

Appendix A

Nesting Study Site Descriptions

Table of Contents

List of Figures	A-ii
List of Tables	A-ii
Introduction	A-1
Site 1: West Sak 17.....	A-2
Site 2: Ugnu-1	A-6
Site 3: West Sak 9.....	A-12
Site 4: West Sak 3.....	A-14
Site 5: Mobil Kuparuk 3-15-11-12.....	A-18
Site 6: Term Well C	A-22
Site 7: Hurl State	A-26
Site 8: Put River 22-33-11-13.....	A-30
Site 9: Getty State.....	A-34
Site 10: Put State 1	A-38
Site 11: Storage Pad	A-42
Site 12: Prudhoe Bay State 1.....	A-46
Site 13: Lake State 1	A-50
Site 14: Delta State 2.....	A-54

List of Figures

Figure A-1	West Sak 17 (Site 1)	A-3
Figure A-2	Ugnu-1 (Site 2).....	A-7
Figure A-3	West Sak 9 (Site 3).....	A-11
Figure A-4	West Sak 3 (Site 4).....	A-15
Figure A-5	Mobil Kuparuk 13-15-11-12 (Site 5)	A-19
Figure A-6	Term Well C (Site 6).....	A-23
Figure A-7	Hurl State (Site 7).....	A-27
Figure A-8	Put River 22-33-11-13 (Site 8)	A-31
Figure A-9	Getty State (Site 9)	A-35
Figure A-10	Put State 1 (Site 10).....	A-39
Figure A-11	Storage Pad (Site 11).....	A-43
Figure A-12	Prudhoe Bay State 1 (Site12)	A-47
Figure A-13	Lake State 1 (Site 13).....	A-51
Figure A-14	Delta State 2 (Site 14)	A-55

List of Tables

Table A-1.	Number of nests and nest success for bird species on disturbed and undisturbed study plots, WS-17, Prudhoe Bay, Alaska.....	A-5
Table A-2	Number of nests and nest success for bird species on disturbed and undisturbed study plots, Ugnu-1, Prudhoe Bay, Alaska.....	A-9
Table A-3	Number of nests and nest success for bird species on disturbed and undisturbed study plots, WS-9, Prudhoe Bay, Alaska.	A-13

Table A-4	Number of nests and nest success for bird species on disturbed and undisturbed study plots, WS-3, Prudhoe Bay, Alaska.....	A-17
Table A-5	Number of nests and nest success for bird species on disturbed and undisturbed study plots, Mobil Kuparuk 13-15-11-12, Prudhoe Bay, Alaska.....	A-21
Table A-6	Number of nests and nest success for bird species on disturbed and undisturbed study plots, Term Well C, Prudhoe Bay, Alaska.....	A-25
Table A-7	Number of nests and nest success for bird species on disturbed and undisturbed study plots, Hurl State, Prudhoe Bay, Alaska.....	A-29
Table A-8	Number of nests and nest success for bird species on disturbed and undisturbed study plots, BP 22-33-11-13, Prudhoe Bay, Alaska.....	A-33
Table A-9	Number of nests and nest success for bird species on disturbed and undisturbed study plots, Getty State, Prudhoe Bay, Alaska.....	A-37
Table A-10	Number of nests and nest success for bird species on disturbed and undisturbed study plots, Put State 1, Prudhoe Bay, Alaska.....	A-41
Table A-11	Number of nests and nest success for bird species on disturbed and undisturbed study plots, Storage Pad, Prudhoe Bay, Alaska.....	A-45
Table A-12	Number of nests and nest success for bird species on disturbed and undisturbed study plots, Prudhoe Bay State 1, Prudhoe Bay, Alaska.....	A-49
Table A-13	Number of nests and nest success for bird species on disturbed and undisturbed study plots, Lake State 1, Prudhoe Bay, Alaska.....	A-53
Table A-14	Number of nests and nest success for bird species on disturbed and undisturbed study plots, Delta State 2, Prudhoe Bay, Alaska.....	A-56

Introduction

In this section we provide detailed descriptions of all sites which were part of the nesting study. Each site includes a disturbed and an undisturbed study plot. Included are verbal descriptions of the biophysical features of the plots (including areas of disturbance) and a summary of nesting results. Also included in these descriptions are site maps which show gravel distribution and other disturbances. Vegetation and landform types are depicted on the site maps as sets of numbers; the top number refers to the vegetation type, and the bottom number to the surface form. In addition, each nest found during the study is located on the site maps, and its outcome (successful or not successful) is indicated.

A list of bird and mammal species recorded during the two parts of this study (nesting and post-breeding use) can be found in Appendix C.

Vegetation type and landform descriptions (Appendix D) use terminology after Walker et al. (1983). Other potentially unfamiliar terms used in these descriptions include the following:

- Thermokarst - surface subsidence caused by increased depth of subsurface thaw
- Pad - the usually-raised gravel substrate from which drilling operations took place
- Reserve Pit - the sump where drilling muds and fluids were discharged during drilling. Berms surrounding these and the flare pits (below) are gravel and/or overburden
- Flare Pit - the sump within which any natural gas that escaped to the surface during drilling was burned off
- Forb - broad-leaved, herbaceous plant
- Overburden - soil, often highly organic, removed from the tundra surface and heaped into mounds or berms during construction of pads and reserve pits
- Graminoids - grasslike plants, including grasses and sedges
- Gravel Spray - thin surface sheets or traces of gravel, usually occurring near margins of fill

Site 1: West Sak 17

Location and Access

West Sak 17 (Fig. A-1) is located in the Kuparuk Unit in Sec. 26, T13N, R9E approximately 1.6 km northeast of Drill Site 3K. There is no road access to the pad, but it can be seen from the gravel road to Mine Site E at a point about 1.6 km beyond the access road to Drill Site 3K. From there it is a short walk southeastward across tundra to the gravel pad.

Description: Disturbed Plot

The well was spudded on January 24, 1981, and suspended on March 4, 1981. The pad dimensions are approximately 115 m x 80 m, and the gravel thickness varies from about 1 to 2 m. A gravel ramp at the southwest corner of the pad tapers to the tundra level. No thermokarsting is evident on the pad except on the gravel ramp. A small area of disturbance including some gravel spray is located off the north edge of the pad. The well head is located on the east-central portion of the pad. A large-diameter section of culvert (the well collar) is buried vertically in the gravel surrounding the well head.

A reserve pit attached to the east side of the pad was filled with water and mud. A flare pit south of the pad also contained water and mud, as well as disturbed tundra and dense vegetation, some of which was emergent. Both pits are enclosed by gravel berms. The gravel, gravel spray, and the two pits cover approximately 26 percent of the disturbed plot.

The tundra surrounding the pad is composed primarily of moist and wet graminoids, with tussock tundra east of the pad. The landform generally shows little relief and is a mixture of low-relief high-centered polygons, many of which are poorly defined, and mixed high- and low-centered polygons. Strangmoor is present north of the pad. Tundra thermokarsting around the edges of the pad is also evident in some areas, particularly near the gravel ramp and around the pits. In addition to the water in the pits, a portion of a natural pond is present on the south side of the plot.

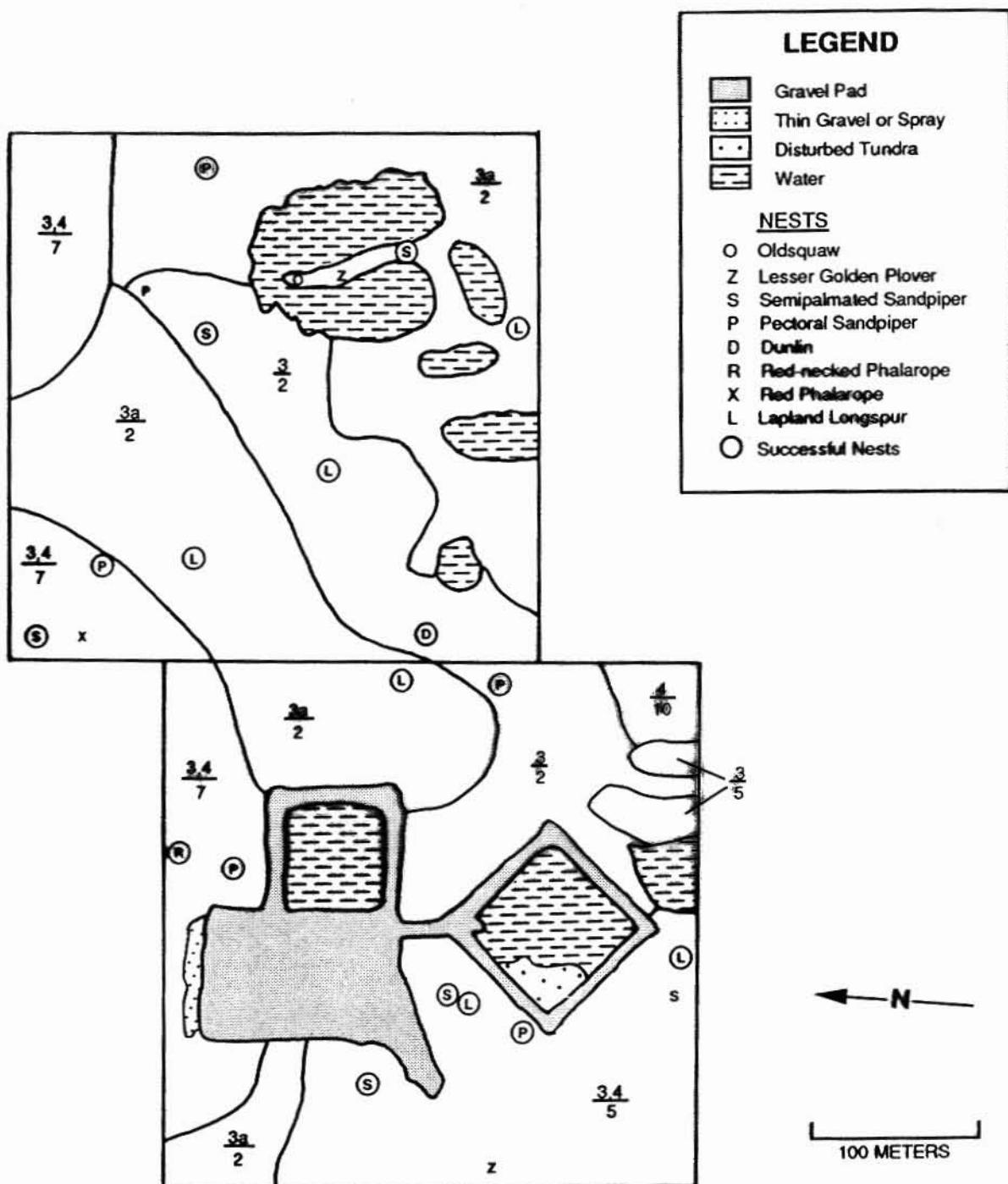


Fig. A-1. Gravel disturbance, nest locations, and geobotanical types of tundra patches on disturbed and undisturbed study plots, WS-17, Prudhoe Bay, Alaska, 1990.



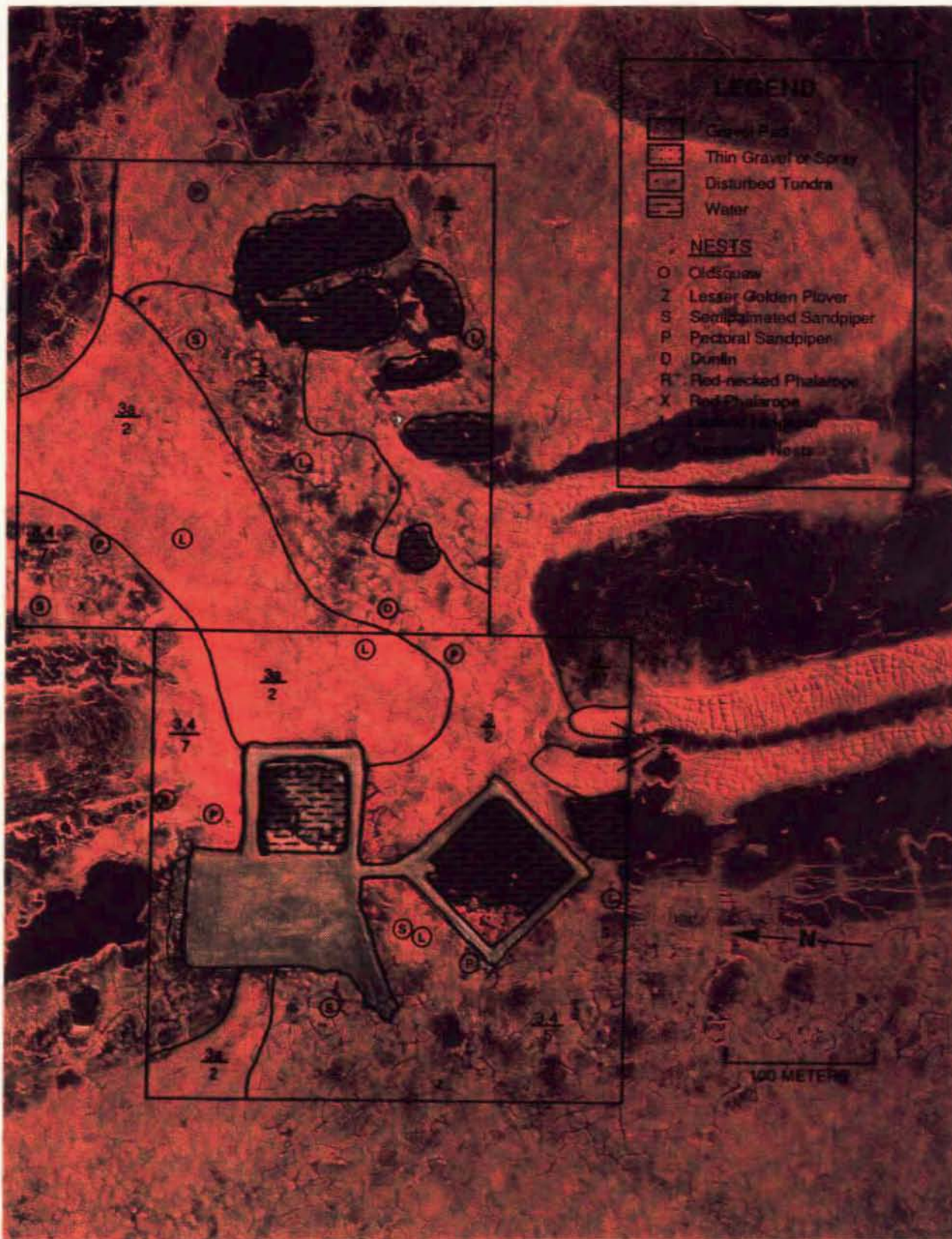


Fig. A-1. Gravel disturbance, nest locations, and geobotanical types of tundra patches on disturbed and undisturbed study plots, WS-17, Prudhoe Bay, Alaska, 1990.

Description: Undisturbed Plot

The undisturbed plot, located immediately northeast of the disturbed plot, is composed of moist and wet graminoids and moist tussock tundra. The landform is generally low-relief high-centered polygons, some of which are poorly defined. Moist and wet strangmoor is present on the north side of the plot. Ponds are located on the south and southeast portion of the plot.

Nesting

Seven species had 13 nests on the undisturbed plot, while 5 species had 11 nests on the disturbed plot (Table A-1). The percentage of successful nests was higher on the disturbed plot; both plots had 9 successful nests. Four species were successful in each plot. Primarily shorebirds and longspurs nested in both of the plots, although one Oldsquaw nested unsuccessfully in the undisturbed plot.

Seven of the 11 nests in the disturbed plot were located on tundra near the perimeter of the gravel pad (Fig. A-1.). Most nests seemed to be generally associated with areas where microrelief was most pronounced. This also appeared to be the case in the undisturbed plot.

Table A-1. Number of nests and nest success for bird species on disturbed and undisturbed study plots, WS-17, Prudhoe Bay, Alaska, 1990.

Undisturbed Study Plot				
Species	Successful Nests	Failed Nests	Total Nests	Percent Success
Oldsquaw	0	1	1	0
Lesser Golden Plover	0	1	1	0
Semipalmated Sandpiper	3	0	3	100
Pectoral Sandpiper	2	1	3	67
Dunlin	1	0	1	100
Red Phalarope	0	1	1	0
Lapland Longspur	3	0	3	100
Total/Mean	9	4	13	69

Disturbed Study Plot				
Species	Successful Nests	Failed Nests	Total Nests	Percent Success
Lesser Golden Plover	0	1	1	0
Semipalmated Sandpiper	2	1	3	67
Pectoral Sandpiper	3	0	3	100
Red-necked Phalarope	1	0	1	100
Lapland Longspur	3	0	3	100
Total/Mean	9	2	11	82

Site 2: Ugnu 1

Location and Access

Ugnu 1 (Fig. A-2) is located in the Kuparuk Unit in Sec. 22, T12N, R9E, about 2.4 km south of CPF-3. There is no road access to the site. The best access is from the gravel road at a point about 1.6 km south of CPF-3. From there the site can be reached in about 20 min on foot.

Description: Disturbed Plot

The well was spudded on approximately February 1, 1969, and suspended on June 1, 1969. There was occasional drilling activity at the site until at least March 1978. A plug-and-abandon date of March 14, 1986 is on record.

Ugnu 1 is one of the most interesting of the nesting study sites in terms of microrelief and structural variety. The boundaries of this pad are not well defined because of the gradual gradation of pad edges into adjacent tundra. The dimensions of the main portion of the pad are approximately 90 m x 100 m. Small areas of thin gravel extend beyond this area on the north, south, and west sides of the pad. Nowhere is the gravel very thick; it is approximately 0.5 m in the thickest areas. This gravel site generally has smaller particle sizes and a higher percentage of sand and silt than do other sites in this study. Thermokarsting is well developed over the entire pad, forming deep troughs in some areas. The well head is located in the southeast portion of the pad and consists of a pipe embedded into the gravel. Debris in the area includes scattered pieces of wood and metal, small sections of pipe, electrical cord, and cement. Wood pilings about 0.5 m high are located on the eastern portion of the pad.

The site has been colonized extensively by many plant species; the vegetative cover is approximately 60 percent. *Carex aquatilis* and *Eriophorum* spp. are the primary colonizers in the wet areas around thermokarst troughs. Many grass and forb species are present on the drier areas. A detailed description of the vegetation is contained in Robus et al. (1986).

A large reserve pit to the east of the pad is filled with water. A mound of overburden east of the reserve pit is bisected by the plot boundary. The gravel disturbance, reserve pit, and overburden cover approximately 20 percent of the disturbed plot.

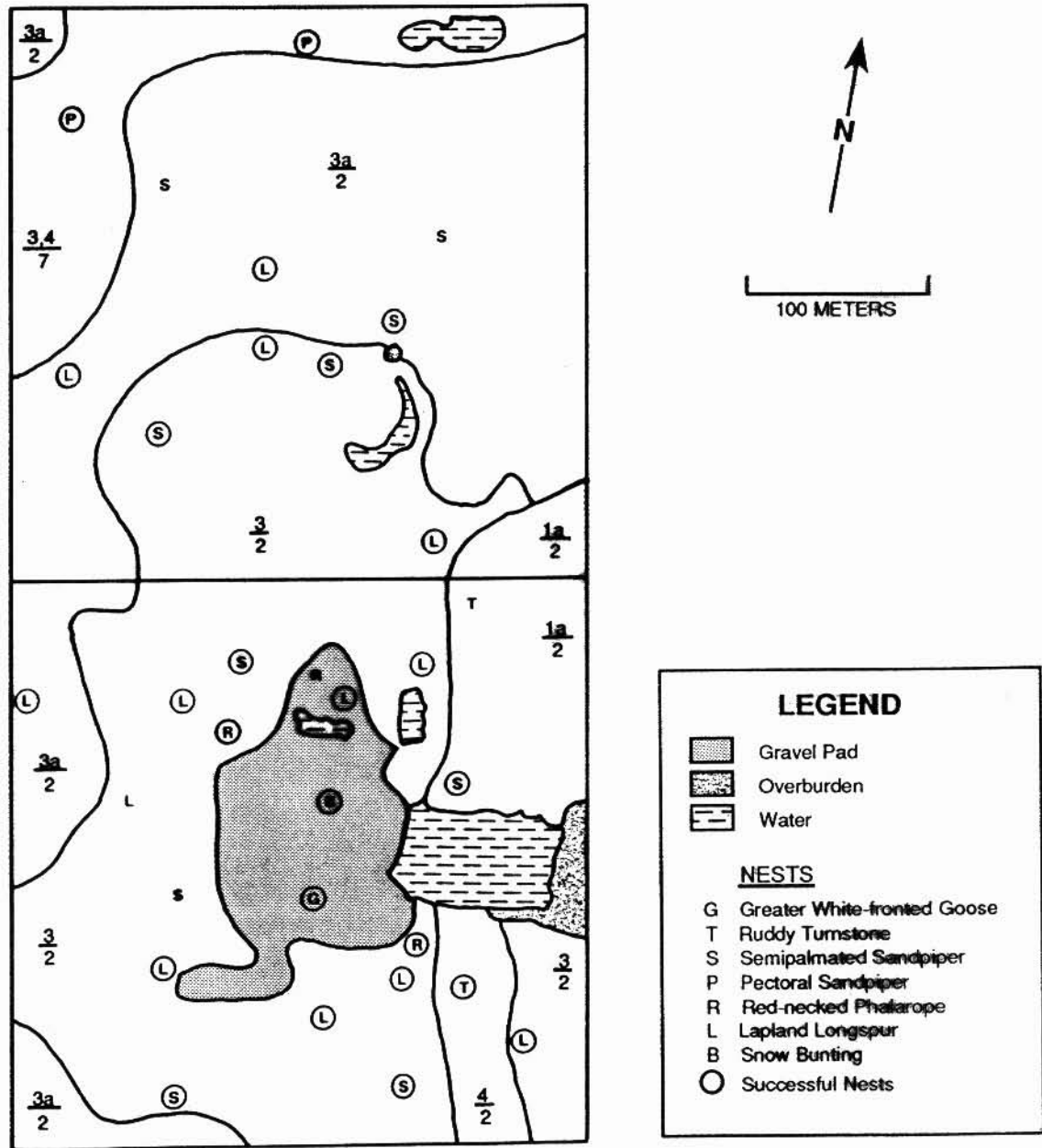


Fig. A-2. Gravel disturbance, nest locations, and geobotanical types of tundra patches on disturbed and undisturbed study plots, Ugnu-1, Prudhoe Bay, Alaska, 1990.





Fig. A-2. Gravel disturbance, nest locations, and geobotanical types of tundra patches on disturbed and undisturbed study plots, Ugnu-1, Prudhoe Bay, Alaska, 1990.

Much of the tundra in the disturbed plot surrounding the gravel pad also shows a high degree of thermokarst disturbance. The vegetation is composed of moist graminoids; the landform is high-centered polygons of low to high relief. This vegetation and landform may have been caused by surface disruptions associated with the drilling activities. The remaining area is composed primarily of moist tussock tundra; this landform is low-relief, high-centered polygons. A sparsely vegetated area in the northeast portion of the plot was classified as prostrate shrub tundra. Besides the water-filled reserve pit, two small ponds are present, one of them within the gravel.

Description: Undisturbed Plot

The undisturbed study plot, located immediately north of the disturbed plot, shows some evidence of disturbance. A small pond in the southcentral portion of the plot has a mound of overburden on the north side and was surely man-made. In addition, the remnants of several small roads which pass through the plot can be seen from aerial photos. These roads are well vegetated and can also be seen from the ground, though with greater difficulty. Most of the plot is composed of moist tussock tundra; the landform is low-relief high-centered polygons. An area of graminoid tundra extending north from the disturbed plot to the southcentral portion of the undisturbed plot shows some possible thermokarsting disturbance. An area of moist and wet strangmoor is present on the north and northwest portions of the plot.

Nesting

The disturbed plot, with 21 nests, had the highest nest density of all plots in this study. Robus et al. (1986) found only 5 nests on a 10.5-ha plot at this site which also included the gravel pad. Six species nested on the plot. The undisturbed plot had 3 species and 11 nests. The percentages of successful nests were essentially identical in both plots; 17 and 9 nests were successful in the disturbed plot and the undisturbed plot, respectively (Table A-2.).

Four nests were located on the gravel pad (Fig. A-2). One of these, of a Snow Bunting, was in a 55-gal fuel drum which is buried in the gravel with the bung hole exposed. The other nests were more or less associated with vegetation on the pad and included a White-fronted Goose which successfully hatched a 2-egg clutch.

Sixteen nests were located in the graminoid tundra surrounding the pad and extending into the undisturbed plot. This area had a fairly high degree of microrelief and appeared to be a preferred nesting habitat. Two Red-necked

Phalaropes nested adjacent to water-filled thermokarst troughs. Three longspurs nested on the sides of thermokarst troughs in clumps of vegetation; 5 nests were located on the tops of high-centered polygons.

The only Ruddy Turnstones found nesting during this study were located on the disturbed plot at this site; one was on a sparsely vegetated area of low-relief high-centered polygons northeast of the pad, the other in a wet, sparsely vegetated area southeast of the pad.

Five of the remaining nests were located on moist tussock tundra in the undisturbed plot. These were nests of Semipalmated Sandpipers and Lapland Longspurs. Two Pectoral Sandpiper nests were located in strangmoor in the undisturbed plot; no Pectoral Sandpiper nests were found in the disturbed plot.

Table A-2. Number of nests and nest success for bird species on disturbed and undisturbed study plots, Ugnu-1, Prudhoe Bay, Alaska, 1990.

Undisturbed Study Plot				
Species	Successful Nests	Failed Nests	Total Nests	Percent Success
Semipalmated Sandpiper	3	2	5	60
Pectoral Sandpiper	2	0	2	100
Lapland Longspur	4	0	4	100
Total/Mean	9	2	11	82

Disturbed Study Plot				
Species	Successful Nests	Failed Nests	Total Nests	Percent Success
Greater White-fronted Goose	1	0	1	100
Ruddy Turnstone	1	1	2	50
Semipalmated Sandpiper	4	1	5	80
Red-necked Phalarope	2	1	3	67
Lapland Longspur	8	1	9	89
Snow Bunting	1	0	1	100
Total/Mean	17	4	21	81

Site 3: West Sak 9

Location and Access

West Sak 9 (Fig. A-3) is located in the Kuparuk Unit in Sec. 3, T11N, R9E, about half-way between Drill Site 2X and Drill Site 2W. From Drill Site 2X, it is readily visible to the north and can be reached in about 20 min on foot.

Description: Disturbed Area

The well was spudded on March 2, 1978, and suspended on April 9, 1978. During the winter of 1989-90, the well was plugged and abandoned.

The pad dimensions are about 130 m x 100 m, and gravel thickness varies from approximately 1 to 1.5 m. A small gravel ramp tapers from the pad to the tundra on the north part of the pad. Thermokarsting on the southwest quadrant of the pad is extensive. Other areas of the pad exhibit little or no thermokarst activity. The well head is located on the east-central part of the pad.

There are several plant species but low vegetative cover on the pad surface. Total vegetative cover on the pad is about 1 percent (Pollard et al. 1990). Colonization is more pronounced in thermokarsted areas.

A reserve pit east of the pad is filled with water and is similar in size to the pad. A flare pit south of the reserve pit is slightly smaller than the reserve pit and is also filled with water. Both pits are surrounded by gravel berms. There is virtually no plant colonization in the vicinity these pits. Large mounds of overburden 6 to 7 m high are present to the east of each pit. The gravel pad, reserve and flare pits, and overburden cover approximately 39 percent of the disturbed plot.

The tundra surrounding the gravel pad is geobotanically varied. It consists primarily of moist and wet graminoid tundra; landforms include frost-boil tundra, strangmoor, low-relief high-centered polygons, low-centered polygons, and non-patterned ground. Some of the tundra surrounding the pad appears to be partially disturbed. Thermokarsting on the west side of the pad continues onto the tundra to the west forming high-centered polygons. Other areas around the north and south sides of the pad also show signs of disturbance. Besides the water in reserve and flare pits, ponds are also present on the east, north and southwest portions of the plot.

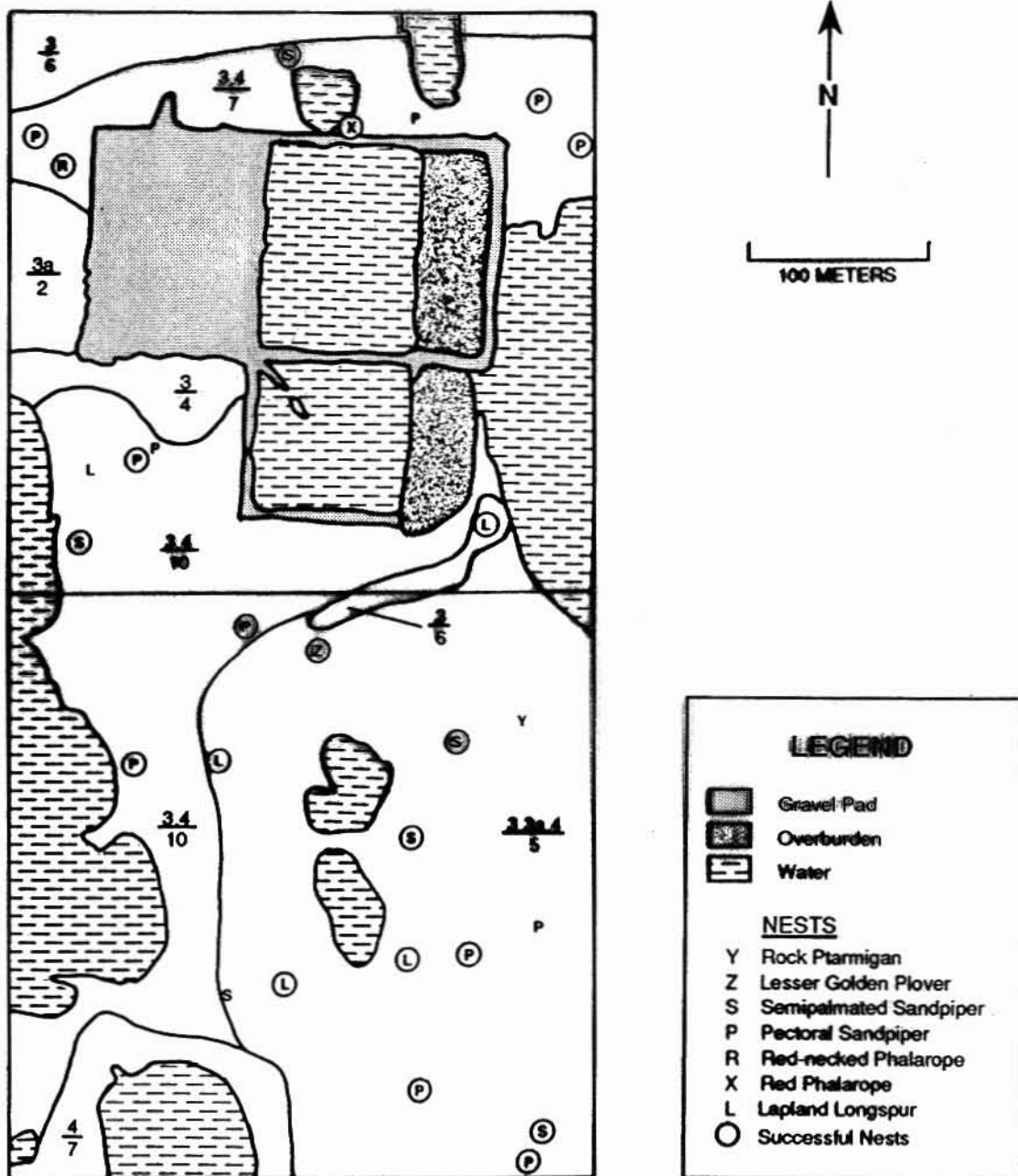


Fig. A-3. Gravel disturbance, nest locations, and geobotanical types of tundra patches on disturbed and undisturbed study plots, WS-9, Prudhoe Bay, Alaska, 1990.



