BW	Broadleaf Woodland
CMF	Closed Mixed Forest
OMF	Open Mixed Forest
MW	Mixed Woodland
CDTS	Closed Dwarf Tree Scrub
ODTS	Open Dwarf Tree Scrub
DTSW	Dwarf Tree Scrub Woodland
CTS	Closed Tall Scrub
OTS	Open Tall Scrub
CLS	Closed Low Scrub
OLS	Open Low Scrub
DDS	Dryas Dwarf Scrub
EDS	Ericaceous Dwarf Scrub
WDS	Willow Dwarf Scrub
DGH	Dry Graminoid Herbaceous
MGH	Mesic Graminoid Herbaceous
WGH	Wet Graminoid Herbaceous
DFH	Dry Forb Herbaceous
MFH	Mesic Forb Herbaceous
WFH	Wet Forb Herbaceous
BM	Bryoid Moss
BL	Bryoid Lichen
BG	Bare Ground
MAH	Marine Aquatic Herbaceous
FAH	Freshwater Aquatic Herbaceous
BAH	Brackish Water Aquatic Herbaceous
NA	Not Applicable

Appendix 5. Description of Kessel's avian habitat classification for Alaska and codes used in 2004 data collection

System	Kessel Code	Habitat Description
Fresh or brackish water	Ia	Lacustrine Waters and Shorelines (lakes, ponds, and shorelines)
	Ib	Fluviatile Waters and Shorelines (streams, rivers, and shorelines)
Marine waters	IIa	Nearshore Waters (protected coastal waters)
	IIb	Inshore Waters (exposed coastal waters)
Unvegetated substrates	IIIa	Rocky Shores and Reefs (boulders, rocks, rubble)
	IIIb	Beaches and Tidal Flats (gravel, sand, silt, mud)
	IIIc	Barrier Islands (usually with sparse or no vegetation)
	IIId	Alluvia and Moraines (unvegetated alluvial and glacial deposits)
	IIIe	Cliffs and Block-Fields (sea stacks, tors, screes, lava flows, etc.)
	IIIf	Subterranean Soil (soil substrate, cut-banks)
Meadows	IVa	Wet Meadow (wet; includes small ponds and vegetated pond margins)
	IVb	Dwarf Shrub Meadow (mesic; shrubs < 0.4 m present)
	IVc	Grass Meadow (relatively dry; mostly graminoids)
	IVd	Salt Grass Meadow (periodically tidal; graminoids)
	IVe	Tall Forb Meadow (forbs >= 0.4 m)
Shrubbery	Va	Dwarf Shrub Mat (dry; shrubs < 0.4 m dominant)
	Vb	Low Shrub Thicket (0.4 - 1.1 m)
	Vc	Medium Shrub Thicket (1.2 - 2.4 m)
	Vd	Tall Shrub Thicket (2.5 - 4.9 m)
Forests and woodlands	VIa	Deciduous Forest (>= 90% deciduous)
	VIb	Coniferous Forest (>= 90% coniferous)
	VIc	Mixed Deciduous-Coniferous Forest
	VId	Scattered Woodland and Dwarf Forest (canopy < 20%)
Artificial Habitats	VII	Artificial Habitats

Appendix 6. List of plants recorded during collection of ALMS habitat data in June 2004.

Scientific Name	Common Name
Shrubs and sub-shrubs	
Alnus viridis	American Green Alder
Betula nana	Dwarf Arctic Birch
Dryas octopetala	Mountain Avens
Empetrum nigrum	Crowberry
Ledum palustre	Labrador Tea
Loiseleuria procumbens	Alpine Azalea
Myrica gale	Sweet Gale
Potentilla fruiticosa	Shrubby Cinquefoil
Rubus spectabilis	Salmonberry
Salix alaxensis	Feltleaf Willow
Salix arctica	Arctic Willow
Salix barclayi	Barclay Willow
Salix planifolia	Diamondleaf Willow
Salix sp.	Willow
Sambucus racemosa	Red Elderberry
Vaccinium uliginosum	Bog Blueberry
Vaccinium vitis-idaea	Low-Bush Cranberry
Herbaceous and Non-woody Plants	
Achillea borealis	Northern Yarrow
Andromeda polifolia	Bog-Rosemary
Angelica lucida	Wild Celery
Arctium minus	Common Burdock
Artemisia sp.	Wormwood
Athyrium filix-femina	Lady fern
Calamagrostis sp.	Bluejoint
Caltha palustris	Marsh Marigold
Carex sp.	Sedge
Castilleja unalaschensis	Yellow Paintbrush
Cicuta mackenzieana	Poison Water Hemlock
Cornus canadensis	Dwarf Dogwood
Cornus suecica	Swedish Dwarf Cornel
Drosera rotundifolia	Round-Leaved Sundew
Epilobium augustifolium	Fireweed
Epilobium latifolium	River Beauty
Equisetum arvense	Common Horsetail
Equisetum sp.	Horsetails
Eriophorum angustifolium	Narrow-leaved Cotton-Grass
Eriophorum sp.	Alaska cotton species

Appendix 6 continued. List of plants recorded during collection of ALMS habitat data in June 2004.

Scientific Name	Common Name
Fragaria chiloensis	Coastal Strawberry
Fritillaria camschatcens	Chocolate Lily
Geranium erianthum	Wild Geranium
Heracleum lanatum	Cow Parsnip
Lagotis glauca	Weasel snout
Lupinus nootkatensis	Nootka Lupine
Lycopodium sp.	Clubmoss
Menyanthes trifoliata	Buckbean
Nuphar polysepalium	Yellow Pondlily
Oxycoccus microcarpus	Bog Cranberry
Pedicularis capitata	Capitate Lousewort
Pedicularis kanei	Wooly Lousewort
Pedicularis sp.	Pedicularis
Pedicularis verticillata	Whorled Lousewort
Penstemon sp.	Penstemon
Petasites frigidus	Sweet Coltsfoot
Pinguicula vulgaris	Butterwort
Polemonium acutiflorum	Tall Jacob's Ladder
Polygonum viviparum	Alpine Meadow Bistort
Potentilla palustris	Marsh Five-finger
Rhododendron camtschaticum	Kamchatka Rhododendron
Rubus arcticus	Dwarf Nagoonberry
Rubus chamaemorus	Cloudberry
Rumex arcticus	Arctic Dock
Saxifraga sp.	Saxifrage
Sedum rosea	Kings Crown / Roseroot
Silene acaulis	Moss Campion
Sphagnum sp.	Moss
Spiraea beauverdiana	Alaska Spiraea
Trientalis europaea	Star Flower
Valeriana capitata	Capitate Valerian
Veratrum viride	False Hellebore
Viola langsdorffii	Alaska Violet

Appendix 7. Visit Summary for block 12714 Chignik Lake

Land Unit: Alaska Peninsula NWR
Block Number: 12714
Block Name: Chignik Lake (CHIG)
Observers: Erik M. Andersen and Robb S. A. Kaler

Dates: 19 June - 25 June 2004
Points Completed: 15 of 25
Hours worked: 45

Topography: This was the most difficult (but equally beautiful) site we visited during the 2004 ALMS study. The uplands of the northwest corner (points 16, 17, 21, and 22) are composed of thick alder stands. The lowlands (essentially the remainder of the accessible points) were inundated with water—many points were located in water depth ranging from ankle to knee-deep. The graminoid tussocks in the lowlands were thick and the footing is uneven—taping ankles to prevent spraining may be beneficial for those susceptible to ankle/foot injuries. However, while we feel that this site is safe for future visits, caution should be exercised. The lake located in the center of the plot will undoubtedly continue to change shape and size (e.g., point 13 is located on the southeast edge of the water while the map shows point 13 to lay on the southwest side). We encountered two marsh/bog areas which we highlight as potential dangers: one site (between the butte we camped on and point 15) is clearly an old pond, now covered by WFH and WGH (dominated by *Equisetum* and *Carex* sp.), the second site was found while traveling from point 18 to 13 along the lake's southeastern edge, and was also composed of WFH and WGH. This is not the floating bog typically seen in WFH and WGH habitats; instead it is a vegetated matt of horsetails and sedges which give way to sparser vegetated standing water with a heavy mud/silt bottom. The walking quickly turns from possible to impossible in a matter of steps. To free one leg from this "wet cement" requires the sacrifice of the other leg. Exhaustion is eminent. I suspect "quick sand" works this same way. Fortunately, there was a firm bottom at ~ 0.5 m (a frozen layer I suspect) and I was able to free myself without assistance. Had this bottom been 1 m down (or worse, deeper) I certainly would have been compromised (e.g., breech my chest wader compounding my mired status). Detection and avoidance of these areas is possible, so fear not—however, automatically inflating vests and a throw line are recommended, and observers should walk spread apart (travel in pairs is mandatory).

Time required: Travel was very time-consuming and draining. This spot is very windy—we had gusts approaching 70 mph one afternoon—and suitable survey opportunities are few. Because of the terrain and weather, it took us six days to finish 15 points.

Camp site: We camped on a knoll ~ 20 m high. The spot was one of the only dry, brush-free spots around, but it was very exposed.

Camp location: Between points 19, 20, 14, and 15; Coordinates: N 56.33259, W 158.93918 (NAD 27)

Grid Route:
Day 1: 20-25-24-23-22-21-16-17
Day 2: 19-18-13-14-15-10-5

Skipped points: Points 1, 2, 3, 4, 6, 7, 8, 11, and 12 were not surveyed because they required a dangerous water crossing. Habitat work was completed at point 9, but the count was not conducted because of bear presence.

Water crossings: Bearskin Creek could be crossed at most places with chest waders and at many points with hip waders. The creek that bisects the grid south of Bearskin Creek (unnamed on our

map) was too deep and swift to cross. The waters seemed to be especially high during our visit; the vast majority of the lowlands were submerged.

Wildlife Notes: Bears, including an enraged sow with 3 cubs, were encountered on several occasions. Ungulate and otter spoor was present in fairly high numbers.

Access: Our campsite knoll may be the only place that a helicopter with skids could safely land. A helicopter on floats could put down in most of the lowland area. We used Pollux Aviation's R-44.

Appendix 8. Visit Summary for block 14878 Dog Salmon River

Land Unit: Alaska Peninsula NWR
Block Number: 14878
Block Name: Dog Salmon River (DOGS)
Observers: Susan E. Savage and Jessica A. Eyster

Dates: 16 June – 20 June 2004
Points Completed: 16 of 25
Hours worked: 25

Topography: The Dog Salmon River plot is relatively uniform. The entire plot is a wetland between two and five meters above sea level with the Dog Salmon River winding its way through the plot.

Time required: Good weather during the survey allowed us to finish this plot in three days. The first day, ten bird surveys and two habitat surveys were completed. High winds the second day prevented us from crossing the river so only five habitat surveys were able to be completed. The third day we were able to cross the river and the remaining six accessible points were completed. We conducted bird surveys first and habitat surveys on the return trip.

Camp site: Our campsite was located on river right, between points 9 and 14. The site was not ideal as it was extremely wet. A more ideal location could possibly be found between points 3 and 4 on river left, however access would be difficult for a float plane due to the presence of a high bank. I recommend camping on river right since the majority of the points are located there. The river was difficult to access for drinking water at low tide due to mud. The river was also very silty and hard on the water filters.

Camp location: N 57.40385765 W 157.25060005 (NAD 27)

Grid Route: The ten accessible points on the side of the river we camped on were completed in one day (9, 8, 7, 6, 11, 12, 13, 18, 19, 14). The six points on the far side of the river were completed in the following order (15, 10, 5, 4, 3, 2). Point 3 lay in the river and was moved approximately 50m on a bearing of 93 degrees. Point 2 lay in the middle of floating bog and was moved approximately 30m on a bearing of 230 degrees.

Skipped points: Points 17 and 23 lie in the middle of the river. Point 1 was on the far side on an uncrossable creek. Points 20, 24 and 25 were difficult to access on the far side of a lake. Points 16, 21 and 22 would require moving camp downstream and at least another entire day to make the move and complete the points.

Water crossings: An inflatable canoe was needed in order to complete the 16 points that were done. The creek between points 1 and 2 was uncrossable. The entire plot was very wet and knee boots would be adequate however hip boots are recommended for getting water.

Wildlife Notes: We saw one bear approximately 100m S of point 2 shortly after finishing the bird survey. We also found bear and wolf scat close to that location. Two pair of Greater White-fronted Geese with a total of six goslings were seen on the river the third evening. There were several marbled godwits observed as well as sign of Moose, Caribou and Mink.

Access: This plot is accessible by float plane landing on the river. Team of 2 arrived in a Cessna 206 with approximately 600lbs of gear, including an inflatable canoe. The river is very tidal and difficult to get to shore at low tide due to mud. On the last day the highest tide was approximately 3 hours after the high tide at Egegik. Be sure to use the higher of the 2 high tides.

Appendix 9. Visit Summary for block 16321 Gertrude Creek

Land Unit: Becharof NWR **Dates:** 23 June – 26 June 2004
Block Number: 16321 **Points Completed:** 25 of 25
Block Name: Gertrude Creek (GERT) **Hours Worked:** 40
Observers: Kristin A. Sesser, Gretchen Jehle, Jessica A. Eyster, Sarah M. Schuster

Topography: This plot can be distinguished by its lack of topography and the habitats are fairly homogenous among points—mostly OLS and MGH (Viereck) with a few marshy areas.

Time required: This plot took 4 people 3 days to complete. The first day was rainy, so only habitat data were taken, with a total of 18 points done. The second day saw good weather, so the 2 landbird techs conducted a whopping 13 bird surveys while the other 2 finished the remaining 7 habitat points. Our third day also was good weather and the remaining 12 bird point counts were completed. With two teams each having a rangefinder (total of 2), this plot could have been finished in 2 days, weather permitting.

Camp site: We camped just south of Gertrude Creek on the NW corner of the plot between points 21 and 16. The location had good access to water in the creek and to the rest of the plot, with a creek crossing to get to the most northern points. Probably anywhere along Gertrude Creek would work. Many of the smaller tributaries on the map are little more than trickles, or hard to access (6' below vegetation).

Camp location: N 58.12112 W 156.04123 (NAD 27)

Grid Route: On the second day, 13 bird surveys were conducted along the outer perimeter of the grid (16,11,6,1,2,3,4,5,10,15,20,25,24) and were completed within 6 hours of sunrise. On day three, with 12 bird surveys remaining, we split into two teams, with a landbird tech on each. One team took the early morning shift (5:30 – 8:30) to do 6 points (21,22,23,19,18,17) and the later morning shift (8:30 – 11:30) finished the remaining 6 points (12,13,14,9,8,7). This was to allow each point count to be conducted with a laser rangefinder and for the other two techs to participate in point counts.

Skipped points: None

Water crossings: Crossing most of the smaller tributaries involved nothing more than jumping across a gap, but a few, including Gertrude Creek involved wading. Knee boots were sufficient; you'd just have to pick your spot.

Wildlife Notes: Upon arrival, a bear was seen right in the middle of the grid and promptly left the area. On the last day, a sow with cubs was seen just a couple of km downstream of the grid. Moose and caribou sign seen within the plot.

Access: Helicopter landing at camp location. 2 trips in an R44 with 650 lbs (incl. people) on each run. Take out included a helicopter shuttling one group of two plus their gear to Gertrude Lake to be taken the rest of the way to King Salmon via a float plane.

Appendix 10. Visit Summary for block 17035 North King Salmon River

Land Unit: Becharof NWR
Block Number: 17035
Block Name: North King Salmon River (KING)
Observers: Robb S.A. Kaler, Kristin A. Sesser

Dates: 9 June – 14 June 2004
Points Completed: 19 of 25
Hours worked: 38

Topography: This plot had two different topographies. The eastern portion of the grid is comprised of rolling hills at higher elevation and predominantly EDS (Viereck) with a few wetlands interspersed, therefore pretty easy walking. The western portion of the grid was predominantly wetlands of WDS, WGH, or MGH (Viereck) so the walking was slower. The vegetation within the entire plot was very open.

Time required: We completed this plot in 5 days. Weather played a roll in delaying the surveying due to wind and fog, so it could take less time, weather permitting. Our first 3 days were limited to habitat surveys and PAGP nest searching. Day 1 we finished 5 habitat points after arriving. Day 2 had rain and wind and we finished 9 more habitat points. Day 3 had high winds, so we finished the remaining 7 habitat points for a total of 21 habitat points surveyed. Day 4 had good weather and 9 point counts were done. Day 5 had thick fog to the ground with little visibility and we started once the fog had lifted at 09:30 and conducted 6 point counts. The Day 6 also had thick fog with counting not starting until 09:45 and 4 point counts done. Two points remained unsurveyed due to poor weather. Since this was one of the first plots surveyed, we were hesitant to stay beyond 6 days lest the remaining plots could not be completed.

Camp site: We camped in the middle of the plot on a small rise along the edge of the highlands and lowlands between points 13,14,8, and 9. The site was tolerably close to a lake (approx. 150m), but some kind of water reservoir would have meant fewer trips between the two. The location was pretty exposed to the wind, but on calm days, it would pick up a nice breeze to lessen the bug factor, and the view was nice.

Camp location: N 58.31378 W 156.63334 (NAD 27)

Grid Route: From camp we circled around the eastern edge the first day (8,3,4,5,10,15,20,25,24). The second day we started another circle, starting near camp again (9,14,19,18,23, then 17 as an afterthought because it was after 12:00 but we knew we should complete 15 points). The third day we only had time to complete 4 points, starting near camp again (13,7,12,16).

Skipped points: Points (11,6,1,2) were on opposite side of creek and not surveyed. Points 21 and 22 were not surveyed for birds because we ran out of time, although the habitat data had been collected.

Water crossings: In marshy portion of plot, knee boots were sufficient, although hip boots would allow for more flexibility in routes. Several points on western edge of plot are on opposite side of a creek that we assume can't be crossed.

Wildlife Notes: Caribou and moose sign seen within grid. A single red fox was seen on two separate days ~ 300 m northeast of camp.

Access: Helicopter landing at camp location. Team of 2 in Bell JetRanger III, with 600 lbs (people + gear).

Appendix 11. Visit Summary for block 15125 South Becharof Lake/Bear Creek

Land Unit: Becharof NWR
Block Number: 15125
Block Name: S. Becharof Lake/Bear Creek (SBEC)
Observers: Erik M. Andersen and Robb S. A. Kaler

Dates: 25 June - 28 June 2004
Points Completed: 20 of 25
Hours worked: 28

Topography:
The elevations of the points range from ~20-200 m. The site is hilly and mostly dry. Areas of thick brush alternate with open areas—the difficulty of travel between points is medium.

Time required:
Twenty points were completed in 2.5 days. Vegetation work was completed immediately after a point count at ~50% of the points.

Camp site:
Camp was located on an open *Empetrum*-covered hillside ~150 m from Bear Creek. It was an ideal location.

Camp location:
SE of point 18; Coordinates: N 57.66371, W 155.99623 (NAD 27)

Grid Route:
Day 1: 18-17-22-21-16-11-6-1-2
Day 2: 13-12-7-8-9 (late start due to rain)
Day 3: 19-15-20-25-24

Skipped points:
All points could be accessed. We did not sample points 3, 4, 5, 10, or 23 because of time constraints.

Water crossings:
Bear Creek is the only sizable stream in the grid. Hip waders were required to cross it during our visit.

Wildlife Notes:
Salmon were not yet running in the creek during our visit. Four bears (2 lone, 1 pair) were encountered on several occasions, often at close range. The bears showed no aggression and were chased away several times. There were several beaver ponds at the site. Ungulate spoor was present but not abundant. Mosquitoes and whitesocks were incredibly thick at times.

Access:
There are numerous options for helicopter landing. We used Pollux Aviation's R-44.

Appendix 12. Visit Summary for block 14882 Ugashik/Deer Mountain

Land Unit: Alaska Peninsula NWR
Block Number: 14882
Block Name: Ugashik/Deer Mountain (UGAS)
Observers: Gretchen Jehle, Kristin A. Sesser

Dates: 19 June – 23 June 2004
Points Completed: 20 of 25
Hours Worked: 35

Topography: The plot has higher elevation and lower elevation regions which are quite different in character. The higher elevation points are at or above the shrub line - 100m to 260m. There are thick alders throughout the plot, but at the higher elevation points there are distinct patches with clear areas in between. The changes in topography require repeated ascending and descending over ridges. The lower elevation points are at the same elevation as the prominent SE to NW creek (40-50m). The shrubs are thick at these lower points, often making mobility more challenging.

Time required: It took 4 days to complete 20 of 25 points, arriving on the evening before we began. The first day was limited to habitat sampling due to strong winds - we completed 8 habitat points. On day 2, we completed 8 bird and 2 habitat points. On day 3 we completed 7 bird and 7 habitat points. On day 4 we completed 5 bird and 5 habitat points. On days 2-4 we completed several of the habitat points while doing the bird point rather than returning to each point twice. This took an additional 10-15 minutes per point.

Camp site: We camped on a shelf near point 18. The site was at 80m and was a convenient spot to access both the higher and the lower sites. Water was available in a shallow lake and a small stream. Camping on this shelf is recommended, as it would be challenging to reach the upper and lower extent of this plot from the top or bottom.

Camp location: N 57.49562 W 156.61714 (NAD 27**)**

Grid Route: We surveyed the north and east outer perimeter on the first day (22, 23, 24, 25, 20, 15, 10, 5). Point 19 proved difficult to access from above or from either side of the slope, as there are deep gullies on the slope on either side of it. We did not survey birds at 19; it may be possible to access it from below. Between points 10 and 5 there is a steep waterfall and gully to be avoided. Point 4 could perhaps be added after point 5. On the second day, we had some difficulty finding routes through the alders. On the third day, we found an excellent game trail beginning between point 18 and point 22, and leading all the way down to the creek. This trail is worth finding, as it saves a lot of time and energy otherwise required for bush bashing. Trail bottom is at N57.49419 W156.62135

Skipped points: We did not survey points 1, 6, 4, (up on steep slopes), 9 and 19.

Water crossings: It was possible to cross the stream in 18" knee boots (16" too short).

Wildlife Notes: We observed 2 brown bears on a ridge NW of the plot, visible from point 24. We also saw a sow with 3 cubs SE of the plot, up the ridge from point 5. There were 2 caribou at the lake near point 25. There was limited sign of moose. There was a beaver lodge in the lakes between 16 and 21. There were fresh bear and caribou tracks on the river bed, as well as unidentified mustelid tracks (otter?).

Access: Helicopter (Pollux Aviation R-44) transported 650 lbs including people.

Appendix 13. Visit Summary for block 14645 Wide Bay

Land Unit: Alaska Peninsula NWR **Dates:** 9 June – 14 June 2004
Block Number: 14645 **Points Completed:** 16 of 16
Block Name: Wide Bay/Coal Point (WIDE) **Hours Worked:** 36
Observers: Gretchen Jehle, Erik M. Andersen, Jessica A. Eyster

Topography: The Wide Bay plot is highly variable, with open areas, thick alder, steep slopes, and rolling ridges. The presence of a beach along the southern limit of the plot facilitates traversing the plot.

Time required: It took us 4 solid days to complete the bird and vegetation surveys, with the first two days limited to doing vegetation work because of rain and wind. Because there are only 16 points available, the bird surveys can be completed in 2 good days.

Camp site: Two suitable camping spots are available, near each of the 2 streams that flow from the plot onto the beach. We camped at the creek closer to point 11, although we felt it might be easier for future teams to camp between points 13 and 14. Because of the bad weather that the Pacific side is famous for, we camped in a depression between two vegetated dunes for protection from the wind.

Camp location: N 57.58035665 W 157.14955695 (NAD27)

Grid Route: The points along the eastern (25, 20, 15, 10) and northern (21-25) sides are exposed to the wind. The weather needs to be quite good and the winds minimal for these points to be surveyed adequately. We did all 10 of those points on the first good day that we had, in the following sequence (10, 15, 20, 25, 24, 23, 22, 21, 16, 17). This enabled us to work upslope gradually, rather than climbing steep slopes during the survey. Point #21 is on a steep, vegetated slope (about 40 degrees, with spots reaching perhaps 50 degrees during the approach). Approaching point 21 from point 16 is a steep uphill climb. The remaining points are generally more sheltered than the ridge points, although points 12 and 13 are also pretty open. The ridge route should be done on the best day and the lower points could be completed in less ideal conditions. The plot could also be split into 2 bird survey days with 8 points each (10, 15, 20, 25, 24, 23, 22, 21 on one day and 11, 12, 13, 14, 16, 17, 18, 19) on the other.

Skipped points: None

Water crossings: It was possible to cross all streams wearing knee boots.

Wildlife Notes: There were about a dozen caribou and at least 4 brown bears (3 on an offshore island). One bear had visited our camp during the night without incident. Fresh tracks led straight towards and away from our camp the following morning. We saw red fox and had minimal sign of moose. There were fresh wolf tracks on the beach.

Access: Fixed wing landing on beach at low tide (at least 2 hours +/- high tide). Be sure to use the Pacific Side tide table, as it differs from Bristol Bay side. Team of 2 carried in with Cessna 185 or similar, 600 lbs. including people and gear. One additional staff member arrived in a Husky. This staff member was being trained on methods.