FINAL REPORT
2 May 2002

Small Mammal Trapping in the Prudhoe Bay Oilfield, Summer 2001

Prepared for

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ABSTRACT

There have been few small mammal studies in the Prudhoe Bay region of the Alaskan Arctic Coastal Plain. This pilot study was conducted to determine small mammal species composition, abundance, and habitat use in the Prudhoe Bay region. Between 26 June and 12 September 2001, trapping was conducted at two plots (Plot 1 was a 2 ha plot composed of natural tundra, and Plot 2 a 1.1 ha plot located on a revegetated site), adjacent to X Pad in the Western Operating Area of the Prudhoe Bay oilfield. Animals were live-trapped and tagged subcutaneously with passive integrated transponder (PIT) tags for identification when recaptured. A total of 11,841 trap checks occurred using 335 traps during 3 sampling sessions in 2001. The sampling effort yielded a total of 31 small mammal captures of 16 individuals (0.26 captures per 100 trap checks). Plot 1, the tundra site, had a capture effort of 0.3 captures/100 trap checks. Plot 2, the revegetated site, had a capture effort of 0.09 captures/100 trap checks. Five species were captured including collared lemming (*Dicrostonyx groenlandicus*), brown lemming (*Lemmus sibiricus*), tundra vole (*Microtus oeconomus*), arctic shrew (*Sorex arcticus*), and common or masked shrew (*Sorex cinereus*). Although the small mammal population was relatively diverse in the study area, the number of captures was low, which limited the ability to accurately estimate population size.

Key words: Arctic Coastal Plain, arctic shrew (*Sorex arcticus*), brown lemmings (*Lemmus sibiricus*), collared lemmings (*Dicrostonyx groenlandicus*), common shrew (*Sorex cinereus*), mark-recapture study, microtine rodents, and tundra vole (*Microtus oeconomus*).

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INTRODUCTION

Small mammals, such as lemmings (*Lemmus* and *Dicrostonyx* species), are an important food source for many arctic predators, including arctic foxes (*Alopex lagopus*), snowy owls (*Nyctea scandiaca*), short-eared owls (*Asio flammeus*) and jaegers (*Stercorarius* spp.) (Pitelka et al. 1955, Pitelka 1957, Chesemore 1968, Eberhardt et al. 1983). Some small mammal populations, most notably the brown lemming, are cyclic with average periodicity estimated at 3-4 years (Pitelka 1957; Krebs 1963, 1964; Pitelka 1973; Krebs and Myers 1974). Predator populations may fluctuate in relation to the microtine rodent populations in predator-prey cycles (Pitelka et al. 1955, Burgess 2000). During periods of low lemming abundance, increased predation on nesting waterfowl and shorebirds may affect these avian species.

Despite the importance of small mammals to predator populations, information on the population trends, distribution, habitat use, and diversity of small mammals on the Arctic Coastal Plain of Alaska between the Colville and Canning rivers is limited. Gavin (1980) reported qualitative observations of lemming cycles in the Prudhoe Bay area by characterizing high and low lemming years. Brink (1978) studied small mammal populations in the Franklin Bluff area south of Prudhoe Bay. Feist (1975) investigated microtine population trends in 1971 and 1972 in the Prudhoe Bay region and compared microtine abundance in the Prudhoe Bay area with that of the Barrow region. Additional small mammal data have been collected opportunistically during studies investigating den use by arctic foxes on the Colville River delta and in the Prudhoe Bay area (Eberhardt et al. 1983, Garrott et al. 1983) and during shorebird studies at Point McIntyre (TERA 1992).

In the past, anecdotal evidence, such as the estimated abundance of predators (i.e., snowy owls and pomarine jaegers), has been used as an index of microtine abundance and the stage of microtine population cycles. However, lemmings display wide variation in local densities and the relative use of different habitats may change depending on population density and time of the year (Pitelka 1957, Feist 1975, Babcock 1986). Anecdotal information for lemming populations in the Prudhoe Bay area has been published (Gavin 1980), although the timing of the microtine population cycles in the Prudhoe Bay area has not.

Microtines are known to use disturbed habitats in developed areas (McKendrick 2000). Disturbed areas include sites of current industrial activities and areas undergoing remediation, such as old gravel pads, airstrips, and peat roads. In the Prudhoe Bay area with oilfield development, little information is available on microtine population cycles or habitat use of disturbed habitats.

Study Rationale

To understand the relationship between small mammals, predators, and habitat use, more baseline information on microtine populations is needed. Although oilfield development and infrastructure have increased since the early 1980s (BPXA 2001), small mammal studies have been limited in scale in relation to this development in the Prudhoe Bay region. This pilot study was conducted to investigate small mammal species, which are important components of the North Slope food web. Information on the diversity and cyclic nature of small mammal populations in the Prudhoe Bay area may allow us to more accurately predict annual variation in microtine rodent populations and the effect of these fluctuations on predator populations and competing herbivores.

In addition, the restoration and revegetation of plant cover to natural conditions on disturbed sites, such as gravel pads, impoundments, and roads is an important issue for oilfield operators. Wildlife use of these disturbed habitats is one important facet of the restoration issue. Studies of wildlife interactions, including small mammals, within revegetated habitat, even at the pilot study stage, may be beneficial to oilfield developers.

Understanding the relationship between microtine rodents, their predators, and their preferred habitats may help wildlife managers and oilfield developers mitigate wildlife impacts during planning of oilfield developments.

OBJECTIVES

The objectives of this study were:

- To determine small mammal diversity and abundance in the Prudhoe Bay region, and
- To document small mammal use of a revegetated area.

STUDY AREA

The study area was located north of X Pad in the Western Operations Area of the Prudhoe Bay Unit on the Alaska North Slope (long 148°39'W lat 70°14'N; Figure 1). Landform characteristics were generally flat tundra with low-centered polygons; however, there were small areas of drier high-centered polygons. Primary habitat in Plot 1 was classified as a Moist/Wet Tundra complex by Walker (1983; Figure 2). Plants in this moist, patterned ground complex included *Carex aquatilis*, *Eriophorum angustifolium*, *Dupontia fisheri*, and *Poa arctica*.

In the late 1980s X Pad was expanded to accommodate production needs. In 1989, the original flare pit was removed to accommodate pad enlargement, which had been abandoned. Gravel from the old pit was removed and the area was revegetated in 1989 and 1990 with *Arctagrostis latifolia*, *Poa glauca*, and *Festuca rubra* (J. McKendrick, Lazy Mountain Research, pers. comm.). Since then, *Dupontia fisheri* and *Arctophila fulva* have naturally invaded the wet sites of the pit, while *Puccinellia angustata* and *P. borealis* have invaded the drier sites (Figure 3). Primary habitat in Plot 2 was classified as a Wet Tundra Complex (Walker 1983).

METHODS

Plot Design

Two study plots were established in the study area. Plot 1 measured approximately 150 m x 150 m (2 ha) and was located approximately 300 m north of X Pad to facilitate accessibility to the plot, yet limit the potential disturbance (i.e., noise, road and dust activity) of facility activities on small mammals (Figure 1). Plot 1 was established to determine small mammal species diversity and abundance. Plot 2 was located in the revegetated area formerly occupied by the old flare pit and was approximately 100 m x 110 m (1.1 ha; Figure 4). The primary goal of Plot 2 was to document small mammal use in a revegetated area.

A trapping grid was established in each study plot. Trapping stations were located every 10 m and marked with a numbered piece of orange flagging. Plots 1 and 2 contained 225 and 110 trapping stations, respectively.

One live trap was placed within 1 m of each station (Figure 5). Live traps were aluminum Sherman folding live trap (3 x 3.5 x 9 in [H.B. Sherman Traps, Inc., Tallahassee, FL]). Cottonballs were placed in each trap as bedding to minimize stress to captured animals (Rexstad 1996). Sunflower seeds were provided as an energy source (E. Rexstad, University of Alaska-Fairbanks, pers. comm.). A sheet of waterproof felt roofing paper (12 in x 12 in) was placed over each trap to protect captured animals from rain and heat (Figure 6).

Small Mammal Sampling

Plot 1 was sampled 3 times during summer 2001; 26 June to 1 July (Session 1), 20 to 24 July (Session 2), and 7 to 12 September (Session 3). Plot 2 was added after Session 1 and was sampled during Sessions 2 and 3. Sampling periods during Sessions 1 and 3 lasted five days. Session 2 was four days. Traps were checked 3 times daily - morning (0600), afternoon (1400), and evening (2000) to reduce stress and injury to captured animals. Species, sex, weight, general body condition, reproductive status, and location were recorded for each trapped animal (Figure 7).

Trapping effort, measured as a "trap check," was defined as the number of physical checks of the traps for small mammals. For example, in this study traps were checked 3 times daily, thus for each trap there were 3 daily trap checks. Trapping effort for this study was recorded as the number of captures per 100 trap checks.

In the event that a sufficient number of individuals were captured to accurately estimate small mammal population abundance, mark/recapture methodology was used (White et al. 1982). After physical characteristics of captured animals were recorded, a passive integrated transponder (PIT) tag, to identify recaptured individuals, was inserted subcutaneously between the animal's shoulder blades using a 12-guage needle injector. To reduce the potential for infection the needle was cleaned with a betadine solution prior to injection and covered with antibiotic cream during injection. Recaptured animals were scanned with a Biomark Mini-portable reader to identify PIT tag codes (tag model #: TX1400L, size 11.5 mm x 2 mm; 125-kHz; Biomark, Boise, ID).

RESULTS

A total of 11,841 trap checks were recorded from Plots 1 and 2 during 3 sampling sessions. The sampling effort yielded 31 small mammal captures that included

16 individuals of 5 species, approximately 1 capture for every 380 traps checked (Tables 1 and 2). Species captured included the collared lemming, brown lemming, tundra vole (*Microtus oeconomus*), arctic shrew (*Sorex arcticus*), and common, or masked shrew (*Sorex cinereus*). In addition, 2 Lapland longspurs (*Calcarius lapponicus*) were captured in Plot 1.

Plot 1

In Session 1 (26 June to 1 July), 10 individual small mammals were captured during 24 capture events (10 initial captures, 14 recaptures), in 3375 trap checks. Six small mammals were captured only once, while 4 individuals were recaptured during the sampling session. A male collared lemming and a male brown lemming were each recaptured once, a female brown lemming was recaptured 3 times, and a female tundra vole was recaptured 9 times (Figure 8).

During Session 2 (20 to 24 July), only 2 juvenile Lapland longspurs were captured. The birds were released unharmed. A total of 2700 trap checks occurred during Session 2.

During Session 3 (7 to 12 September), 5 small mammals were captured in Plot 1, during 3600 trap checks. No individuals marked in Session 1 were captured during Session 3. One male collared lemming was captured twice. One brown lemming, 1 arctic shrew, and 1 common shrew were each captured once during the third sampling session. Both shrews were trap mortalities.

Trapping effort in Plot 1 for all trapping sessions combined was 0.3 captures per 100 trap checks. Trapping effort for microtine rodents, (i.e., brown and collared lemmings and tundra voles) was 0.28 captures per 100 trap checks (Table 3).

Plot 2

Sampling for Plot 2 was conducted only during the second and third trapping sessions. During Session 2, 406 trap checks occurred from the nearly completed plot containing 85 traps. One arctic shrew was captured. In Session 3, 1760 trap checks occurred from the completed plot containing 110 traps and one tundra vole was captured. Both animals recorded in Plot 2 were captured at trapping stations on the outer edge of the plot where revegetated habitat was next to undisturbed tundra habitat. No other small mammal activity or evidence was observed at the inner stations during the trapping sessions.

Evidence of winter use (i.e., old nests and runways) was noted in portions of Plot 2, near undisturbed tundra, $\leq$ 10 m from the outside edge of the plot and in the standing vegetation along the pad edge. This is the same area where the arctic shrew and tundra vole were captured.

Trapping effort in Plot 2 for both trapping sessions combined was 0.09 captures per 100 trap checks. Trapping effort for microtine rodents was 0.05 captures per 100 trap checks (Table 3).

DISCUSSION

Small Mammal Population Estimate and Abundance

During 2 years of study in the Prudhoe Bay area, Feist (1975) reported that the number of captures of microtines was low, ranging from 0 to 8 individuals per trapping session on 0.25 ha study plots. The number of individuals captured in the current study ranged from 0 to 10 individuals per trapping session, although the study plot sizes (2 ha and 1.1 ha) were much larger than those of Feist (1975). Capture numbers were too low in the current study to accurately calculate a population estimate for any small mammal species.

There has been speculation that small mammal populations throughout the North Slope region may not fluctuate equally in size. The area near Barrow has been known for its pronounced microtine fluctuations (Thomson 1955a, 1955b; Bee and Hall 1956; Pitelka 1957; Pitelka 1973; Pitelka and Batzli 1993). However, in other North Slope regions, such as the Prudhoe Bay area and the Arctic National Wildlife Refuge, microtine population fluctuations do not appear to be as pronounced (Feist 1975; Babcock 1985, 1986). Feist (1975) concluded that the impact of lemmings on the ecosystem appeared to be very small in the Prudhoe Bay area compared to other regions of the North Slope.

In some studies, it appeared that microtine population sizes affected trapping effort. Trapping effort increased during an apparent microtine population decline in the Prudhoe Bay area and the Colville River Delta during the 1970s (Garrott et al. 1983, Eberhardt et al. 1983). Perhaps, high trapping effort for microtines in Plot 1 implied that the microtine population size was small. It is unknown whether the high trapping effort was the result of a cyclic population decline or due to naturally low numbers in the area.

Species Composition

Bee and Hall (1956) reported that 9 species of small mammals, such as microtine rodents and shrews, were distributed throughout the Arctic Coastal Plain. The present study documented 5 small mammal species in the study area. Previous studies had only documented the presence of collared and brown lemmings in the

Prudhoe Bay region, but did not report the presence of voles or shrews (Feist 1975, Eberhardt et al. 1983, Garrott et al. 1983, D. Troy, TERA, pers. comm.). However, vole and shrew specimens have been collected at the Kuparuk oilfield and on the Colville River delta for the mammal collection at the University of Alaska-Fairbanks Museum (Gordon Jarrell, UAF Museum, pers. comm.).

Stage of Population Cycle

To monitor small mammal population fluctuations and determine the timing of the population cycles, population estimates need to be recorded over numerous consecutive years. This pilot study was a one-year effort and no inferences can be made about microtine population cycles in the Prudhoe Bay region.

Small Mammal Use of Revegetated Areas

McKendrick (2000) noted that small mammals use disturbed habitats in the Prudhoe Bay oilfields. Lemmings grazed wet-sedge reseeded areas in old exploration sites and used peat roads (old winter haul roads) during the winter months. McKendrick (2000) reported that lemmings also graze new growth in oiled areas after remediation where oiled vegetation has been burned. Burning removes the oil and stimulates new growth.

The presence of undisturbed habitat adjacent to the revegetated habitat of Plot 2 may have created an edge effect, accounting for the captures near the edge of the plot. Animals using the undisturbed moist/wet tundra may have ventured into the edges of the revegetated habitat in search of food. In addition, standing water in the old X Pad flare pit may have limited small mammal movements through Plot 2 in September. Due to a shortened trap effort and small sample size, little can be inferred with small mammal use of the revegetated areas of the old X Pad flare pit. McKendrick (2000) stated that geese and caribou are attracted to recovering sites, selectively grazing in certain areas. Small mammal use of revegetated areas is not as well documented, but they are presumably an important component influencing succession as well.

A focused study addressing small mammal use of habitat in disturbed and revegetated sites within the oilfields may allow wildlife managers and oilfield developers to appropriately investigate comparisons of small mammal use of natural sites, restored sites and unrestored sites. This is an important issue for oilfield operators, especially as the North Slope oilfields age and the need increases for restoring and revegetating disturbed sites.

CONCLUSIONS

As a pilot study, this project yielded some limited insights on the small mammal populations of Prudhoe Bay. Although the small mammal population was relatively diverse in the study area, the number of small mammal captures was too low to accurately estimate population size, determine the stage of population cycles, or document habitat use in the X Pad revegetated area. In addition, small mammal abundance and density may not be as pronounced in the Prudhoe Bay regions as in other areas of the Arctic Coastal Plain.

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LITERATURE CITED

Babcock, C.A. 1985. Microtines and ground squirrels of the coastal plain of the Arctic National Wildlife Refuge: notes on distributions, densities, and general ecology. U.S. Fish and Wildlife Service ANWR Progress Report, No. FY85-15.

Babcock, C.A. 1986. Vegetation patterns and microtine rodent use of tundra habitats in northeastern Alaska. M.S. Thesis, University of Alaska, Fairbanks. 72 p.

Bee, J.W. and E.R. Hall. 1956. Mammals of Northern Alaska. University of Kansas, Mus. Nat. Hist. Misc. Pub. 8, 309 p.

BPXA (BP Exploration (Alaska) Inc. 2001. Oil and Gas Development. Technical Brief: *Alaska's North Slope Oilfields.* 4 p.

Brink, K.L. 1978. The effects of the Trans-Alaska oil pipeline on breeding bird and microtine rodent populations at Franklin Bluffs, Alaska. M.S. Thesis, University of Montana, Missoula. 108 p.

Burgess, R.M. 2000. Arctic Fox. Pages 159-178 *in* J.C. Truett and S.R. Johnson (eds.). The Natural History of an Arctic Oilfield. Academic Press, San Diego, California.

Chesemore, D.L. 1968. Notes on the food habits of arctic foxes in northern Alaska. Can. J. Zool. 46:1127-1130.

Eberhardt, L.E., R.A. Garrott, and W.C. Hanson. 1983. Den use by arctic foxes in northern Alaska. J. Mamm. 64(1):97-102.

Feist, D. D. 1975. Population studies of lemmings in the coastal tundra of Prudhoe Bay, Alaska. Pages 134-143 *in* J. Brown, ed. Ecological investigations of the tundra biome in the Prudhoe Bay region, Alaska. Biol. Pap. Univ. Alaska, Fairbanks. Spec. Rept. No. 2.

Garrott, R.A., L.E. Eberhardt, and W.C. Hanson. 1983. Summer food habits of juvenile Arctic foxes in northern Alaska. J Wildl. Manage. 28:358-363.

Gavin, A. 1980. An Arctic coastal Environment, Prudhoe Bay, Alaska. Presented to the 2nd symp. On Management, conservation and utilization of the Coastal Zone. Nov. 17-20, 1980. Presented for Atlantic Richfield Company, Anchorage, Alaska.

Krebs, C.J. 1963. Lemming cycle at Baker Lake, Canada, during 1959-1962. Science 140:674-676.

Krebs, C.J. 1964. The lemming cycle at Baker Lake, Northwest Territories, during 1959-1962. Arct. Inst. No. Am. Tech. Pap. No. 15:1-72.

Krebs, C.J., and J.H. Myers. 1974. Population cycles in small mammals. Adv. Ecol. Res. 8:267-399.

McKendrick, J.D. 2000. Vegetative responses to disturbance. Pages 35-56 *in* J.C. Truett and S.R. Johnson (eds.). The Natural History of an Arctic Oilfield. Academic Press, San Diego, California.

Pitelka, F.A. 1957. Some characteristics of microtine cycles in the Arctic. Pages 73-88 *in* H.P. Hansen (ed.), Arctic Biology. Corvallis: Oregon State University Press.

Pitelka, F.A. 1973. Cyclic pattern in lemming populations near Barrow, Alaska. Arct. Inst. N. Amer., Techn. Papers 25:199-215.

Pitelka, F.A. and G.O. Batzli. 1993. Distribution, abundance and habitat use by lemmings on the North Slope of Alaska 1973. Pages 213-236 *in* The Biology of Lemmings (Linnean Society Symposium Series, No 15). London: the Linnean Society of London.

Pitelka, F.A., P.Q. Tomich, and G.W. Treichel. 1955. Breeding behavior of jaegers and snowy owls near Barrow, Alaska. Condor 57(12):3-18.

Rexstad, E.A. 1996. Small mammal sampling protocol for long-term ecological monitoring program, Denali National Park and Preserve. Fairbanks, Alaska. 32 p.

TERA (Troy Ecological Research Associates). 1992. Trends in bird use of the Point McIntyre Reference Area 1981-1991. Report prepared for BP Exploration (Alaska) Inc., by Troy Ecological Research Associates, Anchorage, Alaska. 60 p.

Thompson, D.Q. 1955a. Ecology of the Lemmings. Final report, Arctic Institute of North America. 63 p.

Thompson, D.Q. 1955b. The ecology and population dynamics of the brown lemming (Lemmus trimucronatus) at Point Barrow, Alaska. Ph.D. Thesis, University of Missouri. 138 p.

Walker, D.A. 1983. A hierarchical tundra vegetation classification especially designed for mapping in northern Alaska. Pages 1332-1337 *in* Permafrost: Fourth International Conference Proceedings, July 17-23, 1983, Fairbanks, AK. National Academy Press, Washington, D.C.

White, G.C., D.R. Anderson, K.P. Burnham, and D.L. Otis. 1982. Capture-recapture and removal methods for sampling closed populations. Los Alamos National Laboratory. LA-8787-NERP, Los Alamos, NM. 235 p.

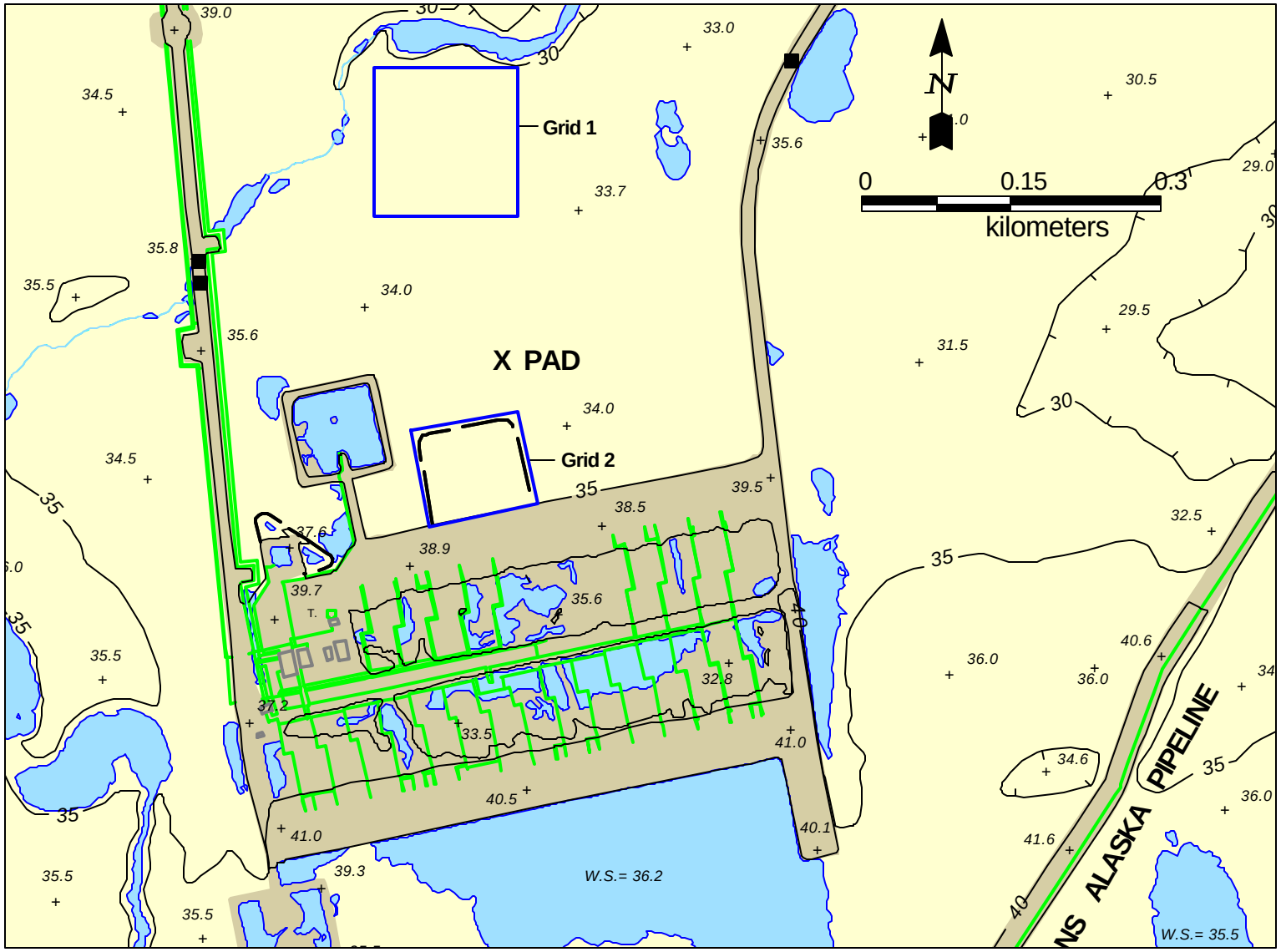

Figure 1. Location of small mammal trapping Plot 1 and Plot 2 in relation to X Pad, Prudhoe Bay oilfield, Alaska, summer 2001.

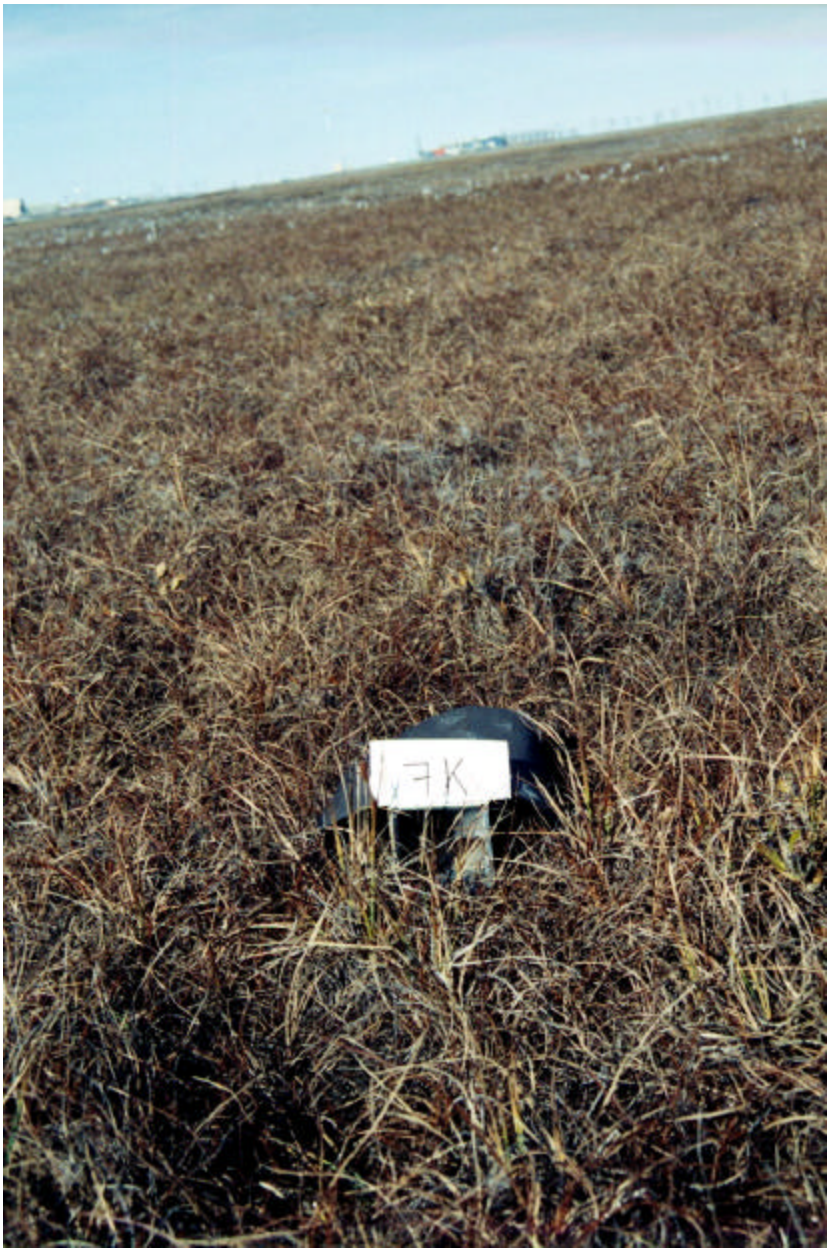

Figure 2. Live trap with cover on moist/wet turndra complex (Walker 1983) habitat at Station 7K, Plot 1, Prudhoe Bay oilfield, Alaska, August 2001.

Figure 3. A vew of the revegetated flare pit looking north from X Pad, Prudhoe Bay oilfield, Alaska, August 2001. Natural tundra (moist/wet tundra complex) is to the left. The flare pit area was classified as wet tundra complex.

Figure 4. Small mammal trapping habitat at Plot 1 looking south to Plot 2 (X Pad is in the background), Prudhoe Bay oilfield, Alaska, August 2001.

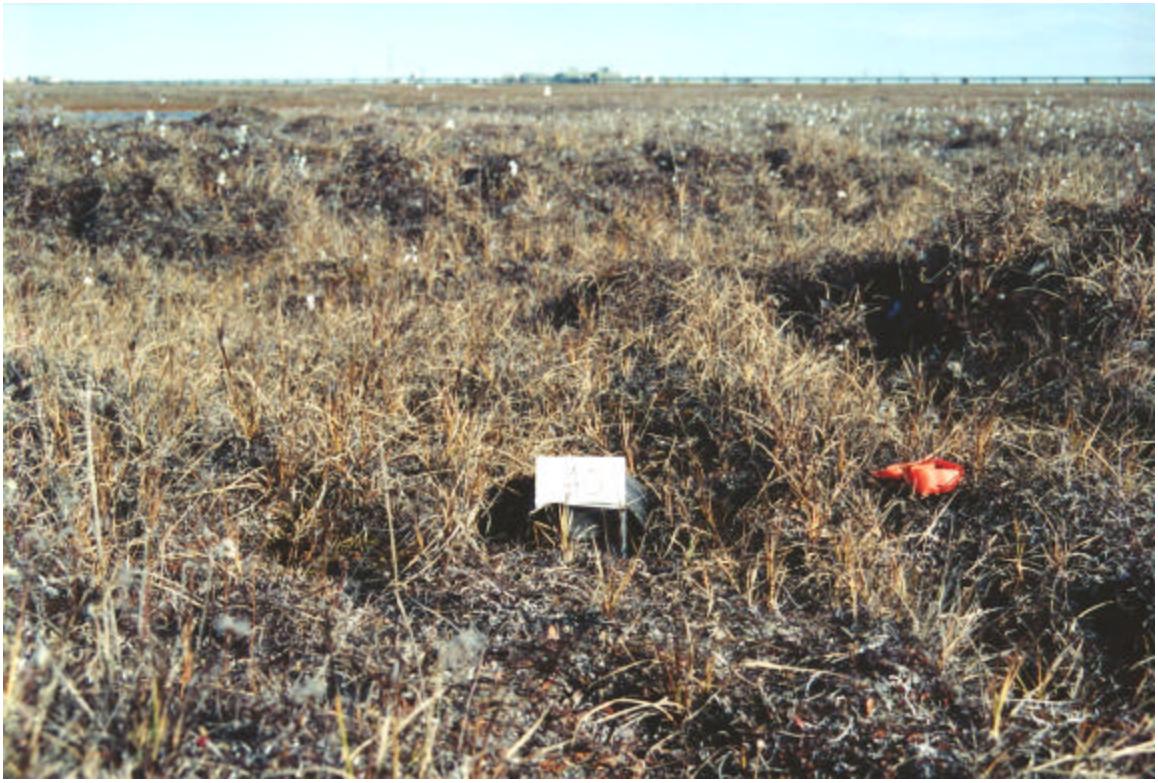

Figure 5. Station 4O on Plot 1 was located in a small area of moist/dry tundra consisting of high centered polygons, X Pad, Prudhoe Bay oilfield, Alaska, August 2001.

Figure 6. A trapping station located along a natural runway, X Pad, Prudhoe Bay oilfield, Alaska, August 2001.

Figure 7. Trapping equipment, including small mammal trap and passive integrated transponder receiver, used on X Pad trapping plots, Prudhoe Bay oilfield, Alaska, August 2001.

Figure 8. Brown lemming captured on X Pad, Plot 1, Prudhoe Bay oilfield, Alaska, August 2001. Animals were scanned with a PIT tag receiver to identify previously coded individuals.

Table 1. Numbers of small mammals captured on two trapping plots near X Pad, Prudhoe Bay oilfield, Alaska, Summer 2001.

	Trapping Session			
	26 June to 1 July 2001	20 July to 24 July 2001	7 September to 12 September 2001	Sessions 1 to 3 combined
	Number of Small Mammals Caught			
Plot 1				
Collared lemming	5	0	1	6
Brown lemming	3	0	1	4
Tundra vole	2	0	0	0
Arctic shrew	0	0	1	1
Common shrew	0	0	1	1
(New)	10	-	4	14
(Recaptures)	14	-	1	15
Total Captures for Plot 1	24	0[a]	5	29
Plot 2[b]				
Collared lemming	-	0	0	0
Brown lemming	-	0	0	0
Tundra vole	-	0	1	1
Arctic shrew	-	1	0	1
Common shrew	-	0	0	0
(New)	-	1	1	2
(Recaptures)	-	0	0	0
Total Captures for Plot 2	-	1	1	2

[a] Two Lapland longspur juveniles were captured during Trapping Session 2 in July 2001.

[b] Sampling effort at Plots 1 and 2 was unequal.

Table 2. Small mammal data collected on two trapping plots near X Pad, Prudhoe Bay oilfields, Alaska, Summer 2001.

Capture number	Trapping Session	Date	Time	Grid	Capture location	Species[a]	Sex	Weight (g)	PIT Tag #	Capture	Comments
1	1	26 June	2000	1	10F	BRLE	F	46	43180F043F	New	Lactating
2	1	27 June	600	1	10M	TUVO	F	37	43192D5E5E	New	Non-lactating
3	1	27 June	600	1	4G	BRLE	F	61	431C050570	New	Lactating (pregnant)
4	1	27 June	1500	1	11L	TUVO	F	26	43192D5E5E	Recapture	
5	1	27 June	2000	1	13J	BRLE	M	44	431B681356	New	
6	1	27 June	2000	1	8L	TUVO	F	36	43192D5E5E	Recapture	
7	1	27 June	2000	1	7K	COLE	M	39	431818073B	New	Testes not distended
8	1	28 June	600	1	13J	BRLE	F	50	43180F043F	Recapture	
9	1	28 June	600	1	11L	TUVO	F	32	43192D5E5E	Recapture	
10	1	28 June	1500	1	13J	BRLE	F	52	43180F043F	Recapture	
11	1	28 June	1500	1	11L	TUVO	F	34	43192D5E5E	Recapture	
12	1	28 June	1500	1	8L	TUVO	F	28		New	Mortality
13	1	28 June	2030	1	6O	COLE	F	37	431A567E70	New	
14	1	28 June	2030	1	13G	BRLE	F	41	43180F043F	Recapture	
15	1	29 June	630	1	13J	BRLE	M	30	431B681356	Recapture	Lethargic
16	1	29 June	630	1	11L	TUVO	F	35	43192D5E5E	Recapture	
17	1	29 June	2030	1	8L	TUVO	F	36	43192D5E5E	Recapture	
18	1	29 June	2030	1	8I	COLE	M	37	431838417B	New	
19	1	29 June	2030	1	6O	COLE	M	35	431A1E721A	New	Scanner not working
20	1	30 June	630	1	7O	COLE	F	76	431C116815	New	Pregnant
21	1	30 June	1430	1	12M	TUVO	F	39	43192D5E5E	Recapture	
22	1	30 June	2000	1	8L	TUVO	F	37	43192D5E5E	Recapture	
23	1	01 July	630	1	8L	TUVO	F	28	43192D5E5E	Recapture	
24	1	01 July	2030	1	4O	COLE	M	39	431A1E721A	Recapture	
25	2	22 July	2030	1	5A	LALO	-	-	-	-	Lapland Longspur juvenile
26	2	24 July	630	1	4D	LALO	-	-	-	-	Lapland Longspur juvenile
27	3	08 September	630	1	11F	ARSH	M	7	-	New	Arctic shrew mortality
28	3	08 September	1400	1	13J	COSH	F	3	-	New	Common shrew mortality
29	3	08 September	2000	1	11M	COLE	M	28	431B7F3C0D	New	
30	3	09 September	630	1	9F	BRLE	F	16	4318205524	New	Juvenile
31	3	09 September	1400	1	9J	COLE	M	28	431B7F3C0D	Recapture	
32	2	23 July	1500	2	10K	ARSH	-	-	-	New	Escaped before measurements
33	3	12 September	630	2	2J	TUVO	-	-	-	?	No measurements taken

[a] COLE: collared lemming, BRLE: brown lemming, TUVO: tundra vole, ARSH: arctic shrew, COSH: common shrew, LALO: lapland longspur

Table 3. Number of trap checks, small mammal captures, and trapping effort on two study plots near X Pad, Prudhoe Bay oilfield, Alaska, Summer 2001.

	No. of trap checks	Number of small mammal captures (number of captures per 100 trap checks)		
		Microtines[a]	Other small mammals[b]	All small mammals[c]
Plot 1				
Session 1	3375	24	0	24
Session 2	2700	0	0	0
Session 3	3600	3	2	5
Total	9675	27 (0.28)	2 (0.02)	29 (0.29)
Plot 2				
Session 1	-	-	-	-
Session 2	406	0	1	1
Session 3	1760	1	0	1
Total	2166	1 (0.05)	1 (0.05)	2 (0.09)

[a] includes collared lemming, brown lemming, and tundra vole

[b] includes arctic shrew and common shrew

[c] includes collared lemming, brown lemming, tundra vole, arctic shrew, and common shrew