



**BIRD USE OF
ABANDONED GRAVEL PADS
IN
ARCTIC ALASKA**

1990 FINAL REPORT

BY

LGL ALASKA RESEARCH ASSOCIATES, INC.
4175 TUDOR CENTRE DR. SUITE 101
ANCHORAGE, ALASKA 99508

FOR

BP EXPLORATION (ALASKA) INC.
900 E. BENSON BLVD.
ANCHORAGE, ALASKA 99519

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Executive Summary

In 1989, BP Exploration (Alaska) Inc. and LGL Alaska Research Associates, Inc., initiated a series of studies of wildlife use of disturbed habitats in Arctic Alaska. A major goal of these studies was to assess the impacts of gravel fill on the wildlife community in and around the Prudhoe Bay oil field and to collect information useful for rehabilitating habitats affected by gravel fill. The findings of the 1989 work (Pollard et al. 1990) indicated that abandoned gravel pads were used by wildlife to a surprising extent. Levels and types of uses varied by species and habitat type, but gravel pads almost always attracted more individuals per time period than did undisturbed tundra plots.

Findings of the 1989 research, and agency interest in the research results, suggested that the use by birds of gravel fill sites warranted more detailed analysis. Studies were modified in 1990 to this end. One experiment (the "nesting study") was designed to explore the effects of abandoned gravel pads on the nesting density, success, and diversity of tundra-nesting bird species. Another experiment (the "post-breeding observational study") was designed to compare several different microhabitat types present on and adjacent to abandoned gravel pads in terms of their post-breeding use by bird species.

For the nesting study, thirteen study sites were used for most comparisons; at each site a biologist laid out a 10-hectare plot surrounding an abandoned gravel pad and another one on adjacent undisturbed tundra. On average, gravel covered approximately 25 percent of the area of the disturbed plots. Data on bird nesting densities, nesting success, and species diversity within plots were collected, and comparisons were made between disturbed and undisturbed plots. Results of the nesting study indicated that:

- Overall, more nests were initiated on undisturbed plots (153) than on disturbed plots (128), but the difference between the two in mean nest densities was not statistically significant.
- Most of the undisturbed plots had more nests than did corresponding disturbed plots, although at four sites the disturbed plots had more nests.
- There were 105 successful nests in the disturbed plots and 111 in the undisturbed plots. Thus, overall nest success was higher in disturbed plots (82 percent) than in undisturbed plots (73 percent), but this difference was not statistically significant.

- More species nested in the disturbed plots (16) than in the undisturbed plots (13). There was no significant difference between disturbed and undisturbed plots in a commonly-used index of diversity (Shannon) that incorporated both numbers and relative abundances of species.
- More nests of moderately abundant species were found in undisturbed plots, but more nests of uncommon species (species with fewer than 3 nests total) were found in disturbed plots.
- The density of nests (all species and plots combined) on the undisturbed portions of disturbed plots was about the same as nest density on the undisturbed plots. This suggests that, at least during a year with relatively high nest densities such as 1990, the value of tundra near abandoned gravel pads as nesting habitat is not diminished by the presence of those pads.

For the post-breeding observational study, elevated blinds were installed at four gravel pad sites for approximately a one-month period following nesting. At each site, bird use was observed on study plots established on various kinds of disturbed microhabitats and on undisturbed tundra. Systematic observations of bird use were made during 2.5-hour sessions in the mornings and afternoons. Data collected included numbers of each species observed, their behavior, and the microhabitat used.

Results of the observational study indicated that:

- Levels of bird use (observations per time period) were usually, but not always, higher on gravel plots than on natural tundra. The most common species using gravel plots was Lapland Longspur.
- The levels of bird use on gravel plots appeared to be related to presence or absence of vegetation and to vegetation type. Levels of use (all species combined) were higher on plots with natural plant colonization than on plots with seeded cultivars. Gravel plots with no vegetation attracted few birds.
- Low levels of use on tundra plots may have been related to the geobotanical type of the particular tundra patch. One tundra plot, composed primarily of high-centered polygons, may have more closely represented optimal longspur habitat than did other tundra

plots, and it had a level of use equal to that of the adjacent gravel plots. Other tundra plots were composed of strangmoor and non-patterned ground.

- Aquatic plots (i.e., reserve pits, an impoundment, and a pond) generally had relatively high levels of use and high species diversity compared with gravel and tundra plots. Species diversity (but not level of use) was always lower on plots without water.
- The most commonly observed behavior on most gravel plots was feeding. Bird behavior was difficult to observe on tundra plots because of concealing vegetation, but it is probable that feeding was the most common behavior on tundra plots also.
- On gravel plots, it appeared that birds were feeding primarily on seeds of forb species which had colonized those sites.

In summary, findings of the 1990 studies are encouraging. During the nesting season, there were no statistically significant differences in nest density, nest success, or species diversity of nesting birds between disturbed plots that contained abandoned gravel pads and undisturbed plots that did not, even though few birds nested on gravel. The association of some nests with natural vegetation and thermokarst on abandoned gravel fill suggests that habitat manipulation may improve the value of abandoned sites as nesting habitat for some birds. During the post-breeding season, Lapland Longspurs were observed more often on abandoned gravel fill, where their most commonly observed behavior was feeding, than on tundra. Levels and types of post-breeding uses of abandoned pads depended on the character of the microhabitats available on the pads, especially the vegetational characteristics and water regime.

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Introduction

In Arctic Alaska, activities related to petroleum development can potentially result in disturbances to wildlife habitats. One of the principal kinds of disturbance is the placement of gravel fill (Walker et al. 1986; 1987a,b,c). Gravel fill is used to support facilities and transportation associated with the production phase of development, and is required to prevent thawing of the underlying permafrost. In past years, gravel fill was also used in the construction of exploratory well pads which since have been abandoned. This practice was discontinued in 1986 when technological advances led to the use of temporary ice pads for exploratory drilling in winter.

The oil industry and regulatory agencies are interested in learning how the placement of gravel fill affects wildlife habitat and wildlife populations. Information concerning impacts of gravel fill upon wildlife will be useful in establishing guidelines for the eventual rehabilitation of abandoned gravel pads and in minimizing potential future impacts should additional petroleum development occur in the Arctic.

Several studies have been conducted to gain insight into the effects of various aspects of oil-related development on wildlife and habitats in the Prudhoe Bay oil field. Troy and Burgess (1983), Troy et al. (1983), Meehan (1986), and Troy (1986, 1988, 1990) have investigated the effects of roads, road dust, habitat fragmentation, and abandoned peat roads on bird nest densities and bird use of tundra habitats. Troy and Carpenter (1990) studied bird displacement before and after construction of oil field facilities. Jorgenson (1988, 1989) and Jorgenson et al. (1990) studied revegetation of disturbed sites.

In 1989, BP Exploration (Alaska) Inc. (BPX) and LGL Alaska Research Associates, Inc., initiated a pilot study (Pollard et al. 1990) to investigate further the effects of development-related habitat disturbance on wildlife. During this pilot study, observations were made of wildlife uses of disturbed habitats (e.g., abandoned gravel pads and impoundments) and of "natural" habitats that resembled disturbed habitats (e.g., flood-plain alluvium and ponds). These observations set the stage for developing firm hypotheses about the relationship between disturbed habitats and wildlife populations which could be more rigorously tested in future years.

The results of the 1989 studies showed that both birds and mammals used disturbed habitats and that the extent of use differed among different groups of

animals. During these studies, observations of nesting birds in the vicinities of abandoned gravel pads suggested that the pads may not have had an adverse effect on birds nesting on nearby tundra. Other observations indicated that certain microhabitat features on and near pads may have attracted some nesting birds. Observations of birds feeding and resting on these pads suggested that specific microhabitat features may have attracted birds. The studies in 1990 focused on abandoned gravel pad sites and were designed to examine these ideas further.

This report describes and discusses the 1990 studies and is organized in two parts. Part One addresses the first of our 1990 studies: Bird Nesting and Abandoned Gravel Pads (the "nesting study"). Part Two addresses the second of our studies: Post-breeding Use of Abandoned Gravel Pads (the "observational study").

Study Area

Study sites (Table 1) were located on the Arctic Coastal Plain of Alaska in or near the Kuparuk and Prudhoe Bay oil fields (Fig. 1 and 1A-D). Physiography of the landscape in the region is typical of that of the coastal plain in general. Soils are moist to wet and the vegetation is dominated by graminoids. The topography is generally flat but has a high degree of microrelief caused primarily by the formation of frost polygons, by the formation and drainage of thaw lakes, and by thermokarst. Many lakes and ponds of various sizes and depths are present. Two major river drainages, the Kuparuk and the Sagavanirktok, pass through the study area.

Part One: Bird Nesting and Abandoned Gravel Pads

Objective

The 1990 nesting study had one major objective:

- To test the null hypotheses that there is no difference in bird nest density, nest success, or species composition of nesting birds between plots containing abandoned gravel pads and undisturbed plots

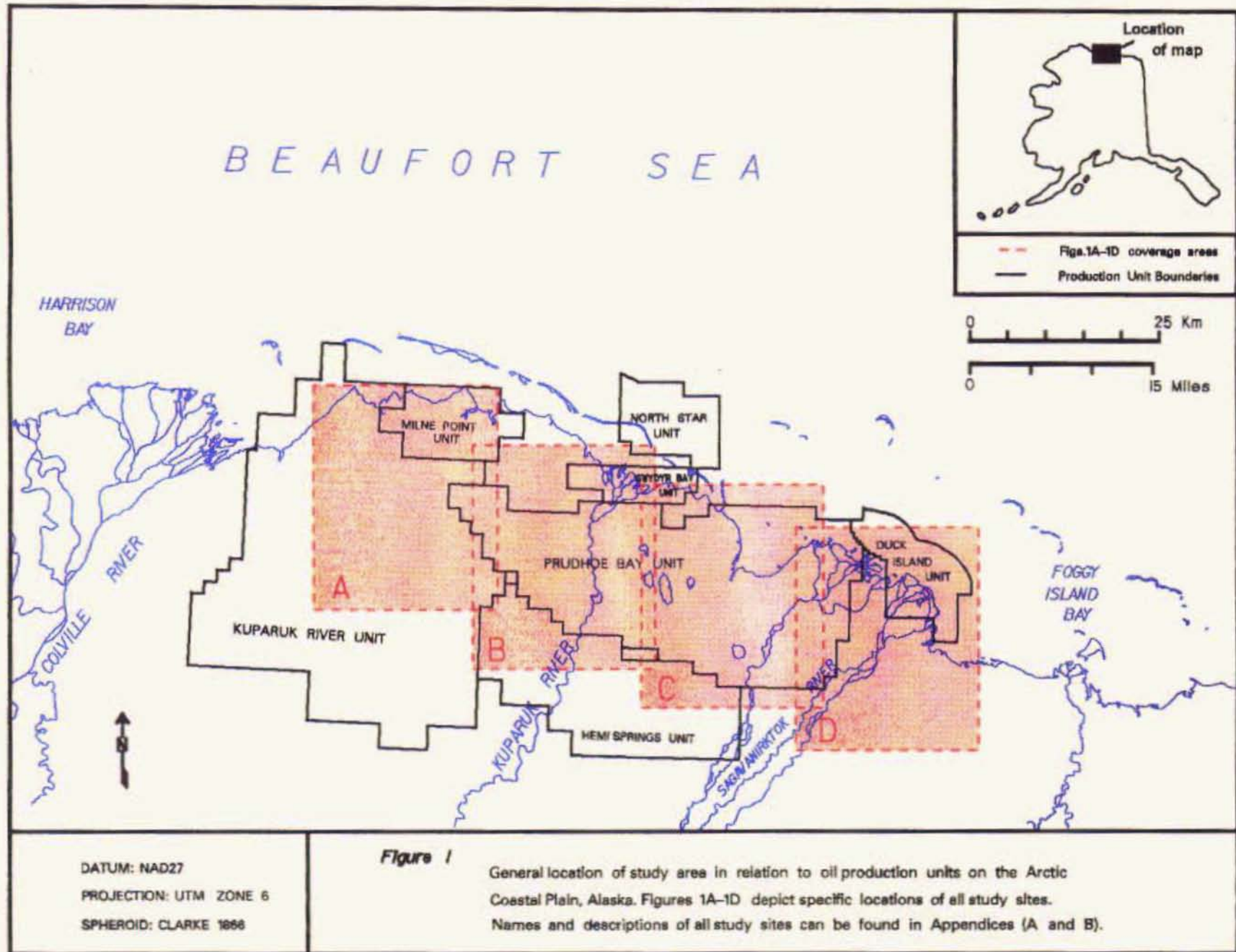


Figure
1B

Sites 5-8

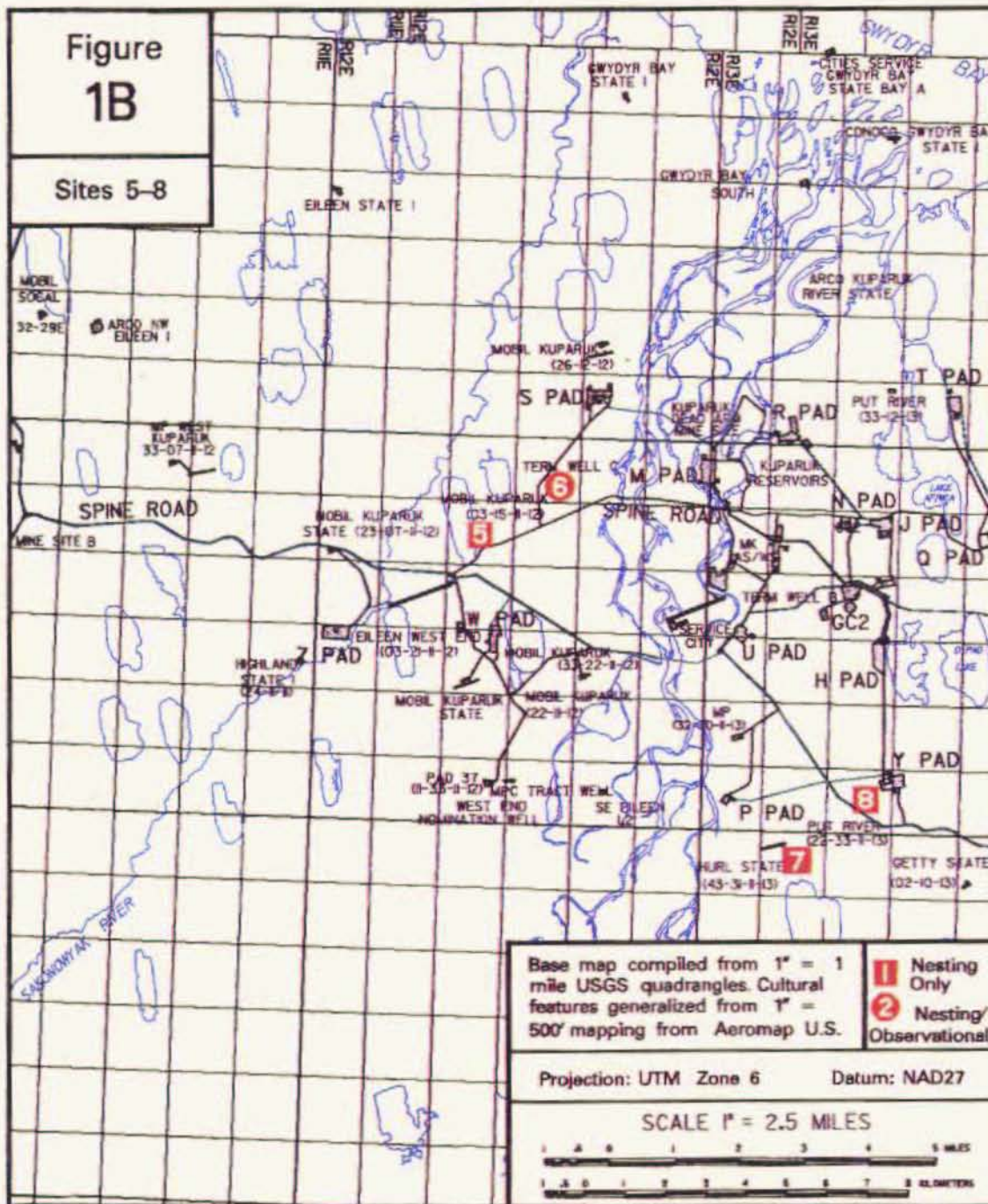
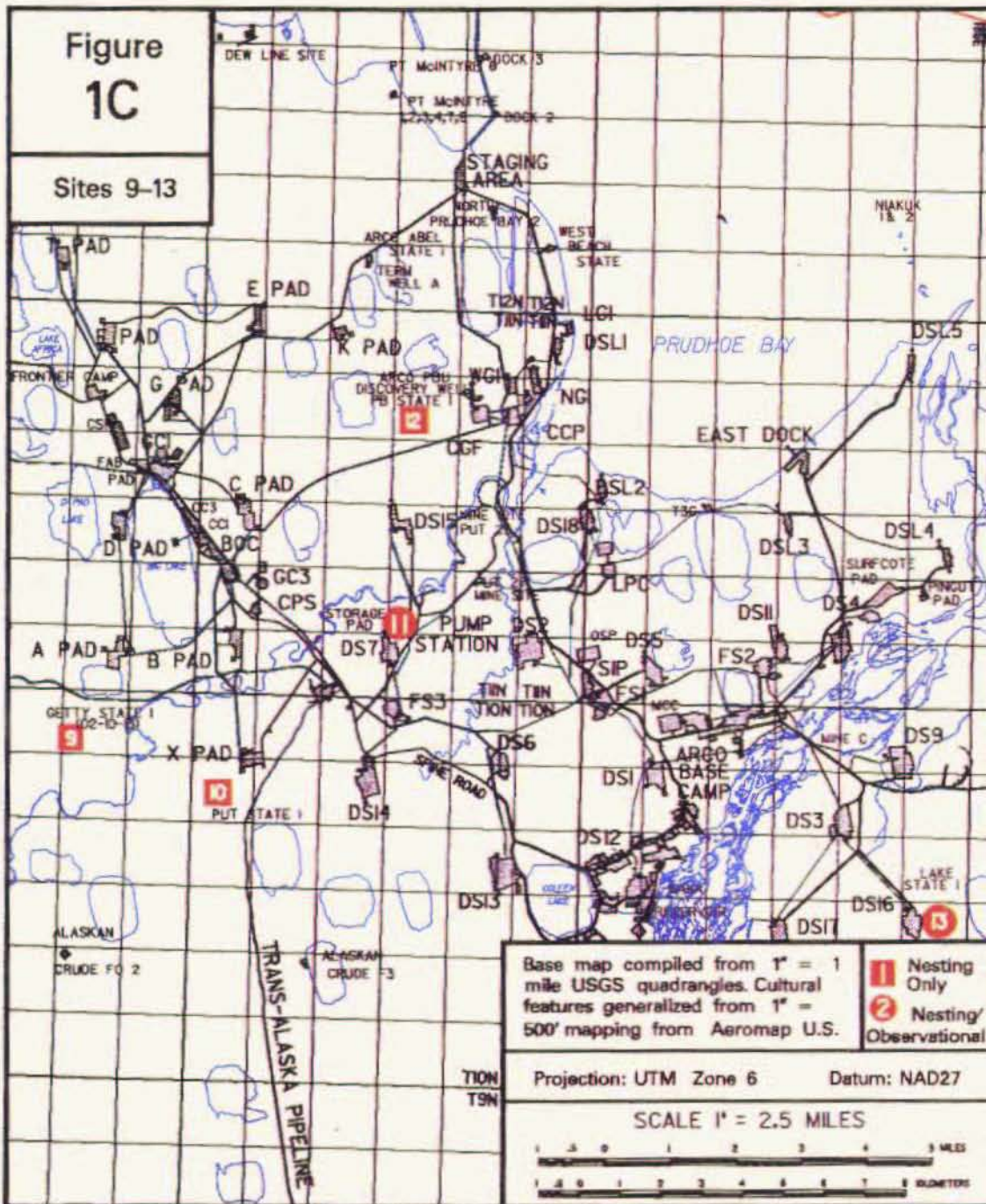


Figure
1C

Sites 9-13



Base map compiled from 1" = 1 mile USGS quadrangles. Cultural features generalized from 1" = 500' mapping from Aeromap U.S.

- 1 Nesting Only
- 2 Nesting/Observational

Projection: UTM Zone 6 Datum: NAD27

SCALE 1" = 2.5 MILES



Figure 1D

Sites 13-14

