

Description: Undisturbed Plot

The undisturbed plot is located north of the disturbed plot on the opposite side of the airstrip. It is composed of moist and wet graminoid tundra. The predominant landform is strangmoor throughout most of the plot, but low-centered polygons are present on the western portion.

Nesting

Seven species had 18 nests on the undisturbed plot, and 5 species had 6 nests on the disturbed plot (Table A-7). All species were shorebirds or longspurs, with the exception of a Willow Ptarmigan which nested successfully in the disturbed plot.

The proportion successful nests was very different in the two plots. All 6 nests in the disturbed plot were successful and only 7 nests in the undisturbed plot survived. Much of the nest predation was directly attributable to fox. This was interesting because an arctic fox had a burrow located in gravel spray near the pad, yet the nest predation occurred in the undisturbed plot. Since nest densities were higher in the undisturbed plot, hunting conditions may have been better there. This may explain the lower success in the undisturbed plot. Page et al. (1983) showed a decrease in nest success when he experimentally increased nest density of Snowy Plovers. A density-dependent effect stemming from higher rates of nest predation at higher nesting densities has also been demonstrated for Field Sparrows (Fretwell 1972:115-117).

Table A-7. Number of nests and nest success for bird species on disturbed and undisturbed study plots, Hurl State, Prudhoe Bay, Alaska, 1990.

Undisturbed Study Plot				
Species	Successful Nests	Failed Nests	Total Nests	Percent Success
Semipalmated Sandpiper	1	3	4	75
Pectoral Sandpiper	1	2	3	33
Dunlin	0	1	1	0
Stilt Sandpiper	0	1	1	0
Buff-breasted Sandpiper	2	1	3	67
Red Phalarope	2	1	3	67
Lapland Longspur	1	2	3	33
Total/Mean	7	11	18	39

Disturbed Study Plot				
Species	Successful Nests	Failed Nests	Total Nests	Percent Success
Willow Ptarmigan	1	0	1	100
Semipalmated Sandpiper	1	0	1	100
Pectoral Sandpiper	1	0	1	100
Stilt Sandpiper	1	0	1	100
Lapland Longspur	2	0	2	100
Total/Mean	6	0	6	100

Site 8: Put River 22-33-11-13

Location and Access

Put River 22-33-11-13 ("BP Pad") (Fig. A-8) is located in the Prudhoe Bay Unit in Sec. 33, T11N, R13E. It is approximately 0.5 km west of Y Pad. There is no road access to the site, but it can be reached in about 5 min by foot from Y Pad.

Description: Disturbed Plot

The well was spudded on January 24, 1969, and suspended on May 5, 1969. The well head has been removed from the site.

This site is the object of an experimental rehabilitation project being undertaken by BPX. Most of the gravel was removed from this site to within six inches of the original grade in May 1989. Some additional gravel was removed in April 1990. Overburden was placed over the area of gravel removal. The area was fertilized and planted with *Poa glauca*, *Festuca rubra*, and *Arctagrostis latifolia* in May 1989. It was fertilized again after the first growing season in September 1989. A wooden snow fence was installed north of the gravel site just prior to gravel removal. The purpose of this fence is to attempt to accumulate drifting snow as a source of water for the cultivars. The cultivars were doing well during the 1990 field season. The cultivated area includes most of the area designated as "disturbed tundra" on the site map (Fig. A-8). The smaller portion of disturbed tundra showed signs of disturbance such as sparsely vegetated areas.

The area surrounding the disturbed portion of the plot is composed of moist and wet graminoid tundra. The landform is primarily strangmoor and non-patterned ground. Small patches of high-centered polygons and mixed high- and low-centered polygons extend into the undisturbed plot. Some of the ponds had dried up, and their mud bottoms were exposed. The disturbed area covers approximately 50 percent of the plot.

Description: Undisturbed Plot

The undisturbed plot is located south of the disturbed plot and is slightly offset from it. It is composed of moist and wet graminoid tundra. The landform is predominately non-patterned ground and strangmoor, with patches of high-centered polygons and mixed high- and low-centered polygons. Several ponds are also present, some of which partially receded during the summer.

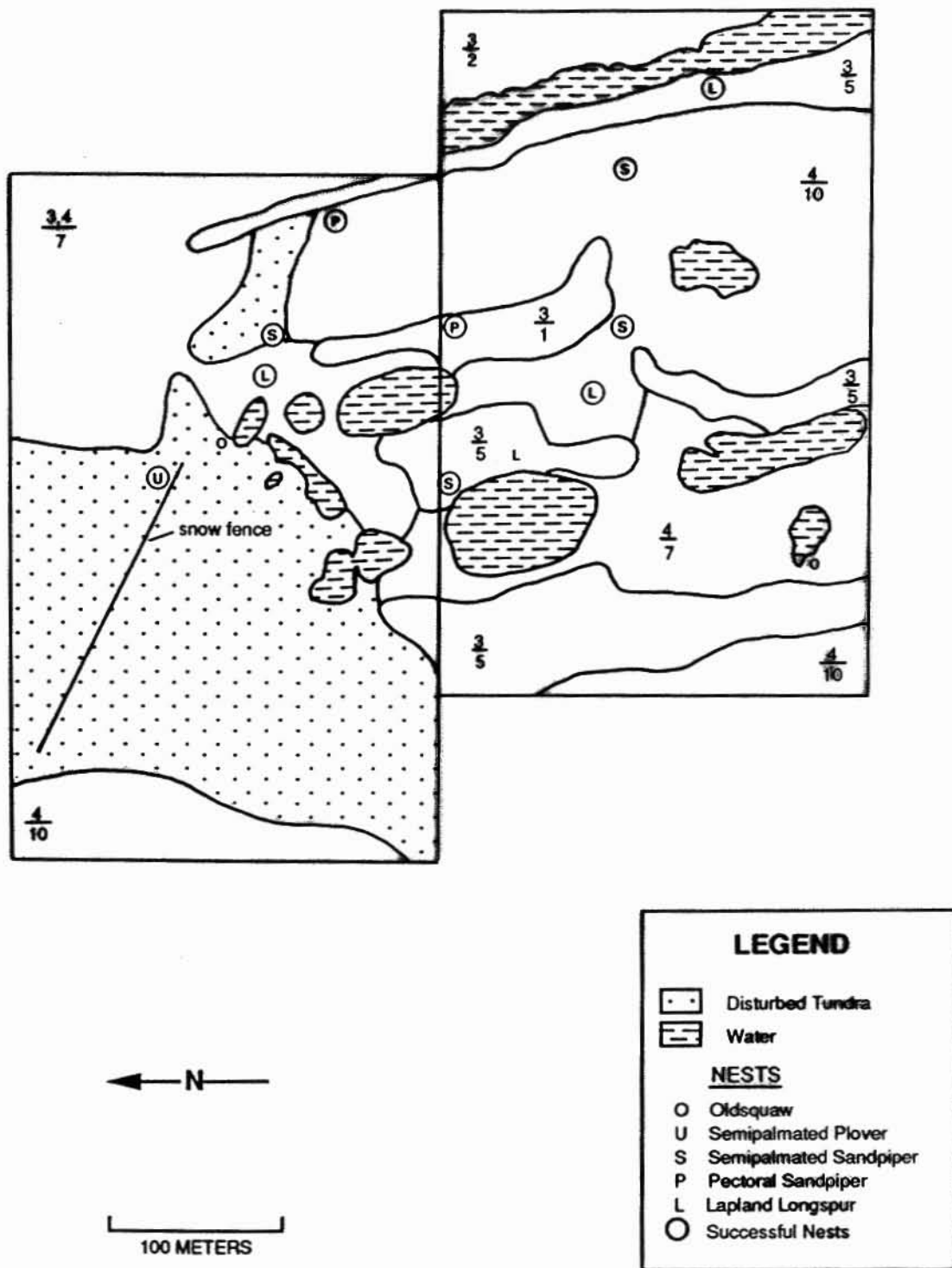


Fig. A-8. Gravel disturbance, nest locations, and geobotanical types of tundra patches on disturbed and undisturbed study plots, Put River 22-33-11-13, Prudhoe Bay, Alaska, 1990.

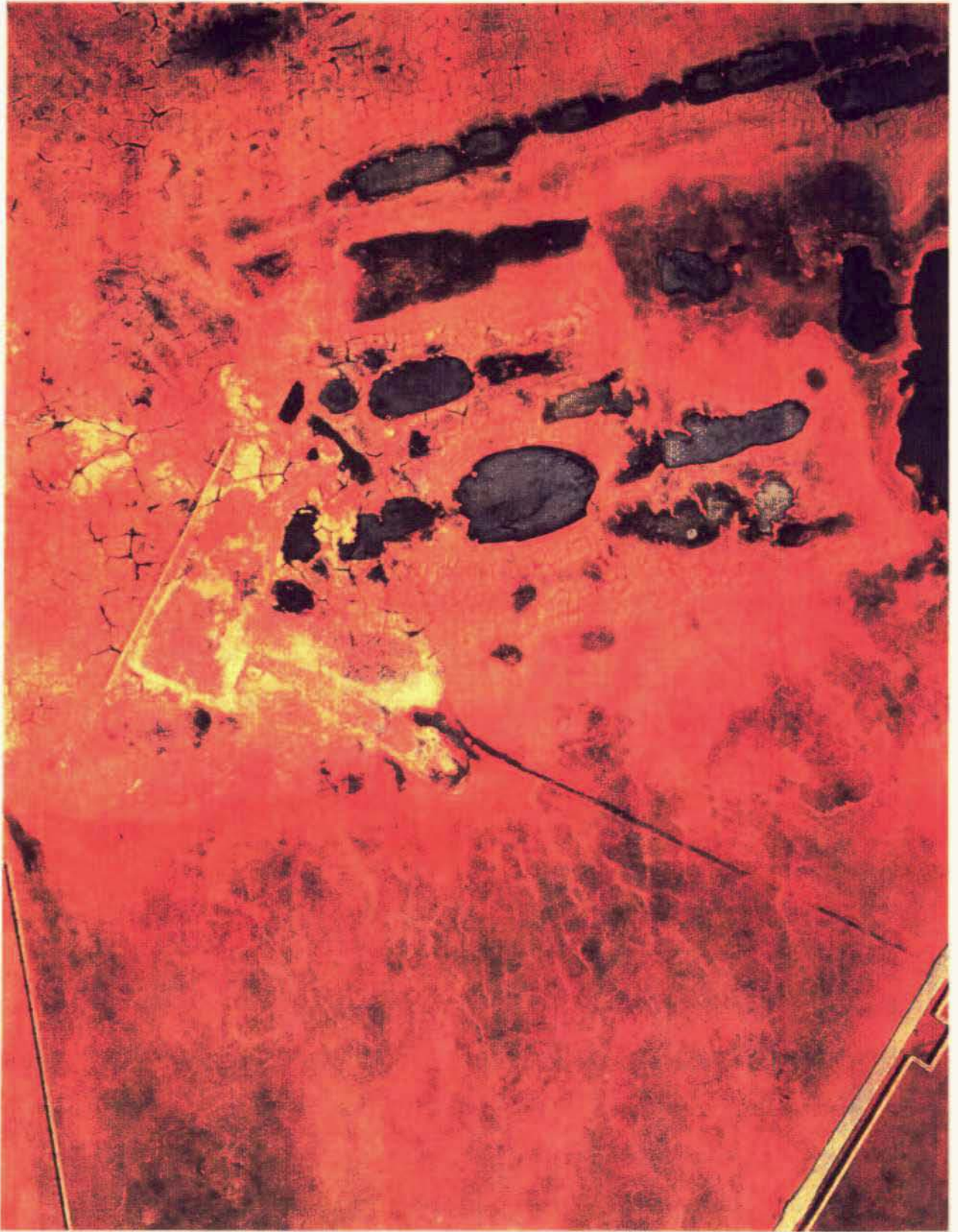




Fig. A-8. Gravel disturbance, nest locations, and geobotanical types of tundra patches on disturbed and undisturbed study plots, Put River 22-33-11-13, Prudhoe Bay, Alaska, 1990.

Nesting

Four species had 8 nests in the undisturbed plot and 5 species had 5 nests in the disturbed plot (Table A-8). Six nests were successful in the undisturbed plot compared to 4 in the disturbed plot. Oldsquaws nested unsuccessfully in each plot. All other species were either shorebirds or longspurs.

The only Semipalmated Plover nest found during this study was located near the snow fence in the disturbed plot. This nest, with 3 eggs, was successful. This species was also known to have nested in this area during the previous year (pers. obs.).

The Oldsquaw nest in the disturbed plot was located among peat clumps on barren ground near the east end of the snow fence. This area became well vegetated with cultivars as the season progressed. The Oldsquaw nest in the undisturbed plot was located on tundra adjacent to a small pond.

Considering this single site, it is difficult to assess the effect of the gravel removal and revegetation program on nesting habitat. Only one bird, an Oldsquaw, nested on the area of gravel removal. The Semipalmated Plover nest was probably just outside the area of the former gravel pad.

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, 1990.

Undisturbed Study Plot				
Species	Successful Nests	Failed Nests	Total Nests	Percent Success
Oldsquaw	0	1	1	0
Semipalmated Sandpiper	3	0	3	100
Pectoral Sandpiper	1	0	1	100
Lapland Longspur	2	1	3	67
Total/Mean	6	2	8	75

Disturbed Study Plot				
Species	Successful Nests	Failed Nests	Total Nests	Percent Success
Oldsquaw	0	1	1	0
Semipalmated Plover	1	0	1	100
Semipalmated Sandpiper	1	0	1	100
Pectoral Sandpiper	1	0	1	100
Lapland Longspur	1	0	1	100
Total/Mean	4	1	5	80

Site 9: Getty State

Location and Access

Getty State (Fig. A-9) is located in the Prudhoe Bay Unit in Sec. 2, T10N, R13E approximately 2 km southwest of A Pad. The closest access is from a gravel road south of A Pad from which Getty State can be seen. It lies approximately 1 km south of this road and can be reached in about 15 minutes on foot.

Description: Disturbed Plot

The well was spudded on December 13, 1975, and suspended on May 11, 1980. The well head consists of a "christmas tree" surrounded by a metal railing located southeast of the reserve pit.

The pad dimensions are approximately 180 m x 65 m. Gravel thickness over most of the pad is approximately 1.5 m. Little thermokarsting is evident other than on a small portion of the pad's western corner where gravel thickness was only about 0.6 m. Several small patches of gravel spray are present around the edges of the pad. A reserve pit attached to the north side of the pad was filled with water and is surrounded by a gravel berm. The gravel disturbance and reserve pit cover approximately 17 percent of the study plot.

The area surrounding the pad is composed of moist and wet graminoid tundra. The landform is primarily low-centered polygons and strangmoor with patches of high-centered polygons and non-patterned ground also present. Extensive thermokarsting has occurred on the tundra north and east of the pad producing deep water-filled troughs. Natural water bodies are present on the western portion of the plot.

Description: Undisturbed Plot

The undisturbed plot is adjacent to the west edge of the disturbed plot. The tundra is composed of moist and wet graminoids. The landform is primarily low-centered polygons and strangmoor with patches of mixed high- and low-centered polygons. A small patch of low-relief high-centered polygons overlaps the disturbed plot at the southern boundary of both plots. This southern boundary is paralleled by a peat road which is about 10 m off the plots. Several ponds are also present.

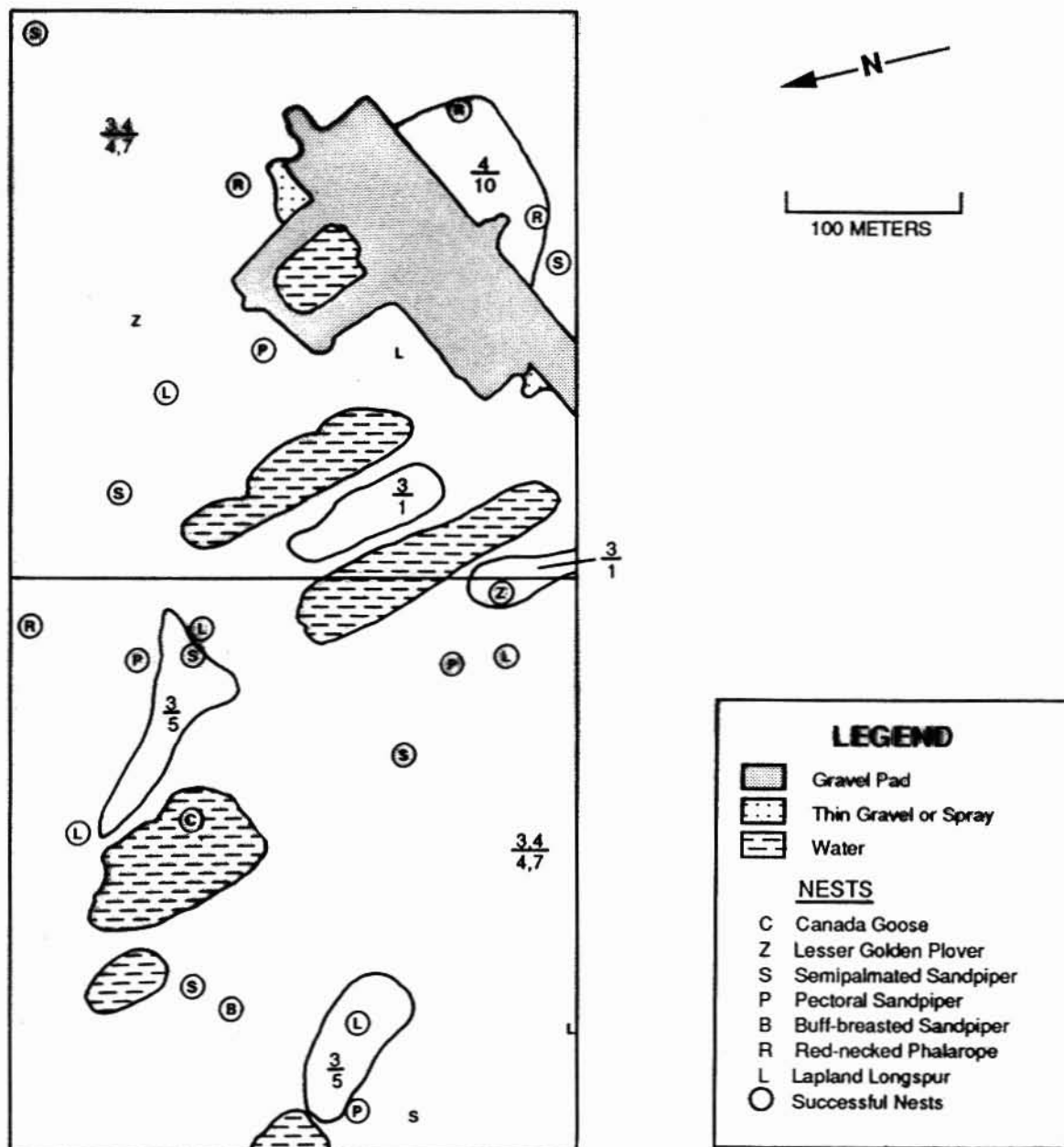
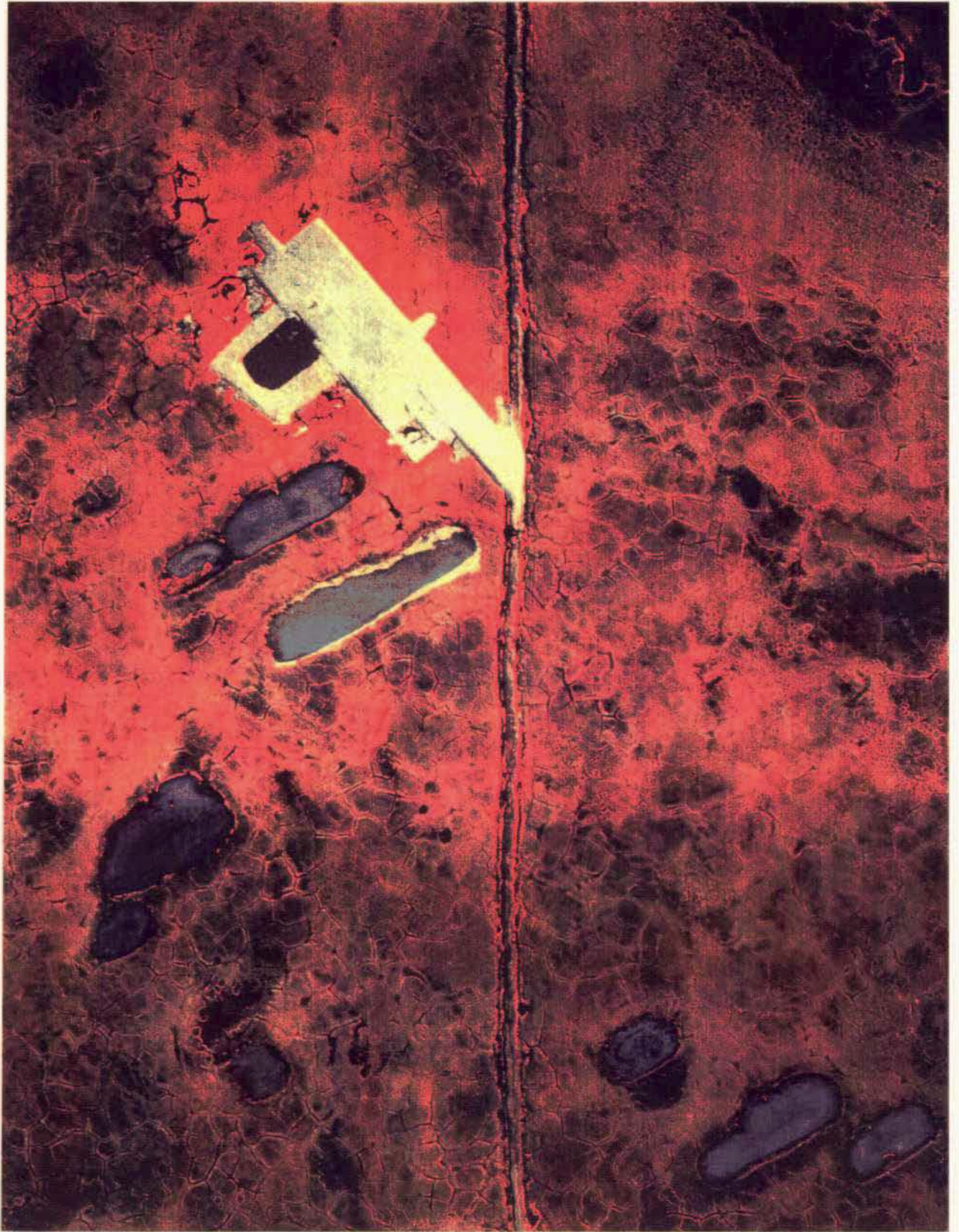


Fig. A-9. Gravel disturbance, nest locations, and geobotanical types of tundra patches on disturbed and undisturbed study plots, Getty State, Prudhoe Bay, Alaska, 1990.



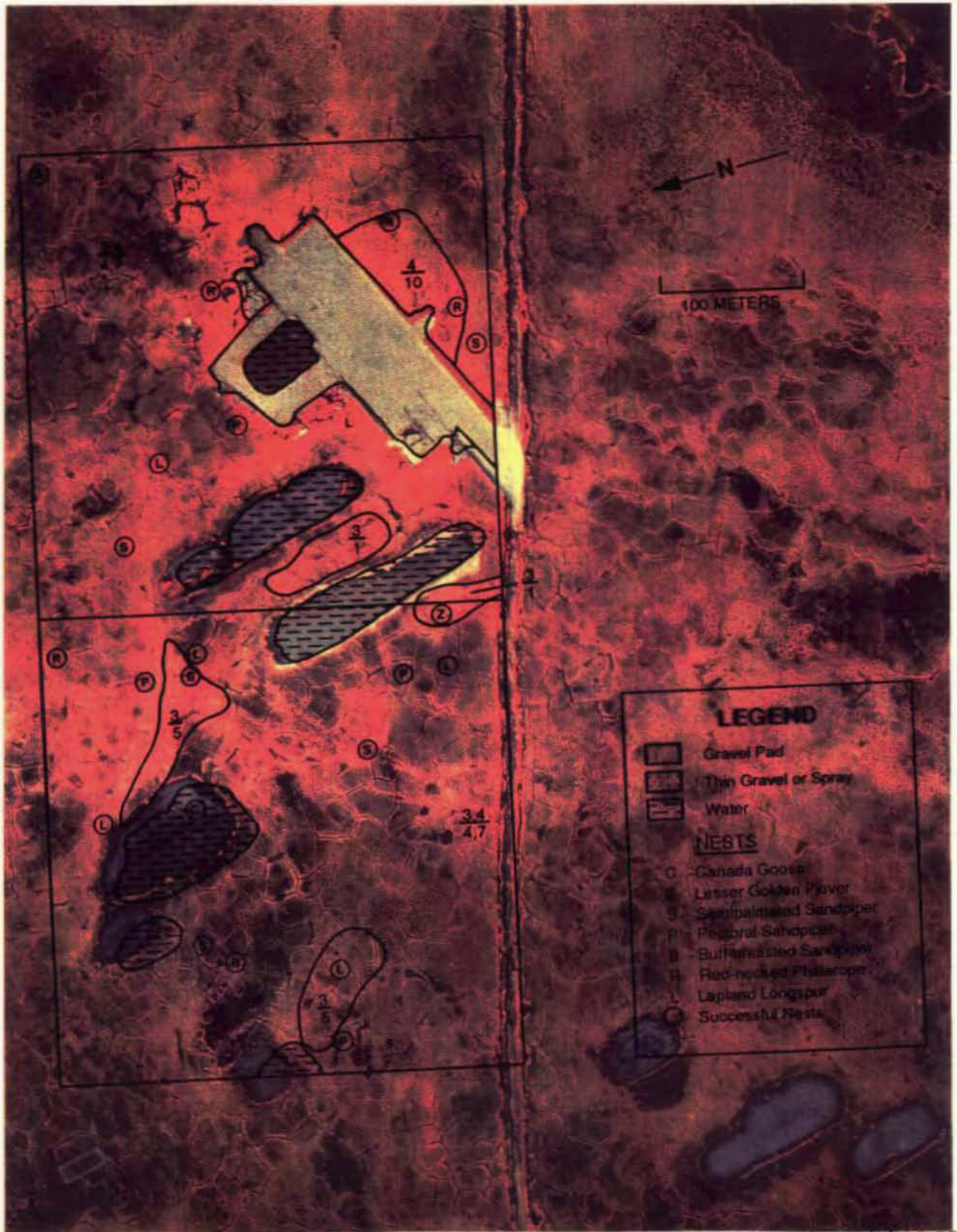


Fig. A-9. Gravel disturbance, nest locations, and geobotanical types of tundra patches on disturbed and undisturbed study plots, Getty State, Prudhoe Bay, Alaska, 1990.

Nesting

Seven species had 16 nests in the undisturbed plot, and 5 species had 10 nests in the disturbed plot (Table A-9). Two nests failed in each plot. All species were either shorebirds or longspurs with the exception of a Canada Goose which nested successfully on an island in a pond in the undisturbed plot.

In the disturbed plot, 3 Red-necked Phalaropes nested on tundra near the pad in areas which had thermokarsted. Several other nests were also located near the gravel pad.

In the undisturbed plot, nests were scattered throughout and were located on all landforms. The Lesser Golden Plover which nested successfully in the southeast corner of the plot may have been a re-nest of the pair that failed in the disturbed plot.

Table A-9. Number of nests and nest success for bird species on disturbed and undisturbed study plots, Getty State, Prudhoe Bay, Alaska, 1990.

Undisturbed Study Plot				
Species	Successful Nests	Failed Nests	Total Nests	Percent Success
Canada Goose	1	0	1	100
Lesser Golden Plover	1	0	1	100
Semipalmated Sandpiper	3	1	4	75
Pectoral Sandpiper	3	0	3	100
Buff-breasted Sandpiper	1	0	1	100
Red-necked Phalarope	1	0	1	100
Lapland Longspur	4	1	5	80
Total/Mean	14	2	16	88

Disturbed Study Plot				
Species	Successful Nests	Failed Nests	Total Nests	Percent Success
Lesser Golden Plover	0	1	1	0
Semipalmated Sandpiper	3	0	3	100
Pectoral Sandpiper	1	0	1	100
Red-necked Phalarope	3	0	3	100
Lapland Longspur	1	1	2	50
Total/Mean	8	2	10	80

Site 10: Put State 1

Location and Access

Put State 1 (Fig. A-10) is in the Prudhoe Bay Unit in Sec. 7, T10N, R14E, about 0.6 km southwest of X pad. There is no road access to the pad, but it can be seen from X pad, and reached in approximately 15 min on foot.

Description: Disturbed Area

The well was spudded on May 12, 1969, and suspended on July 1, 1979. Since then, the well has been plugged and abandoned.

The pad dimensions are approximately 70 m x 160 m. Gravel thickness averages about 1.3 m. Topography is fairly uniform, but some areas exhibit mild thermokarsting. No water was present in thermokarst troughs. The well head is located slightly north of the pad center and consists of a pipe imbedded in a gravel mound. A group of wood pilings is embedded in parts of the western portion of the pad. Some gravel spray is present near the east side of the pad. An old peat road passes through the study plot just north of the pad.

The gravel, gravel spray, reserve pits, and overburden (not including the peat road) cover approximately 18 percent of the disturbed plot. An area of disturbance north of the pad is sparsely vegetated and has scattered vehicle tracks and thermokarsting. Including this area, disturbance covers approximately 26 percent of the disturbed plot. The peat road is not included in this figure because it also passes through the undisturbed plot.

A wide variety of plant species is uniformly distributed over the pad surface; total vegetative cover is approximately 10 percent (Pollard et al. 1990). One *Festuca* sp. is well distributed over the entire pad surface. Mosses are colonizing the thermokarst troughs, and *Carex aquatilis* is growing on the thinner areas of gravel around the edges of the pad. *Salix* spp. and a number of forb species are also common.

A reserve pit bordering the north edge of the pad is filled with water and surrounded by overburden/peat. This pit is being colonized by *Eriophorum vaginatum*, *Carex aquatilis*, and *Arctophila fulva*. Another pit bordering the southwest part of the pad is also water-filled and surrounded by overburden; it is being colonized by *Carex* sp. and *Eriophorum* sp.

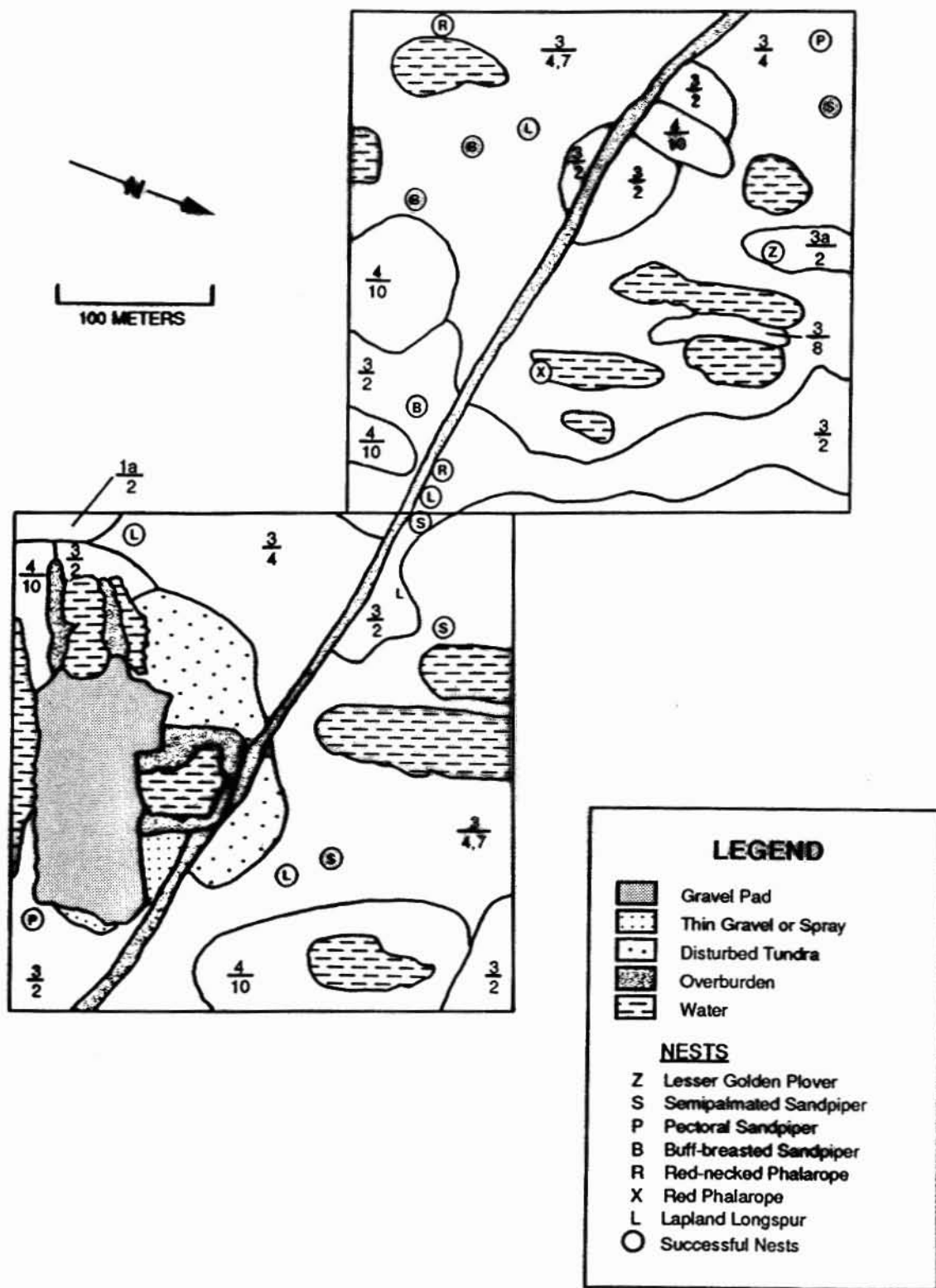
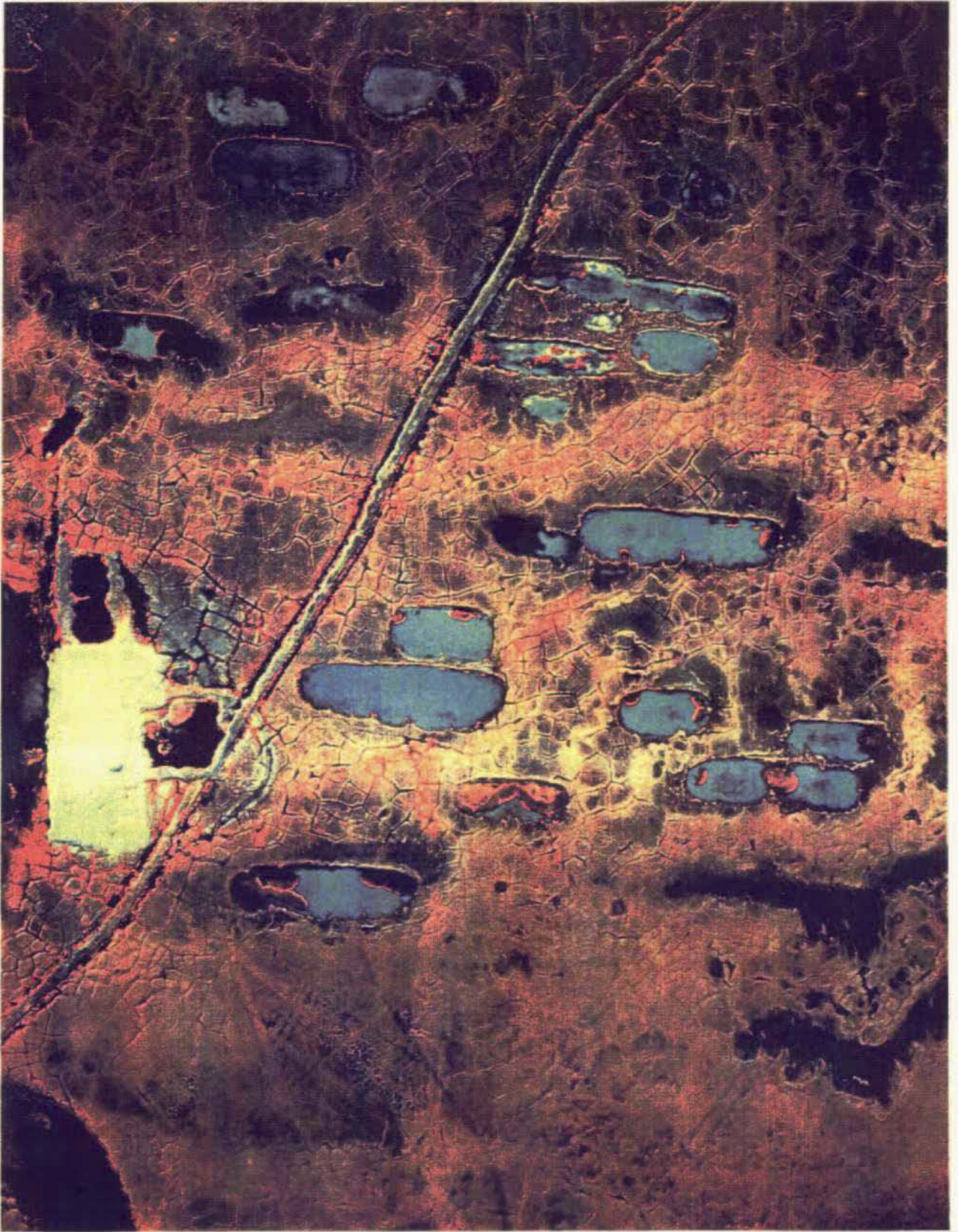


Fig. A-10. Gravel disturbance, nest locations, and geobotanical types of tundra patches on disturbed and undisturbed study plots, Put State 1, Prudhoe Bay, Alaska, 1990.



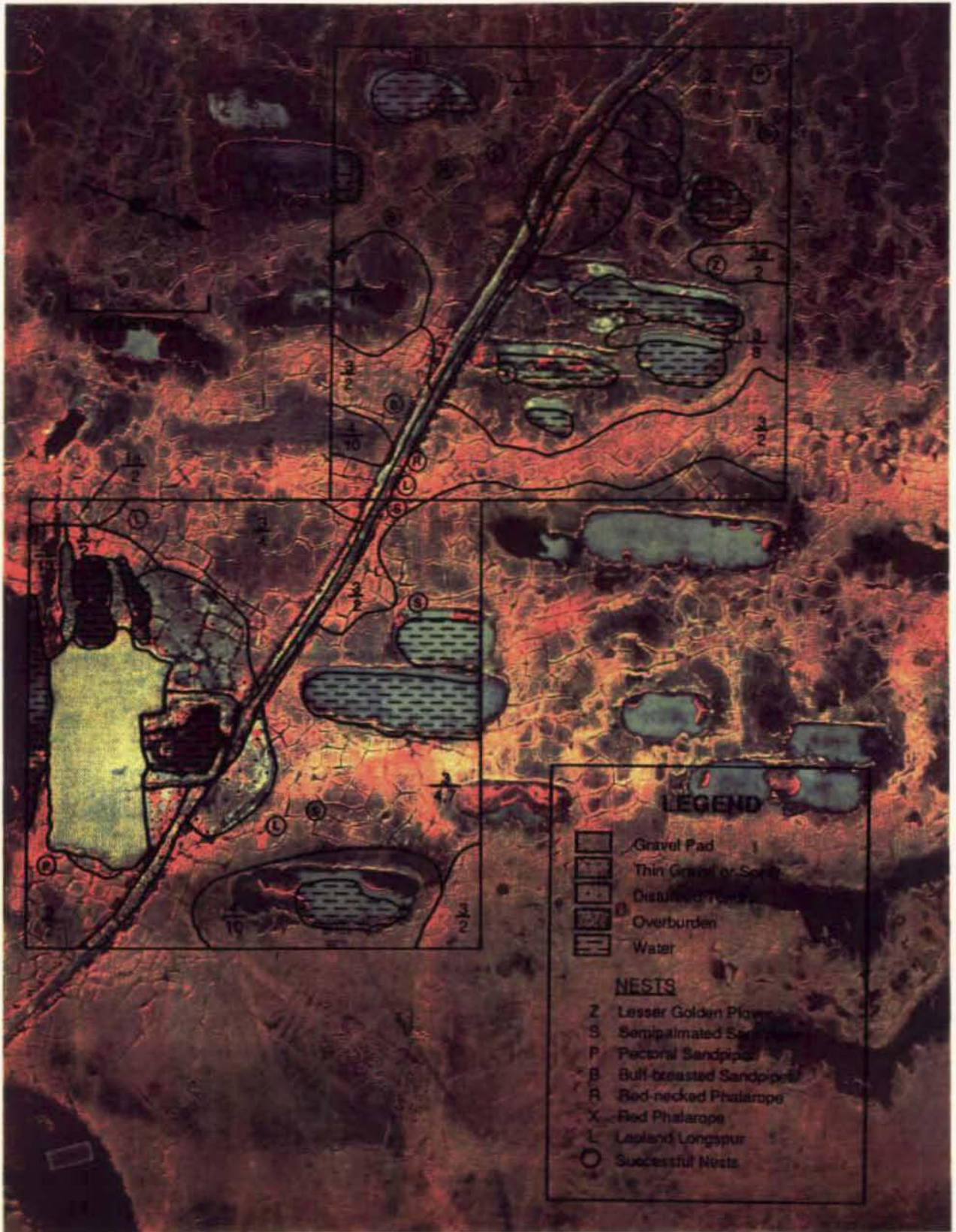


Fig. A-10. Gravel disturbance, nest locations, and geobotanical types of tundra patches on disturbed and undisturbed study plots, Put State 1, Prudhoe Bay, Alaska, 1990.

The area surrounding the pad is primarily composed of moist and wet graminoid tundra; a small patch of prostrate shrub tundra is present in the southwest corner of the plot. The landform is a mixture of low-relief high-centered polygons, low-centered polygons, strangmoor, and non-patterned ground. Several ponds are located throughout the plot.

Description: Undisturbed Plot

The undisturbed plot is adjacent to the northwest corner of the disturbed plot. It was oriented such that the peat road which passes through the disturbed plot would similarly pass through the undisturbed plot, thus creating the same non-gravel disturbance in each.

The undisturbed plot is composed of moist and wet graminoid tundra. The landforms are similar to those of the disturbed plot with the addition of a small hummocky patch in the northcentral portion of the plot. Ponds are also scattered throughout this plot.

Nesting

Seven species had 11 nests on the undisturbed plot, and 3 species had 7 nests on the disturbed plot (Table A-10). All 11 nests in the undisturbed area were successful, and 6 of 7 were successful in the disturbed area. All species were either shorebirds or longspurs.

Two nests in the undisturbed plot seemed to be directly associated with the peat road. A Red-necked Phalarope nested in tundra at the edge of the water-filled peat road ditch, and a longspur nested in a crevice in the bank formed by the peat road ditch and adjacent tundra. These were both located in the southeastern corner of the plot (Fig. A-10). A Semipalmated Sandpiper which nested nearby in the disturbed plot also may have been attracted by the peat road, but its nest was slightly further away and the association was less evident. Peat roads have been shown to attract tundra-nesting birds (Troy 1990).

As was the case with the Red-necked Phalarope mentioned above, the 2 other phalarope nests found were also near water. Both were found in the undisturbed plot.

Three Buff-breasted Sandpipers successfully nested south of the peat road in the undisturbed plot. This was the largest number of nests of this species on any plots in this study.

Table A-10. Number of nests and nest success for bird species on disturbed and undisturbed study plots, Put State 1, Prudhoe Bay, Alaska, 1990.

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

Disturbed Study Plot				
Species	Successful Nests	Failed Nests	Total Nests	Percent Success
Semipalmated Sandpiper	3	0	3	100
Pectoral Sandpiper	1	0	1	100
Lapland Longspur	2	1	3	67
Total/Mean	6	1	7	86

Site 11: Storage Pad

Location and Access

Storage Pad (Fig. A-11) is located in the Prudhoe Bay Unit in Sec. 27, T11N, R14E. It is about 0.3 km east of the north end of Drill Site 7. A gravel road from the pad intersects the southern end of the Drill Site 15 access road at an expansion loop in the pipeline next to the road. Storage Pad can be reached in about 2 min on foot from this point. This pad was not an exploratory well site.

Description: Disturbed Plot

The pad dimensions are approximately 185 m x 80 m. Gravel thickness is approximately 0.5 m over most of the pad. Thermokarsting is well developed and many troughs were filled with water, particularly on the southern portion. Plant colonization has occurred over the entire pad and is most pronounced on the southern portion. (For a list of plants identified at this site see Table B-1, Appendix B). Part of the gravel access road and a patch of gravel spray are also included in the disturbed plot. The gravel disturbance covers approximately 17 percent of the plot.

The area surrounding the pad is composed of moist and wet graminoid tundra. The landform is varied and includes well defined high-centered polygons, low-centered polygons, mixed high- and low-centered polygons, strangmoor, frost-boil tundra, and non-patterned ground. Ponds are well distributed throughout the the plot.

Description: Undisturbed Plot

The undisturbed plot is located approximately 0.3 km west of the disturbed plot. It lies about 100 m west of the north end of Drill Site 7. It is composed of moist and wet graminoid tundra. The landform includes low-centered polygons, strangmoor, frost boil tundra, and non-patterned ground. A portion of an oxbow pond is located on the eastern portion of the plot.

Nesting

Five of 7 nests in the undisturbed plot were successful, and 6 of 8 nests were successful in the disturbed plot (Table A-11). Each plot had 4 species which were all either shorebirds or longspurs.

In the disturbed plot, a Baird's Sandpiper nested unsuccessfully on the southern portion of the gravel pad. The clutch had 3 eggs. At least 3 individual

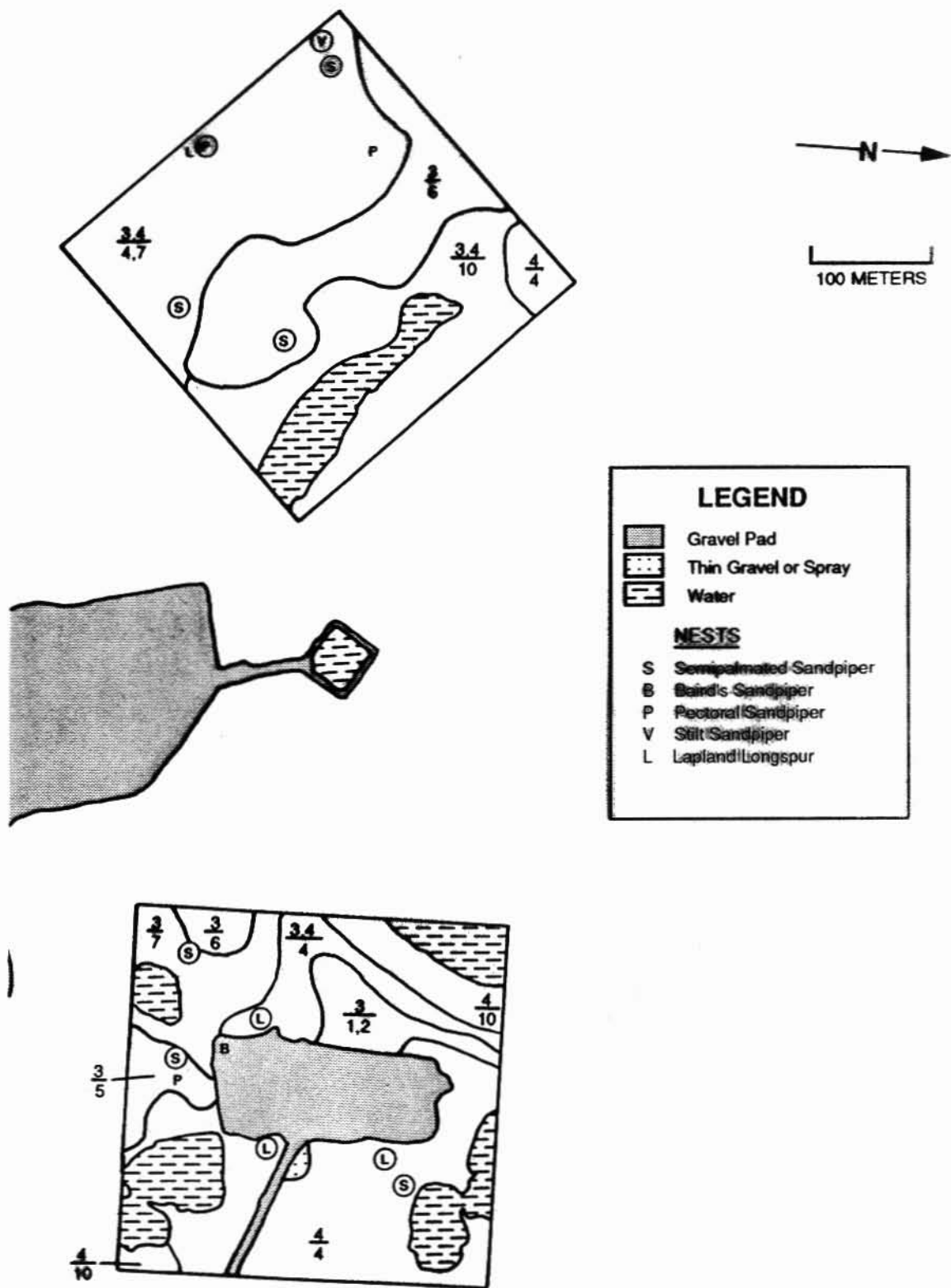


Fig. A-11. Gravel disturbance, nest locations, and geobotanical types of tundra patches on disturbed and undisturbed study plots, Storage Pad, Prudhoe Bay, Alaska, 1990.



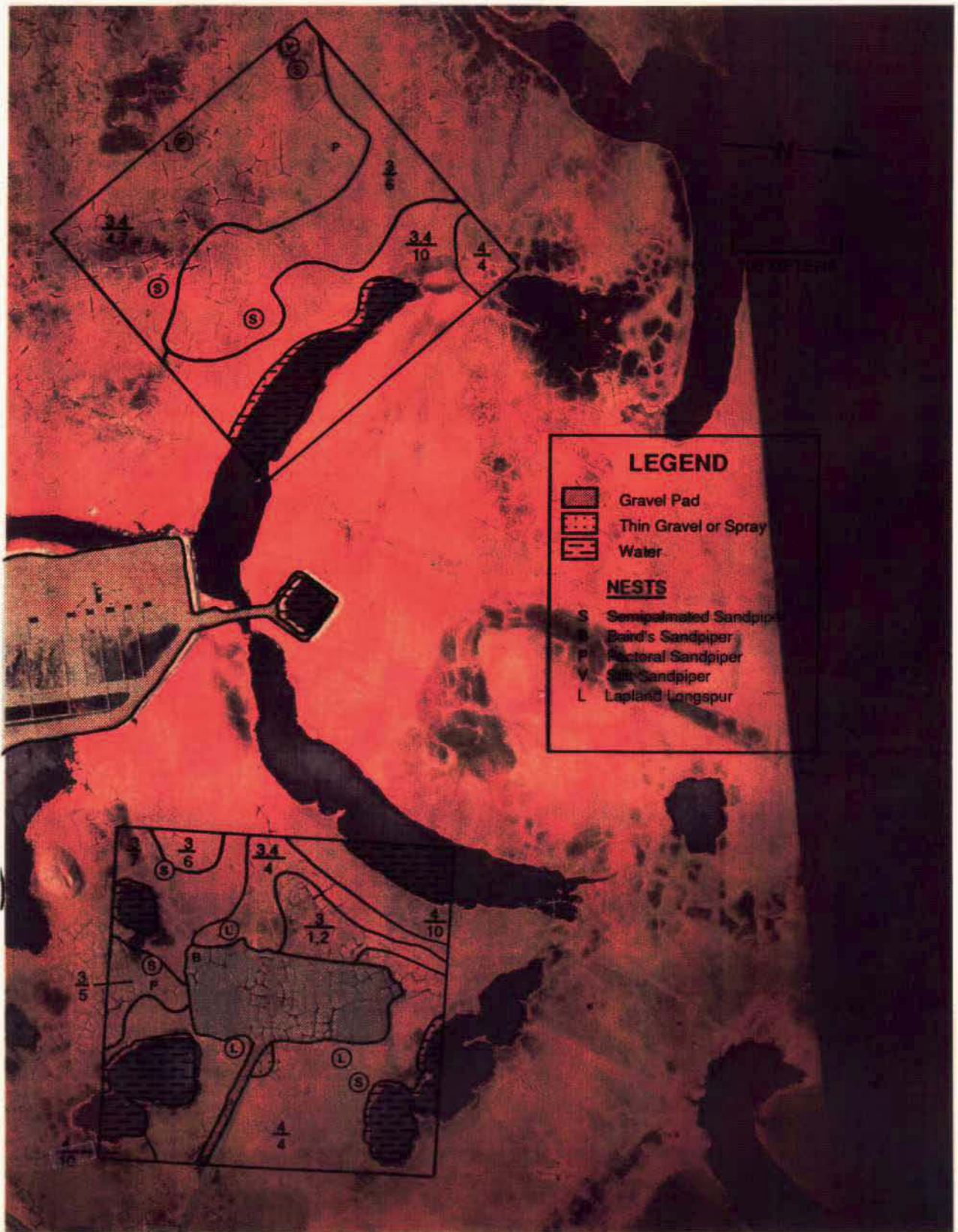


Fig. A-11. Gravel disturbance, nest locations, and geobotanical types of tundra patches on disturbed and undisturbed study plots, Storage Pad, Prudhoe Bay, Alaska, 1990.