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ARCTIC FOX DEN DISTRIBUTION AND ACTIVITY BETWEEN THE SAGAVANIRKTOK RIVER AND THE STAINES RIVER, ALASKA, SUMMER 2000

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BP EXPLORATION (ALASKA) INC.
P.O. Box 196612
900 East Benson Blvd.
Anchorage, Alaska 99519-6612

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ARCTIC FOX DEN DISTRIBUTION AND ACTIVITY BETWEEN THE SAGAVANIRKTOK RIVER AND THE STAINES RIVER, ALASKA, SUMMER 2000

by

Craig J. Perham

LGL ALASKA RESEARCH ASSOCIATES, INC.
1101 East 76th Avenue, Suite B
Anchorage, Alaska 99518

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ABSTRACT

Potential development of oil and gas reserves in the Point Thomson Unit (PTU) prompted an evaluation of arctic fox den site distribution and occupancy in the region. The objectives of this study were to identify active and inactive den sites, locate suitable denning habitat in the PTU, and mark foxes for future assessment. Thirty-three arctic fox (*Alopex lagopus*) den sites between the Sagavanirktok and Staines Rivers (the Badami and Bullen to Staines study areas), including the PTU, were surveyed by helicopter in July 2000 to quantify and characterize dens. Sixteen dens (48%) were inactive (i.e., unoccupied) and 17 dens (52%) were active (i.e., occupied). Two active dens (6%) had been abandoned earlier in the season. Seven of 33 dens were located in the PTU (4 active, 3 inactive). Five of 33 were new dens located during July 2000. The proportion of active dens in 2000 (52%) and in 1999 (45%) were similar indicating that the fox population was probably stable in the survey area. Suitable denning habitat along streams and coastal areas was documented during an aerial search in the PTU. Four foxes were live-captured and marked in early September 2000 to determine presence/absence of rabies and study den site fidelity in future years. Results of rabies tests were not yet available.

Key words: *Alopex lagopus*, Arctic Coastal Plain, fox den density, Point Thomson Unit

INTRODUCTION

This 2-year study documented arctic fox (*Alopex lagopus*) dens between the Sagavanirktok and Staines rivers (the Badami and Bullen to Staines study areas) and suitable denning habitat in the Point Thomson Unit (PTU), a smaller portion of the overall study area between the Sagavanirktok and Staines rivers, prior to oil and gas development in the PTU. We included the region west of the PTU (between the Sagavanirktok River and Bullen Point) to compare the distribution and activity of fox dens throughout the area.

Arctic fox den locations and condition of the den site are important factors that can affect productivity and survival of fox populations (Chesemore 1969; Garrott et al. 1983; Smith et al. 1992). Macpherson (1969) suggested that the proportion of dens containing pups can measure reproductive success. Foxes generally selected elevated den sites with well-drained, warmer, sandy soils, (e.g., pingos or streambanks) throughout the Arctic Coastal Plain (Chesemore 1969; Smith et al. 1992; Burgess 2000). Foxes also preferred large, old dens with south-facing burrow entrances once a location has been selected (Smits et al. 1988; Burgess 2000). Preferred fox den sites can be used annually and may be hundreds of years old (Macpherson 1969).

Arctic foxes on the North Slope of Alaska exhibit seasonal movements beginning September through November, when they disperse to sea ice, and from March to April when they return inland to den (Chesemore 1968; Bannikov 1970; Eberhardt et al. 1983a). During winter, straight-line movements by foxes can be greater than 1000 km across pack ice (Macpherson 1969; Wrigley and Hatch 1976; Eberhardt and Hansen 1978). Drifting pack ice can displace foxes far from their previous summer ranges and natal dens, although some foxes may return to their breeding areas (Macpherson 1968; Eberhardt et al. 1983b).

Arctic foxes are opportunistic predators, adaptable to changing environmental conditions. Arctic foxes are able to exploit man-made structures as denning sites (Eberhardt et al. 1982; Burgess et al. 1993). Supplemental food sources (e.g., garbage) may also affect regional fox populations (Eberhardt et al. 1983a; Ballard et al. 2000). Recently, the availability of garbage in the Prudhoe Bay Oil Field (PBOF) complex was suspected to have increased arctic fox densities by increasing over-winter survival and productivity and limiting winter movements (Eberhardt et al. 1983a; Burgess 2000; Ballard et al. 2000). However, lack of pre-development demographic data in the PBOF has made it difficult to determine the causes of fluctuations in the arctic fox population.

Potential development of oil and gas reserves in the Point Thomson Unit, located approximately 100 km east of the PBOF on the Arctic Coastal Plain, prompted an assessment of arctic fox den site distribution and occupancy between the Sagavanirktok

and Staines rivers, including the PTU (Fig. 1). Operators of oil and gas developments on Alaska's North Slope have been concerned with human/fox interactions since the late 1970s (Eberhardt et al. 1982). High fox densities caused by human development can increase predation on tundra-nesting shorebirds and waterfowl (Quinlan and Lehnhausen 1982; Johnson et al. 1993a,b; Samelius and Alisauskas 2000) and facilitate the transmission of disease epizootics, such as rabies (Dieterich and Ritter 1982; Ritter and Follmann 1995; Robards et al. 1996; Ballard et al. 2001). In addition, government agencies have expressed concerns about increasing fox numbers near developments (Martin 1997).

Previous investigations of fox den activity have been concentrated in the PBOF region, where pre-development data on fox populations were lacking (Eberhardt et al. 1983a,b; Garrott et al. 1983; Garrott et al. 1984; Burgess and Banyas 1993; Burgess et al. 1993; Rodrigues et al. 1994; Ballard et al. 2000). Earlier surveys had identified 28 arctic fox dens between the Sagavanirktok and Staines rivers (east of the PBOF) (Quimby and Snarski 1974; WCC and ABR 1983; Burgess and Banyas 1993; Rodrigues et al. 1994). However, no extensive enumeration of dens throughout this area has occurred until this study.

Prior to this study, only 2 fox dens had been located in the Point Thomson Unit. In 1983, WCC and ABR (1983) conducted arctic fox den surveys throughout the PTU for initial environmental baseline information. They located 1 active and 1 inactive den during the summer of 1983. In 1999, Perham (2000) also found only 2 den sites in the PTU, presumably the same two dens. However, it was believed that additional suitable denning habitat existed in the PTU, and a more thorough search was necessary to document suitable denning habitat and den sites within the PTU prior to development.

Fox den location and den activity data from the Sagavanirktok to Staines rivers could help assess and mitigate potential impacts to regional fox populations from the development of the Point Thomson Unit. Potential impacts include: 1) loss of natural den sites due to placement of production and operation facilities; 2) increased fox/human interactions and potential disease transmission; 3) increased productivity and over-winter

survival due to supplemental food availability; and 4) increased den site availability in man-made structures.

Objectives

The objectives of this study were:

- To determine the location and status of arctic fox dens between the Sagavanirktok River and the Staines River, including the PTU, thereby providing predevelopment data.
- To add to the long-term geographic database of fox den sites on the Alaska North Slope.
- To identify suitable fox denning habitat in the PTU.
- To live capture and mark arctic foxes to determine site fidelity of individual foxes to den sites or summer ranges.

STUDY AREA

The study area was located on Alaska's North Slope from the Sagavanirktok River east to the Staines River (long 148°05'W to long 146°00'W) and from the Beaufort Sea coast south to lat 70°00'N. The study area of approximately 1700 km^2 (Fig. 1) was divided into 2 sub-areas: the Bullen to Staines Study Area [640 km^2], formerly the Point Thomson Study Area (Perham 2000) located between Bullen Point and the Staines River, and the Badami Study Area [1060 km^2] located between the Sagavanirktok River and Bullen Point. Perham (2000) described the study areas in detail. The Point Thomson Unit was contained within the Bullen to Staines Study Area. Although the PTU contains portions of the Beaufort Sea and the Barrier Islands, most notably Flaxman Island, only the mainland portion of the PTU (180 km^2) was included in this study.

METHODS

Den Site Reconnaissance

Arctic fox den site reconnaissance was conducted from a Bell 206 Long Ranger helicopter on 10, 11, and 12 July 2000. All 28 previously identified den sites between the east channel of the Sagavanirktok River and the Staines River were visited to document

current den activity and characteristics. Coordinates for all den site locations were determined using a Garmin® XL12 Global Positioning System (GPS) receiver. Evidence of human-generated refuse (e.g., food wrappers, styrofoam cups and blocks, rubber, wood by-products, and other non-food items) was documented. Distances from fox dens to developed sites or temporary human camps were also recorded. These areas included airstrips, exploration gravel pads, industrial sites (i.e., the Badami development), or research camps present at the time of the study. Approximate distances of dens from the developed Prudhoe Bay region were also calculated by using the distance from the Deadhorse Airport, located on the eastern edge of the PBOF.

A den site was defined as "active" if it was occupied by foxes during the spring/summer 2000 season. Occupation was determined by the presence of adult foxes or kits at the den, or indirectly by evidence of arctic foxes, such as fresh scat, fresh diggings, recent fox tracks, fresh prey remains, molted winter hair or odor in den entrances (Chesemore 1969; Burgess et al. 1993). Dens lacking physical evidence of recent activity and occupancy were considered "inactive." Changes in den characteristics from 1999 to 2000, such as new entrances or collapsed burrows, were recorded. Dens that appeared to be active earlier in the season, but inactive at the time of the survey, were defined as abandoned. These dens were previously termed "active/inactive" in Perham (2000). Abandoned dens were considered active because of potential use as natal dens earlier in the season.

Habitat and land features at the site, approximate den age, and orientation of entrances were recorded at newly discovered den sites. Dens not exhibiting a specific orientation were categorized as having an open exposure. Number of entrances, amount of vegetation on the den site, extent of the burrowing system, and number of collapsed burrows (after Macpherson 1969) were used to classify den age into one of four categories: youthful, mature, old, and senile. Youthful dens were characterized by few burrows with sparse vegetation, while mature dens exhibited no collapsed burrows and a moderate vegetation mat. Old dens had extensive collapsed burrows and a well-developed grass mat, and senile dens were unoccupied with a heavily collapsed burrow system.

Aerial Search for Denning Habitat in the Point Thomson Unit

To identify suitable denning sites in the PTU, we selectively searched specific landform types in the PTU. Arctic foxes use various elevated habitat features for their den sites (Macpherson 1969; Garrott 1980; Eberhardt et al. 1983b; Garrott et al. 1983; Smits et al. 1988). Because den site selection was correlated with certain landforms, Smith et al. (1992) suggested that maps or photos could be used to identify potential denning habitat. Aerial photos were examined to identify landforms in the PTU that could provide potential fox denning habitat. In the PTU, these landforms included stream corridors, lake margins, coastlines, and elevated areas. Areas identified as having suitable denning habitat were then ground-truthed using a helicopter (Bell 206 Long Ranger) with 3 observers flying at 100m AGL on 11 and 12 July 2000. When new dens were located, we landed at the den site and recorded den activity and characteristics.

Live-capture of Arctic Foxes

A pilot study was conducted to examine den site fidelity of individual foxes. Foxes were live-trapped at 7 active den sites from 31 August through 5 September 2000. One to 3 Havahart® box traps (Woodstream Corp., Lititz, PA.; 42 in x 15 in x 15 in) were placed at each den site (Fig. 2). Canned fish was used as bait. Traps were checked daily and traps were reset after a capture if additional foxes were using the den site.

Captured foxes were immobilized with Ketamine (11-18 mg/kg) and xylazine (6-10 mg/kg). Standard body measurements and weight were recorded for each fox and 5 to 6 ml of blood was collected to test for the presence of rabies antibodies (Eberhardt et al. 1982; E. Follmann pers. comm.). Each fox was then fitted with a two-toned color-coded collar. The upper portion of the collar was color-coded to the specific den site where the animal was captured, while the lower portion was color-coded to the age of the animal (juvenile: red or adult: blue). Live-captured animals were observed until the drug effects decreased, and then released.