

GHX-1 WATERBIRD AND NOISE MONITORING PROGRAM

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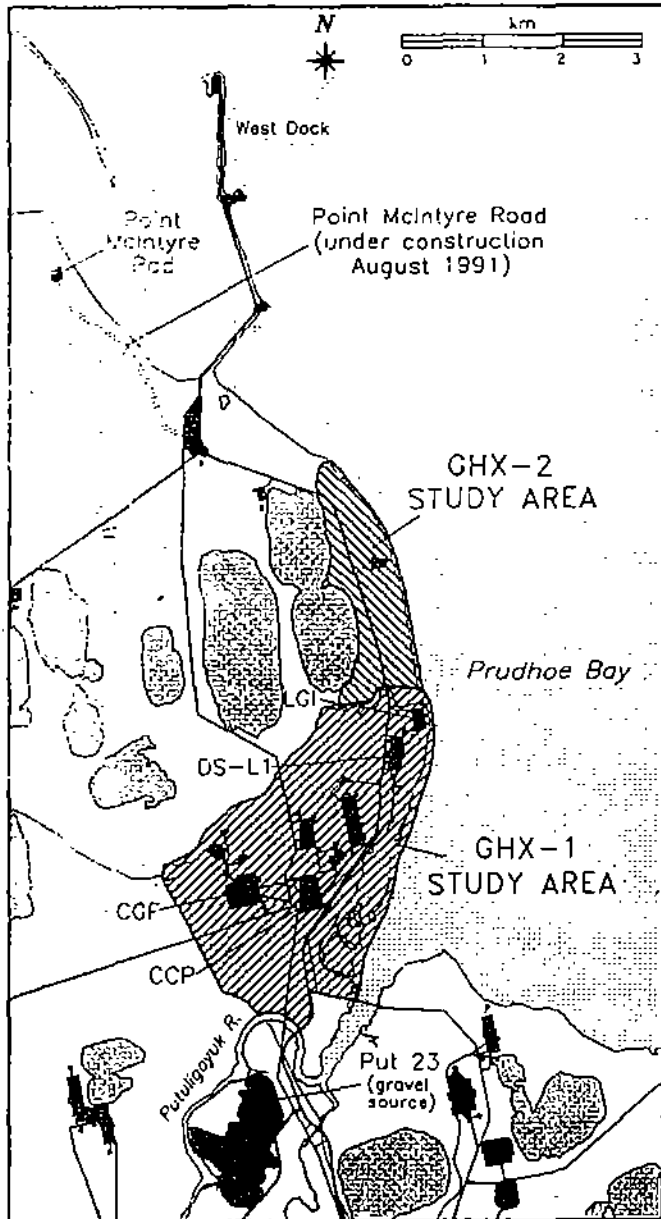
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ABUNDANCE AND DISTRIBUTION OF WATERBIRDS IN THE GHX-2 STUDY AREA

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THE EFFECTS OF POINT McINTYRE/GHX-2 GRAVEL HAULING ON BRANT

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**THE EFFECTS OF POINT McINTYRE/GHX-2 GRAVEL HAULING ON
BRANT**

FINAL REPORT

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EXECUTIVE SUMMARY

- In August and September 1991, construction of a new road to the Point McIntyre pad and construction activities associated with the second phase of the Gas Handling Expansion Project (GHX-2) required the transport of gravel in large trucks past brood-rearing habitats used by Brant. The objectives of this study were to assess the effects of these gravel-hauling activities on the distribution, abundance, and behavior of Brant along the western shore of Prudhoe Bay.
- Gravel-hauling trucks transported gravel from the mine site (Put 23) near the Putuligayuk River to the Point McIntyre road commencing on 10 August and continuing through 15 September. Early in construction, most gravel for the road was reclaimed from the North Prudhoe Bay State No. 2 pad, which eliminated the need for gravel-hauling traffic to pass Brant using the brood-rearing area near the Central Compressor Plant (CCP). When gravel was transported from the Put 23 site, gravel-hauling trucks moved along West Dock Road at an average rate of 14.8 full trucks/h and 12.4 empty trucks/h. Additional gravel was hauled in August to expand the Central Gas Facility, add to the West Dock Road, and to expand roads near MCC and in Deadhorse.
- Noise associated with gravel-hauling trucks was monitored at a permanent monitoring station used for the GHX-1 bird and noise study. This station was located approximately 250 m east of West Dock Road on the mainland adjacent to the brood-rearing island used by Brant near CCP. A comparison of two 4-day periods before and during gravel-hauling indicated that noise levels increased from a mean of 52.3 dBA (decibels, A-scale) before gravel-hauling to a mean of 57.2 dBA during gravel-hauling.
- At a distance of approximately 25 m, gravel-hauling trucks (Euclids) produced an average of 97.6 dBA when full and an average of 95.8 dBA when empty. Maxi-Haul trucks were substantially less noisy than Euclids (81.9 dBA for a full load).
- Brant used brood-rearing habitats on the coastal island southeast of CCP and along the coast north of West Beach State No. 1 from early July through mid-August. Annual comparisons of Brant numbers near CCP indicated that, although the number of adults in 1991 was comparable to those recorded in previous years, the number of young was down compared to previous years, probably due to low productivity of Brant in the Prudhoe Bay region.
- The distribution of Brant in coastal habitats along the western shoreline of Prudhoe Bay was similar in 1991 to that recorded in previous years except for increased use of the area north of West Beach State No. 1 by brood-rearing birds. Distribution of Brant in the area was not affected by disturbance from gravel-hauling trucks. Although few Brant were recorded near CCP after 20 August,

similar movements of Brant out of the area have been recorded in previous years.

- Reactions of Brant to fully loaded and empty gravel-hauling trucks were observed on three occasions. All flocks were 200-300 m from the West Dock Road. No overt reactions by Brant to gravel-hauling trucks were observed.
- In conclusion, based on our observations in the CCP vicinity and north along the Prudhoe Bay coastline, the relatively moderate levels of disturbance caused by Point McIntyre road construction and construction activities associated with GHX-2 did not have detrimental effects on the brood-rearing activities of Brant.

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INTRODUCTION

During August and September 1991, gravel was hauled for construction of a new road to the Point McIntyre pad located west of the West Dock Causeway and to support construction activities for the second phase of the Gas Handling Expansion (GHX-2) at the Central Compressor Plant (CCP). Because these activities required the transportation of gravel past brood-rearing habitats used by Brant (*Branza bernicla*) near the mouth of the Putuligayuk River and along the western shore of Prudhoe Bay north of CCP, ARCO Alaska, Inc., on behalf of the Prudhoe Bay Unit Owners and the Point McIntyre Owners, contracted with Alaska Biological Research, Inc., to monitor the effects of these activities on brood-rearing Brant. The study was initiated because of concerns that gravel-hauling trucks and the noise they generate could affect the use of coastal habitats by brood-rearing Brant and affect their normal behavior. The objectives of the study were to monitor the abundance and distribution of Brant before and during gravel hauling and to assess behavioral reactions of Brant to the gravel-hauling vehicles (Euclid and Maxi-Haul trucks).

STUDY AREA

The study area encompassed the entire western shoreline of Prudhoe Bay from the mouth of the Putuligayuk River north to the base of the West Dock causeway and Point McIntyre (Figure 1). The major gravel source for construction of the Point McIntyre road was the pit (Put 23) near the North Slope Borough Landfill and adjacent to the Putuligayuk River. Habitat types in the study area have been described previously by Murphy et al. (1989), Anderson et al. (1990), and Johnson et al. (1990).

METHODS

GRAVEL-HAULING ACTIVITY

The amount of disturbance associated with gravel-hauling trucks was determined by counting the number of passes of trucks (full and empty) past the major Brant brood-

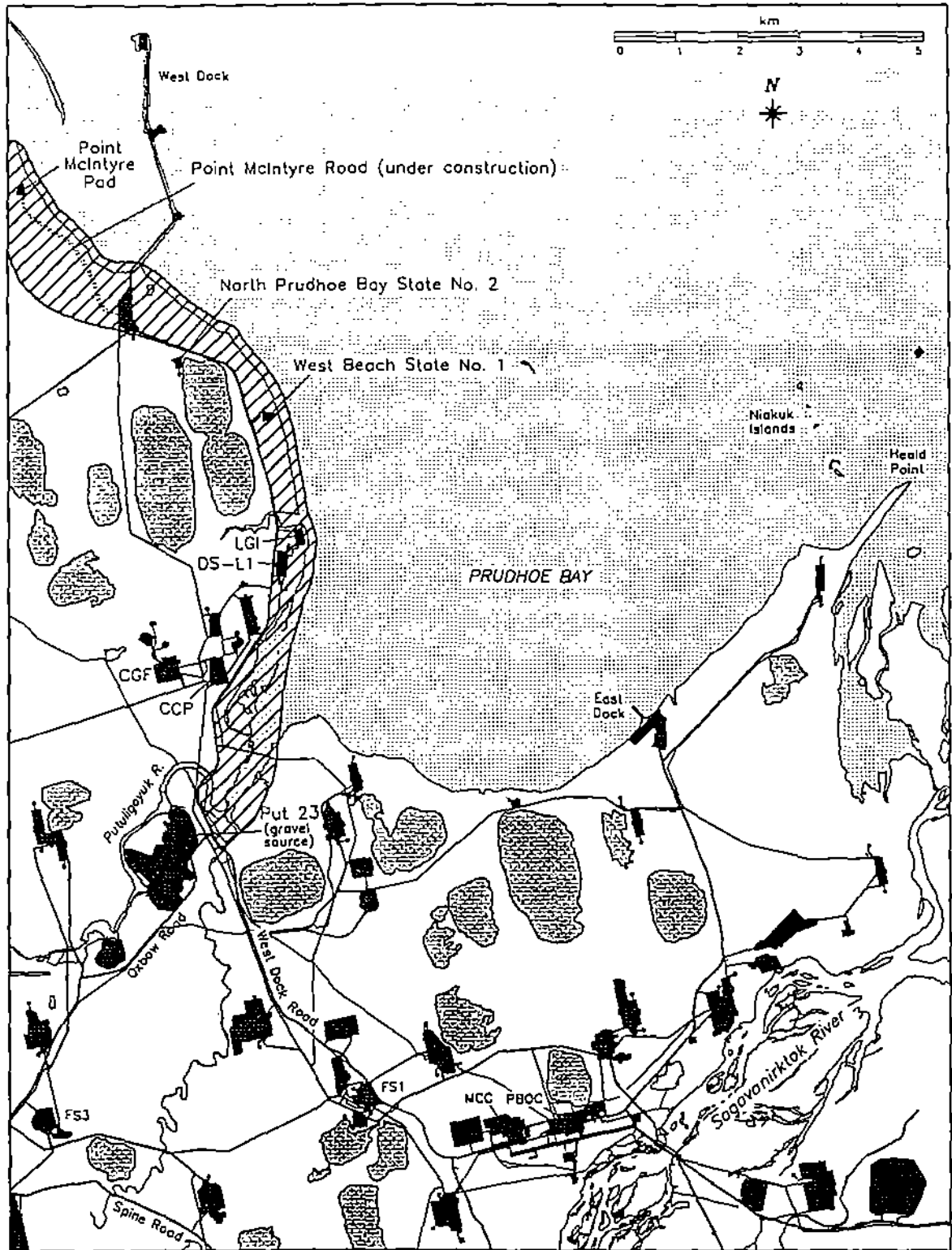


Figure 1. Location of the study area on the western shore of Prudhoe Bay, Alaska. Striped area was surveyed for Brant during gravel-hauling activities in August and September 1991.

rearing areas during 15-min periods. An hourly traffic rate was calculated for the different types of gravel-hauling trucks and for other truck types. Gravel trucks included Euclid bellydumps, Euclid dump trucks, and Maxi-Haul semi-type trucks. Other truck types included pickup trucks and Suburban-type vehicles (classified as Light Trucks), larger-than-Suburban trucks (Heavy Trucks), and road maintenance vehicles (e.g., operating graders).

SOUND LEVELS NEAR CCP AND FROM GRAVEL-HAULING TRUCKS

In addition to counting trucks, the increase in sound levels in the CCP vicinity due to these trucks was assessed using sound measurements from the permanent noise monitor, used for the GHX-1 noise study (Anderson et al. 1992), located along the coast southeast of CCP. Sound readings were recorded continuously at the monitor and integrated over 1-h intervals. I compared mean sound levels (hourly Equivalent Sound Level [L_{eq}], measured in decibels, A-scale [dBA]) from the permanent monitor for a sample of four days before (28-31 July 1991) and during (28-31 August 1991) gravel hauling. To estimate the sound levels generated by gravel-hauling trucks, I recorded single event levels (SEL) with a Larson-Davis Sound Meter (Model 870) of a variety of truck and load types at approximately 25 m from the road.

DISTRIBUTION AND ABUNDANCE OF BRANT

The distribution and abundance of Brant in the CCP area were recorded during road surveys conducted approximately every 4 days between late May and late September for the GHX-1 Bird Noise Monitoring Program (Anderson et al. 1992). Only data for the time period (approximately 1 August - 4 September) when both gravel hauling and road surveys were taking place are included in this report. The locations of all Brant seen in the area were recorded on maps of the study area and the number of adults and young were recorded on data sheets keyed to the appropriate maps. In addition to observations of Brant in the GHX-1 study area, the distribution and abundance of Brant along the coast north of Drill Site L1 (DS-L1) were recorded in conjunction with surveys of the GHX-2 study area (an addition to the GHX-1 study in 1991). The number and location of Brant in coastal habitats at the base of the West Dock Causeway also were recorded

between 27 July and 4 September 1991.

BEHAVIORAL REACTIONS OF BRANT TO GRAVEL-HAULING TRUCKS

The behavioral reactions of Brant to gravel-hauling trucks were determined during passage of trucks on West Dock Road near CCP and along the coast north of CCP. I opportunistically recorded reactions using the methodology for instantaneous reactions to disturbance developed for the Lisburne Terrestrial Monitoring Program (Murphy et al. 1990). These observations were opportunistic in that Brant had to be visible from the road and gravel-hauling trucks had to be operating at the same time in order for me to behavioral reactions. If both Brant and gravel-hauling trucks were present, behavioral reactions were recorded during regular surveys and during a 15-min period after the survey was completed. Behaviors included no reaction, alert, walk/swim, run/swim-escape, and fly/swim-with-wing-flap. These reactions are listed in order of increasing severity of reaction to the disturbing stimulus.

RESULTS AND DISCUSSION

GRAVEL-HAULING ACTIVITY

POINT MCINTYRE ROAD

Although gravel hauling for the Point McIntyre road was permitted as of 1 August 1991, gravel hauling did not commence until 10 August (Figure 2). Installation of culverts around the Waterflood pipeline was necessary before the placement of a road across the pipeline. Welders were working on these culverts from approximately 5 August until 14 August. The Point McIntyre road was constructed primarily with gravel reclaimed from the North Prudhoe Bay State No. 2 (NPBS-2) pad located about 1 km south of the West Dock staging area. Use of NPBS-2 pad as a gravel source allowed most of the Point McIntyre road to be constructed without driving large, gravel trucks past the major brood-rearing habitat near CCP. Gravel was hauled from the Putuligayuk gravel pit (Put 23) to the Point McIntyre road, and past the brood-rearing habitat, beginning on 10 August and continuing through 15 September.

The rate of passage of gravel-hauling trucks to Point McIntyre was assessed during

Point McIntyre/GHX-2 Construction Activities

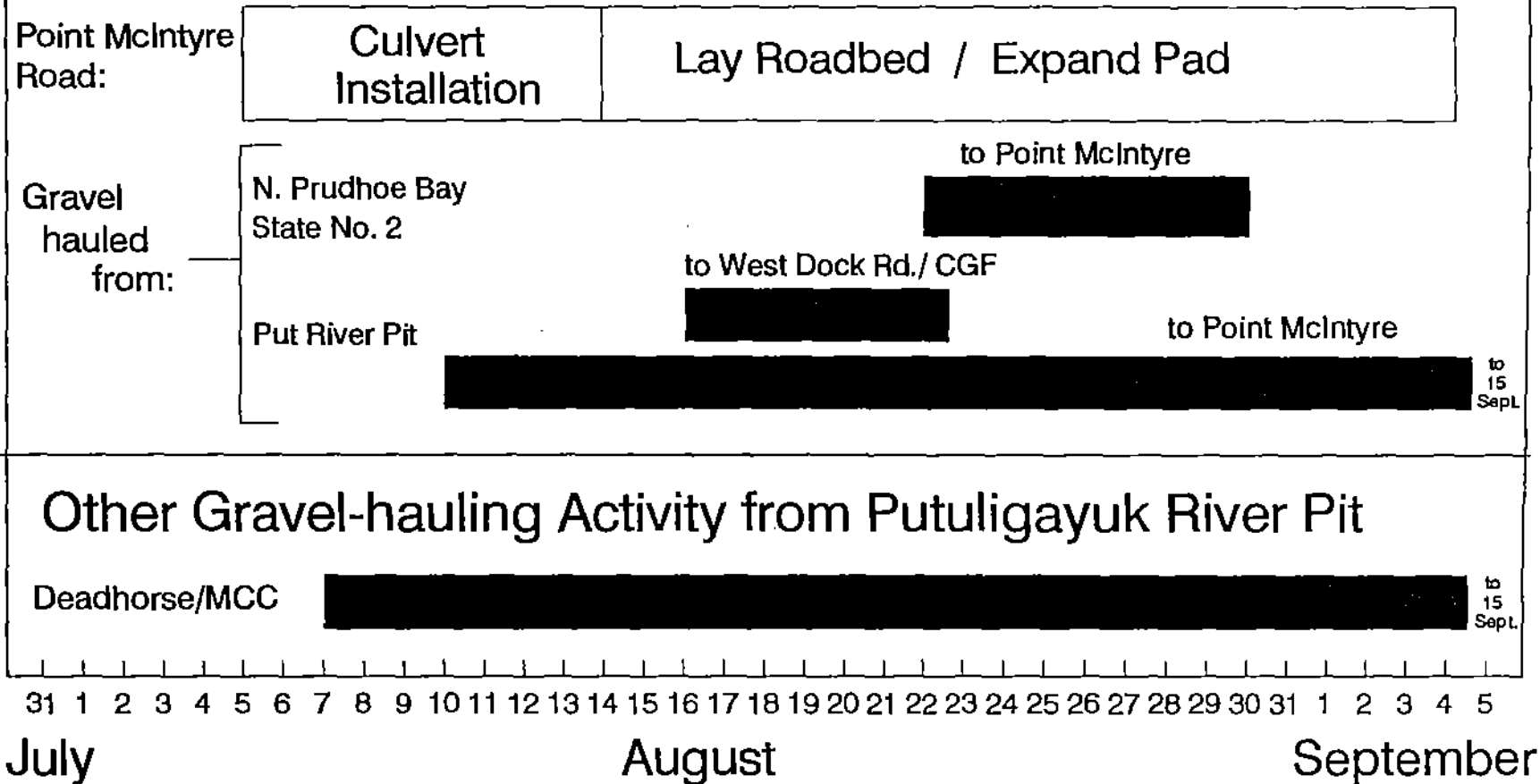


Figure 2. Time table of construction and gravel-hauling activities for the Point McIntyre road and GHX-2 program.

15-min traffic counts on 28 August, 1 September, and 4 September ($n = 15$). Euclid bellydumps passed by the CCP brood-rearing area and the brood-rearing area near the West Beach State No. 1 pad (WBS-1) at an average rate of 14.8 full trucks/h and 12.4 empty trucks/h (Table 1). Maxi-Haul bellydumps were less numerous (1.2 full trucks/h and 0.4 empty trucks/h).

GHX-2 PROJECT

Gravel hauling for the GHX-2 Project was permitted as of 15 August 1991, but did not commence until 16 August and had been substantially completed by 24 August (Figure 2). Gravel for this project was taken from the Put 23 and used for expansion of the south side of the pad at the Central Gas Facility (CGF), widening of the access road between West Dock Road and CGF/CCP, and for minor widening of curves on the West Dock Road north of CCP. Traffic counts for these gravel-hauling trucks were obtained on only one day (20 August) and indicated a rate for Euclid bellydumps of 4.0 full vehicles/h and 4.5 empty vehicles/h (Table 1); no Maxi-Haul trucks were observed. Additional gravel also was added to West Dock Road between the Oxbow Road and FS-1; this activity was completed by 15 September.

OTHER AREAS

In addition to gravel for the Point McIntyre Road and the GHX-2 Project, gravel was hauled beginning 7 August to expand the Spine Road in front of the Main Construction Camp and the Prudhoe Bay Operations Center, and for road widening near Lake Colleen in Deadhorse (Figure 2). This gravel hauling continued until 19 August. Although those gravel trucks did not pass by brood-rearing habitats used by Brant, noise from the trucks leaving Put 23 was heard by the observer at the brood-rearing habitat near CCP.

SOUND LEVELS NEAR CCP AND FROM GRAVEL-HAULING TRUCKS

Sound levels recorded at the permanent sound meter, located on the mainland shoreline southeast of CCP, generally were higher during gravel hauling than before gravel hauling (Figure 3). The mean hourly L_{eq} reading during a 4-day period (28-31 July 1991) before gravel hauling commenced was 52.3 dBA (SD = 1.85 dBA, $n = 96$

Table 1. Traffic counts (15-min duration) of gravel-hauling trucks and other vehicles on West Dock Road during construction activities for the Point McIntyre road and GHX-2 project, August - September 1991.

Project/ Date of Count	Light Trucks	Heavy Trucks	Gravel-hauling Trucks				Location of Count ^a
			Euclid		Maxi-Haul		
			Full	Empty	Full	Empty	
<u>GHX-2^b</u>							
20 August	11	4	4	4	0	0	CCP/S
	4	0	3	5	0	0	CCP/N
	13	2	3	5	0	0	CCP/S
	6	3	6	4	0	0	CCP/N
\bar{x}	8.5	2.2	4.0	4.5	0	0	
SD	4.20	1.71	1.41	0.58	0	0	
\bar{x} vehicles/h	34	9	16	18	0	0	
<u>Point McIntyre^c</u>							
28 August	8	3	2	3	0	0	CCP/S
	3	0	2	3	0	0	CCP/N
	6	3	3	2	0	0	CCP/N
	0	0	4	3	0	0	WBS-1
	0	0	3	7	0	0	WBS-1
1 September	11	2	4	3	2 ^d	0	CCP/S
	5	0	4	3	1 ^d	0	CCP/N
	0	0	4	5	1 ^d	1	WBS-1
4 September	13	3	5	1	0	0	CCP/S
	2	1	5	1	0	0	CCP/N
	4	1	5	3	0	0	CCP/N
\bar{x}	4.7	1.2	3.7	3.1	0.3	0.1	
SD	4.45	1.33	1.10	1.70	0.65	0.30	
\bar{x} vehicles/h	18.8	4.8	14.8	12.4	1.2	0.4	

^a CCP/S - south of Central Compressor Plant (CCP)

CCP/N - north of CCP

WBS-1 - north of West Beach State #1 (WBS-1).

^b Destination of gravel was access road between West Dock Road and the Central Compressor Plant - Central Gas Facility.

^c Destination of gravel was the Point McIntyre Road.

^d Full loads going south from Point McIntyre (i.e., removing gravel).

hourly intervals), but increased to 57.2 dBA (SD = 2.78 dBA, n = 96) during a 4-day period (28-31 August 1991) when gravel hauling occurred. Wind velocities, recorded at the weather station located north of the Western Gas Injection pad, were <15 mph during both time periods, therefore, wind probably did not affect the sound readings. Although sound levels increased during gravel hauling, they still were within the range (45.9 dBA to 64.5 dBA) of hourly L_{eq} sound levels recorded throughout the summer (27 June - 27 August 1991), when gravel-hauling activities were not taking place.

Sound measurements (single event levels [SEL]) of both full and empty gravel trucks indicated a difference in noise generation both between load types and between truck types. Euclids carrying full loads of gravel produced an average of 97.6 dBA (SD = 1.41, n = 10) at approximately 50 m. Empty Euclids were slightly less noisy (mean = 95.8 dBA, SD = 1.54 n = 10) than fully loaded Euclids. Although the sample size was limited, Maxi-Haul bellydumps were substantially less noisy than Euclids, even with a full load (81.9 dBA, n = 1).

DISTRIBUTION AND ABUNDANCE OF BRANT

As in previous years, both adult and young Brant used brood-rearing habitats near the Putuligayuk River in 1991 (Appendix 1), but at somewhat lower levels than recorded in the past several years (Murphy et al. 1990, Anderson et al. 1991). Decreased use of the area probably was due to poor nesting success in the region (particularly Howe Island) that apparently was unrelated to oilfield activities. This decrease in nesting effort resulted in a substantial drop in the number of broods of Brant appearing at the Putuligayuk River mouth in July, although the number of adults present in the area was comparable to earlier years (Figure 4). The pattern of use of this area was similar to that observed in previous years, with groups of brood-rearing Brant using halophytic wet meadow habitats on the island and mainland shore near CCP, as well as intermittently using habitats along the coast of Prudhoe Bay north of CCP (Appendix 2). Unlike previous years, however, a flock of brood-rearing Brant occupied the coastal wetlands north of the West Beach State No. 1 pad by 15 July and remained in that general area throughout the brood-rearing period (Appendix 1). Brant previously have used this area, but not annually and not for the entire brood-rearing period (Murphy et al. 1991). The

ABUNDANCE OF BRANT (ADULTS ONLY) NEAR CCP/PUTULIGAYUK RIVER

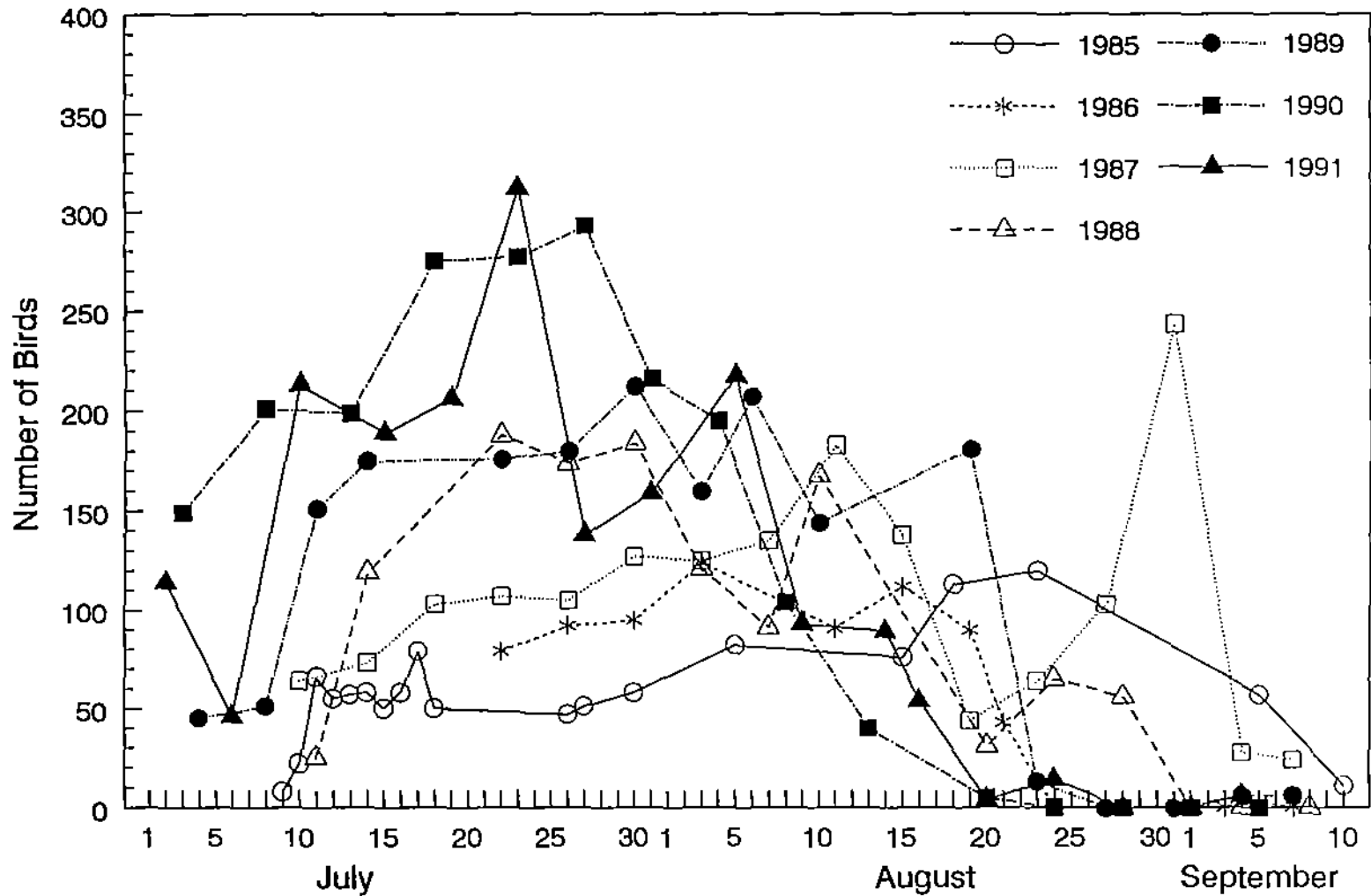


Figure 4. Counts of adult Brant using the brood-rearing areas near the Central Compressor Plant (CCP) and the Putuligayuk River, July - September, 1985 - 1991. Data for 1985 - 1990 are from Murphy et al. (1986, 1987, 1988, 1989, 1990); and Anderson et al. (1991).

peak count of Brant at the CCP brood-rearing area was 312 adults and 67 young on 23 July (Appendix 1). By 31 July, the number of adults and young had decreased to 159 adults and 20 young (Figure 5). Numbers of Brant in the area continued to decline throughout August and were essentially absent by late August. This pattern has been observed in previous years (Murphy et al. 1986, 1987, 1988, 1989, 1990; Anderson et al. 1991) and probably is not attributable to disturbance from gravel-hauling activities (Figure 4).

The presence of small flocks of Brant at the unnamed stream north of DS-L1/LGI during mid August indicates movements of some Brant north from near CCP and possibly some Brant south from near WBS-1 (Appendices 1 and 2). The decline in the number of Brant near CCP on 5 August and the increased number of Brant north of WBS-1 on 9 August indicated both movements of birds north from the CCP area and departure from the CCP area by adults (without broods) that had completed molt. On 9 August, several adult Brant in the flock north of WBS-1 were able to fly. ABR personnel color-marked Brant in the flock north of WBS-1 on 9 August as part of a cooperative Brant banding program with the U.S. Fish and Wildlife Service. This banding program was sponsored and funded by the Prudhoe Bay Unit owners and the Endicott Unit Owners and was a cooperative effort involving industry and agencies. Movements of these banded birds during the remainder of the brood-rearing season and into fall staging indicated that interchange took place among the various brood-rearing habitats along the western shore of Prudhoe Bay (Figure 5). During late August and early September, I saw banded Brant near CCP, along the unnamed stream north of DS-L1/LGI, and near the base of the West Dock causeway. The use of the coastal wetlands at the base of the West Dock causeway occurred while road construction to the Point McIntyre pad was underway. Brant used the small lagoon near the base of the causeway, the moist tundra habitats east of the causeway, and coastal wetlands along the coast west of the lagoon (closer to Point McIntyre). Brant were never closer than 500 m to road construction at any of these locations.

BEHAVIORAL REACTIONS OF BRANT TO GRAVEL-HAULING TRUCKS

The reactions of Brant to both fully loaded and empty bellydumps were observed on

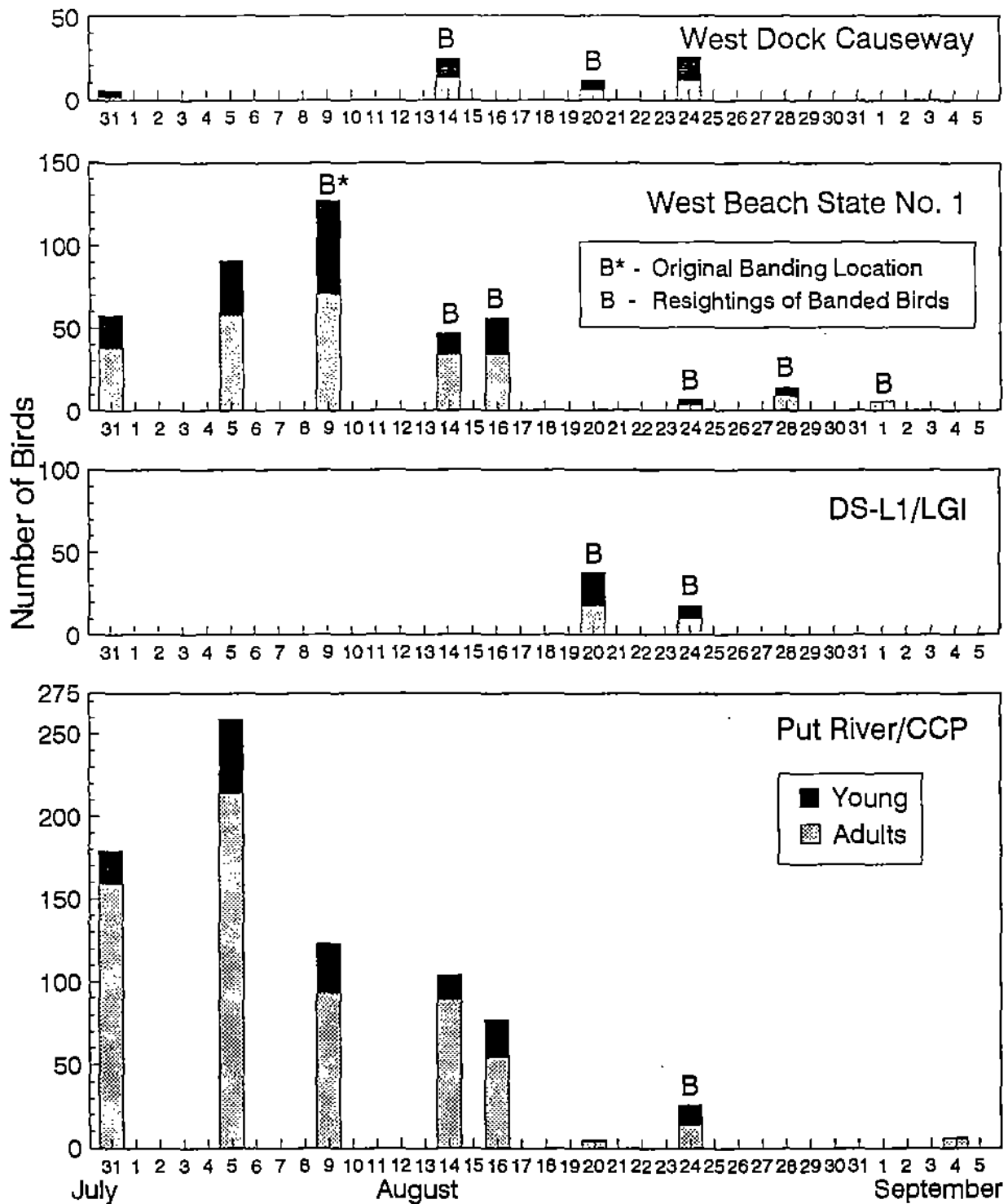


Figure 5. Counts of adult and young Brant in brood-rearing areas near the Central Compressor Plant (CCP) and at several locations along the western shore of Prudhoe Bay, 31 July - 4 September 1991. B above a histogram bar indicates that color-marked birds were present in the flock.

three separate occasions: 20 August, 28 August, and 1 September 1991. On 20 August, a flock of four adults and one juvenile was feeding on the island southeast of CCP approximately 300 m from West Dock Road. These Brant did not react to the passage of four full and four empty Euclids on West Dock Road during one 15-min period. On 28 August, I observed the reactions of a flock of three adults and two juvenile Brant north of WBS-1 to trucks on West Dock Road at an approximate distance of 300 m. These Brant did not react to four full Euclids and three empty Euclids during a 15-min observation period. A second flock of six adults and three juveniles also displayed no reactions to gravel trucks (three full and seven empty Euclids) during a subsequent 15-min period. This flock was located 600 m north of the smaller flock and was approximately 200 m from West Dock Road. In both flocks, adult and young Brant appeared to ignore all vehicular activity on the West Dock Road and continued normal feeding and social behavior (bathing, preening). This pattern also was apparent on 1 September when I observed a flock of six adult Brant approximately 350 m from West Dock Road and 450 m north of WBS-1. Again, these Brant did not react to passing gravel-hauling trucks (four full, five empty Euclids; one full, one empty Maxi-Haul) during one 15-min period.

In addition to these systematic observations, on 14 August, Brant (13 adults/12 young) were observed feeding in the coastal lagoon at the base of West Dock causeway while road construction took place approximately 500 m to the west. This flock did not display any obvious reactions to construction activity on the road, which included constant bulldozer noise and periodic Euclid dump trucks.

CONCLUSIONS

Based on our observations in the CCP vicinity and north along the Prudhoe Bay coastline, the relatively moderate levels of disturbance caused by Point McIntyre road construction and construction activities associated with GHX-2 did not have detrimental effects on the brood-rearing activities of Brant. The only possible effect on Brant may have been a decline in use of the brood-rearing area near CCP during late August, but this type of decline has been observed in previous years when construction activities were

not taking place and is more likely to be normal movements of Brant out of the area at the completion of molt and as young become able to fly. The somewhat earlier onset of this movement in 1991, as compared to some other years, could be due to the earlier arrival of Brant in June and consequently an earlier completion of the molt.

Reclamation of gravel from the North Prudhoe Bay State No. 2 pad for use in construction of the Point McIntyre Road substantially reduced the movement of loaded gravel-hauling trucks past the main Brant brood-rearing area near CCP during early August, thus greatly reducing any potential disturbance of Brant when broods were flightless. Although sound levels at the brood-rearing habitats near CCP were somewhat elevated during gravel hauling, they still were within the range of sound levels recorded when gravel-hauling trucks were not active and apparently did not affect the use of the area by Brant. The presence of Brant in the coastal wetlands near the base of the West Dock causeway during construction of the road to Point McIntyre also indicated that disturbance associated with road construction was not detrimental to Brant when the disturbance was >400-500 m from the birds. Reactions of Brant in the WBS-1 area indicated that at even closer distances gravel-hauling trucks did not elicit reactions from birds.

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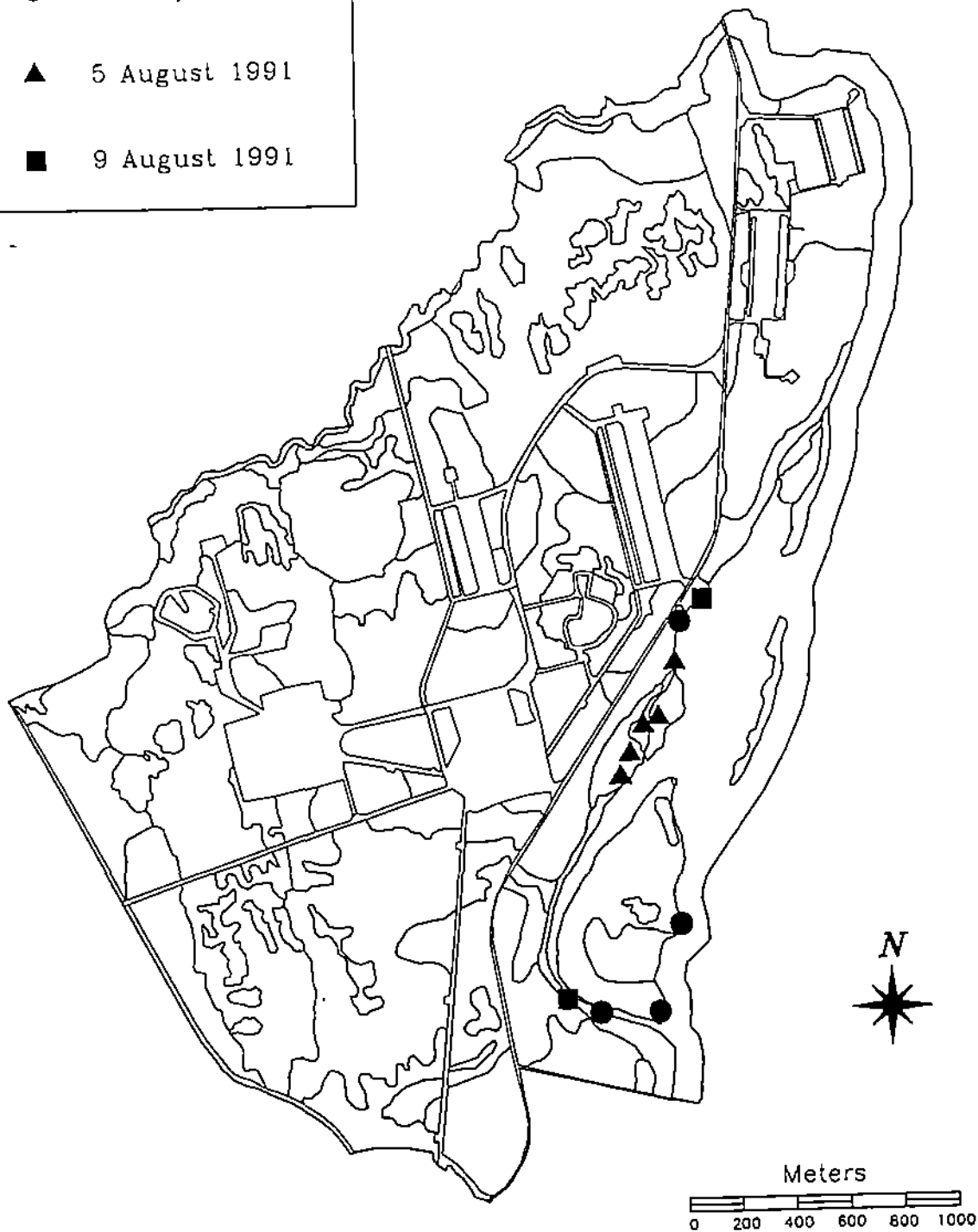
Appendix 1. Number of adult and young Brant at brood-rearing areas along the western shore of Prudhoe Bay, July - September 1991.

Date	Putuligayuk River CCP area		Unnamed Stream N of DS-L1/LGI		West Beach State No. 1		West Dock Causeway	
	Adults	Young	Adults	Young	Adults	Young	Adults	Young
2 July	114	0	4	0	1	0		
6 July	46	13	6	0	4	0		
10 July	213	11			17	0		
15 July	189	29			9	3		
19 July	206	14			16	3		
23 July	312	67	6	8	24	17		
27 July	138	13	18	16	24	22	2	2
31 July	159	20			38	20	2	4
5 August	217	45			58	33		
9 August	93	30			71	56		
14 August	89	15			34	13	13	12
16 August	54	23			34	22		
20 August	4	1	18	20	4	6	6	6
24 August	14	12	10	8	4	3	12	14
28 August					9	5		
1 September					6	0		
4 September	6	0			1	0		

Appendix 2. Locations of Brant during road surveys from 31 July - 4 September 1991. Locations are mapped for Brant in the GHX-1 study area and for Brant along the western shore of Prudhoe Bay north of the GHX-1 area to the base of the West Dock causeway. For names of oilfield facilities refer to Figures 1 and 2.

Locations of Brant

- 31 July 1991
- ▲ 5 August 1991
- 9 August 1991

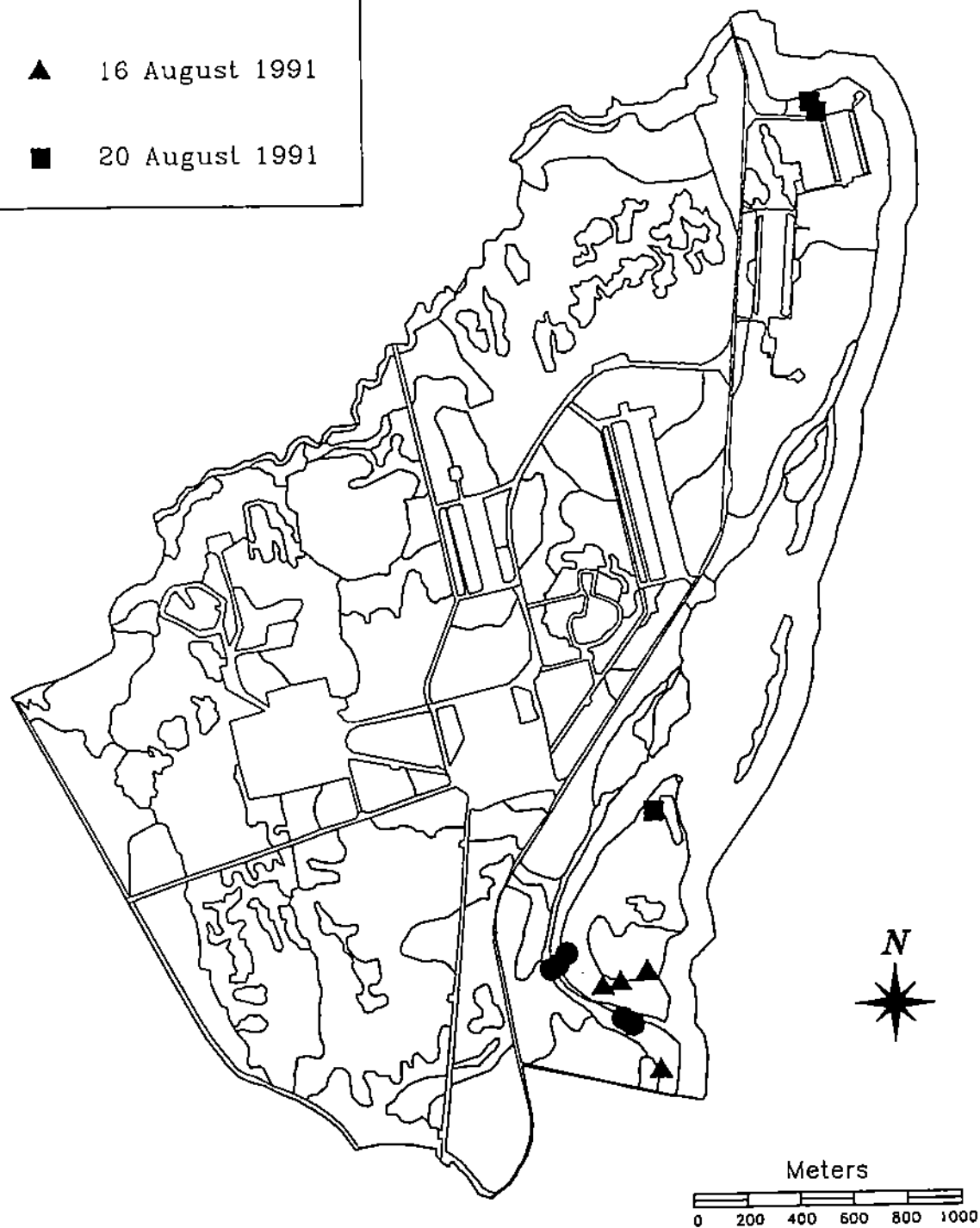


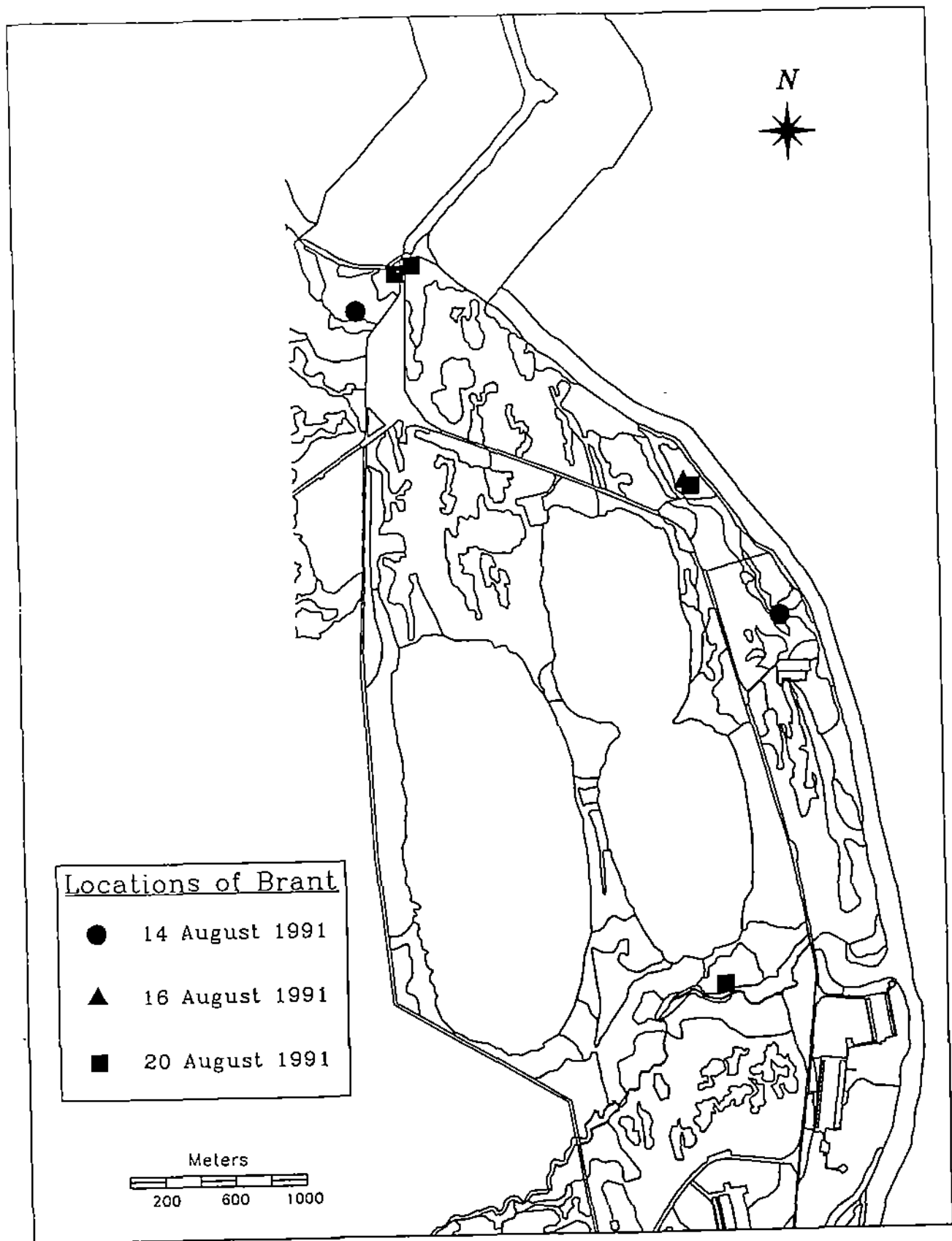
Locations of Brant

● 14 August 1991

▲ 16 August 1991

■ 20 August 1991





Locations of Brant

- 24 August 1991
- ▲ 28 August 1991 (no birds seen)
- 1 September 1991 (no birds seen)
- ◆ 4 September 1991

