LARID BREEDING SITES ON THE NORTH ARM OF GREAT SLAVE LAKE, NORTHWEST TERRITORIES:1986

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ABSTRACT

A survey of the larid breeding sites on the North Arm of Great Slave Lake was conducted from 23-26 June, 1986. The objectives of the study were: 1) to determine the distribution and abundance of Caspian Terns along the North Arm, 2) to determine the distribution and abundance of other larids in the area, and 3) to evaluate all or part of the North Arm as a Key Habitat Site. Observations on other birds were recorded as time permitted.

A total of 73 breeding sites was recorded; many supported more than one breeding species. The number of breeding sites for each species was: Bonaparte's Gull - 1, Mew Gull - 18, Ring-billed Gull - 10, California Gull - 5, Herring Gull - 41, Caspian Tern - 16, and Arctic-Common Terns - 38. The minimum number of breeding pairs for all sites was: Bonaparte's Gull - 1, Mew Gull - 49, Ring-billed Gull - 241, California Gull - 92, Herring Gull - 380, Caspian Tern - 65, and Arctic-Common Terns - 554.

The Caspian Tern population of the North Arm represents a major increase over the previously known numbers in NWT and constitutes approximately 1.3 percent of the Canadian population.

RÉSUMÉ

Les sites de nidification de Laridés ont été inventoriés dans le bras nord du Grand lac des Esclaves entre le 23 et le 26 juin 1986. Cet inventaire avait pour objectifs de: 1) déterminer la distribution et l'abondance des Sternes caspiennes 2) déterminer la distribution et l'abondance des autres espèces de Laridés et 3) évaluer la possibilité d'ajouter le bras nord, ou certaines de ses parties, à la liste des sites reconnus comme exceptionnels (Key Habitat Sites) pour les oiseaux migrateurs dans les Territoires du Nord-Ouest.

Un total de 73 sites a été dénombré et dans plusieurs cas, plus d'une espèce y nichaient. Le nombre de sites de nidification pour chacune des espèces se lit comme suit: Mouette de Bonaparte - 1, Goéland cendré - 18, Goéland à bec cerclé - 10, Goéland de Californie - 5, Goéland argenté - 41, Sterne caspienne - 16, Sterne commune-arctique - 38. Le nombre minimum de couples nicheurs pour chacune des espèces se lit comme suit: Mouette de Bonaparte - 1, Goéland cendré - 49, Goéland à bec cerclé - 241, Goéland de Californie - 92, Goéland argenté - 380, Sterne caspienne - 65, Sterne commune-arctique - 554.

La population régionale de Sternes caspiennes est beaucoup plus importante que celle dénombrée par le passé. La population territoriale s'en voit ainsi augmentée de façon significative; elle représente maintenant 1.3% de la population canadienne.

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Bob Bromley, Gilles Chapdelaine and Bernie Gollop reviewed the manuscript and provided valuable comments and criticisms.

Susan Popowich prepared the figures and arranged for printing the report.

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1.0 INTRODUCTION

1.1 Key Habitat Sites

The Canadian Wildlife Service recently completed a compilation of the Key Migratory Bird Terrestrial Habitat Sites in the Northwest Territories (McCormick et al. 1984). Any site which supports at least one percent of the Canadian population of a migratory bird species or subspecies, for any portion of the year, is considered to be a key habitat site. Evaluations are based upon the best available estimates of national and regional populations and the number of individuals present at each site. Actual or potential sites are regularly surveyed to update or evaluate the numbers present.

Potential Caspian Tern breeding sites along the North Arm of Great Slave Lake were surveyed because:

1) incidental observations suggested that Caspian Terns breed along the North Arm.
2) the Caspian Tern is considered to be a rare species (COSEWIC) in Canada (Martin 1978). Caspian Terns have been reported from only two locations in NWT - Akimiski Island and Great Slave Lake (Godfrey 1986).
3) there has been no extensive survey of larid breeding sites along the North Arm.

1.2 Objectives

The objectives of this study were:

1) to determine the distribution and abundance of Caspian Terns along the North Arm,
2) to determine the distribution and abundance of other larids along the North Arm,
3) to evaluate all or part of the North Arm as a potential Key Habitat Site,
4) to record observations on other birds as time permitted.

2.0 STUDY AREA

The study area includes all of the outer islands along the north side of the North Arm of Great Slave Lake between Frank Channel and Yellowknife Bay (Fig. 1). The West Mirage Islands and the islands in the western half of Yellowknife Bay were also included. One mainland breeding site, adjacent to Yellowknife Bay, is also included (Appendix 1).

The nearest communities are Rae (62° 50'N, 116° 03'W), at the northern extremity of the North Arm and Yellowknife (62° 27'N, 114° 22'W) adjacent to Yellowknife Bay.

2.1 Physiography

The North Arm represents the interface between the Kazan Region of the Precambrian Shield and the Interior Plains of the adjacent Borderlands (Bostock 1970). The north-side mainland is characterized by massive exposed bedrock with numerous lakes and rounded rock outcrops, exhibiting a relief of up to 60 m. It is bordered by a margin of hundreds of small islands, islets, and exposed rocks along much of its length; the area opposite

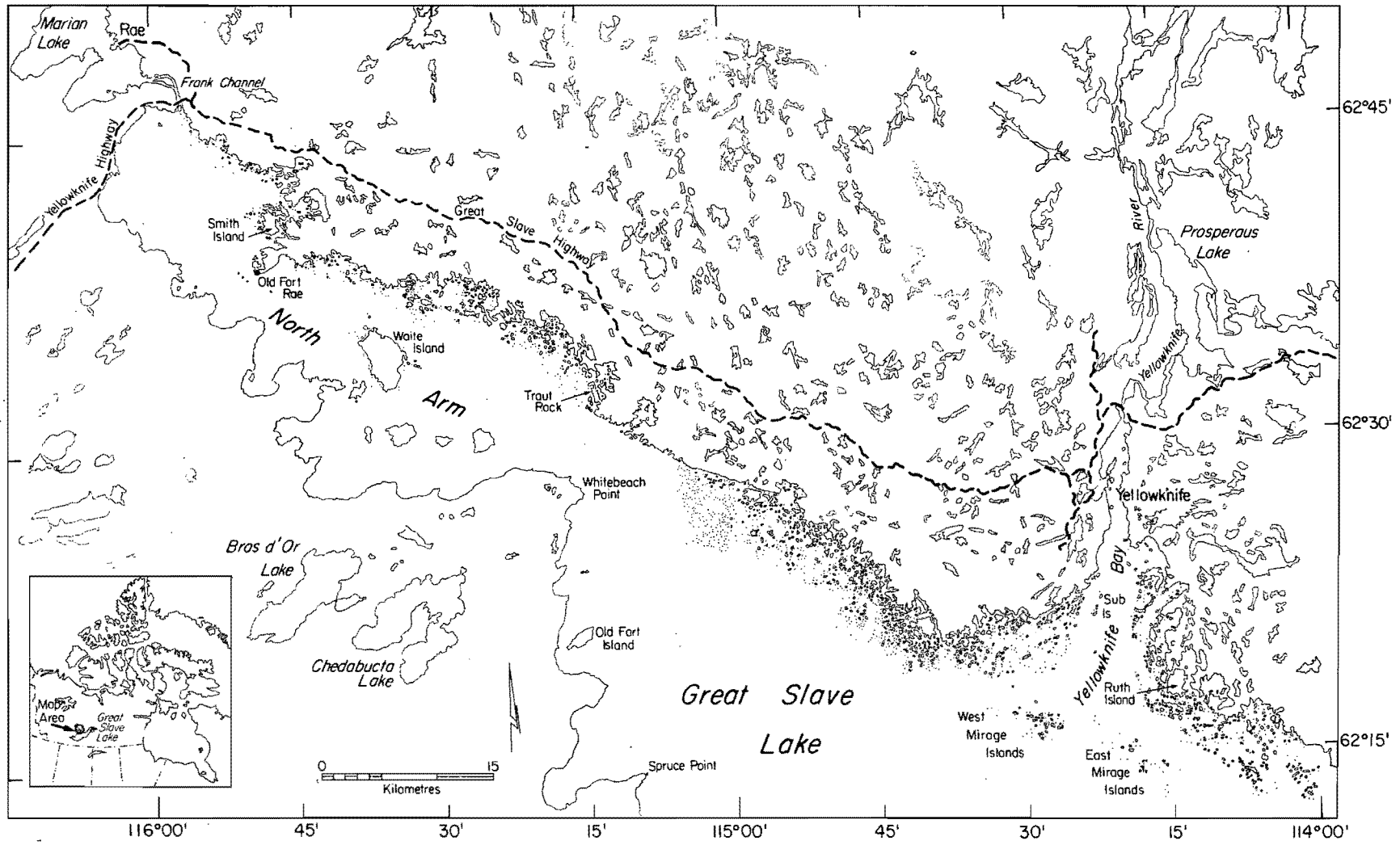

Figure 1. Location of the study area within Northwest Territories.

Whitebeach Point is the sole exception. These myriad islands, which may extend up to 10 km offshore, rarely exceed 10 m in height.

2.2 Vegetation

On the mainland and larger islands, natural depressions and drainage systems with limited soil support stands of Black Spruce (*Picea mariana*), White Birch (*Betula papyrifera*), Green Alder (*Alnus crispa*) and willow (*Salix* spp.). However, the vegetation becomes progressively more stunted on the offshore islands as it is exposed to the harsher climate of Great Slave Lake. Vegetation on these islands ranges from lichens, mosses and grasses to Prickly Saxifrage (*Saxifraga tricuspidata*), Labrador Tea (*Ledum groenlandicum*), Gooseberry (*Ribes* sp.), willow, White Birch, and Black Spruce. Most of the smaller outer islands and rocks are vegetated by algae in the splash zone, and crustose lichens on the drier surfaces.

Extensive wetlands, dominated by stands of River Horsetail (*Equisetum fluviatile*) also characterize this section of the Precambrian Edge (Murdy 1962). Other common plant species include: grasses (*Eriophorum* spp.), sedges (*Carex* spp.), Cattail (*Typha latifolia*), Pond-Lily (*Nuphar variegatum*), Water-Milfoil (*Myriophyllum exalbescens*), and Bladderwort (*Utricularia vulgaris*). Wetlands occupy the shorelines of the numerous bays on the mainland and often interconnect many of the larger shoreward islands. Wetlands are most common in the Rae-Trout Rock portion of the study area.

2.3 Climate And Spring Ice Break-Up

The study area is characterized by a subarctic continental climate with low annual precipitation (175-200 mm) and cool to cold temperatures. The mean daily January temperatures range from -17.5^{o} C to -27.5^{o} C, whereas the mean daily July temperatures range from 7.5^{o} C to 17.5^{o} C. There are 70 to 100 frost-free days per year (Anon. 1982).

Ice is present on the North Arm from the end of October until late June. Water first appears in the shallows surrounding many islands and in shallow bays. Shoreleads develop by mid-May and continue to expand as the ice melts. Accumulations of ice pans, up to two metres high, may occur on the exposed outer islets until mid-June.

Marked differences in water conditions are apparent within the study area. The section between Fort Rae and Whitebeach Point is characterized by shallow, turbid and relatively warm waters whereas the remaining waters are relatively deep, clear and cool.

3.0 METHODS

From 23-26 June 1986, two observers, in a motor boat, examined most of the outer islands along the North Arm of Great Slave Lake (see Appendix 1). However, a few islands may have been unintentionally overlooked because some of them were not indicated on the topographical maps and navigation among the myriad islands was sometimes difficult. Surveys began by late morning and continued into the late evening because the lake

waters were usually much calmer at this time of day. The location of islands was determined from 1:50,000 topographical maps.

Our attention was concentrated on the outer islands due to the larids' (except Bonaparte's Gull) obvious preference for the more exposed, and unvegetated islands. As a result, a number of potential sites (rocky islets) in the shoreward bays were not surveyed. The presence of a bright orange lichen (Xanthoria elegans), with an affinity for nitrogen-rich substrates, on many of the occupied islands also facilitated the discovery of some breeding sites.

Each island was considered as an individual breeding site. However, in some cases, a number of juxtaposed islands were considered as one unit and the data were combined for all islands in the group (see Appendix 1). Colonies have been described as "a distinguishable localized population within a species" (Webster's New Collegiate Dictionary, 1981). As many of the islands were very close to each other we have referred to them as breeding sites rather than colonies (see Weseloh et al. 1986).

Because it was not possible to distinguish between the eggs of Arctic and Common terns, we attempted to identify the adults which were flying about the breeding sites. This proved to be rather difficult. Accordingly, we have lumped these species when presenting and discussing our results. Nevertheless, we have indicated the apparent breeding species at each site, whenever possible (Appendix 2).

The number of nests of each larid species was counted at each

breeding site and the number of breeding pairs was determined from this count. Data were also collected on clutch size, nest materials, egg dimensions, and presence of young, where appropriate. The habitat features of Caspian Tern breeding sites were also noted. Disturbance to breeding birds was minimized by keeping our visits to the breeding sites as short as possible.

4.0 RESULTS AND DISCUSSION

The distribution and population status of larids on Great Slave Lake in general, and within the study area in particular, is poorly known. Historical knowledge is limited to the general notes made by the few explorers and biologists who passed through the area. Recently, an aerial survey was conducted over part of the study area (Allen and Ealy 1979). However, detailed observations within the study area are limited to the West Mirage Islands (Weller et al. 1969, Trauger and Bromley 1976). Available information is discussed in the species' accounts.

A total of 73 breeding sites and eight breeding species was recorded within the study area (Appendix 1). As single breeding pairs of Arctic Terns, Mew Gulls and Herring Gulls are common in this area, additional sites were probably overlooked. Approximately half (36) of the sites supported a single species whereas two species were recorded at 22 sites and 12 sites supported three species. Four species were recorded at three sites. Species accounts are presented below.

4.1 Caspian Tern

4.1.1 Population Status

Limited historical records suggest that Caspian Terns have been present on Great Slave Lake since the mid-nineteenth century. Ross, in 1862, noted the species as rare on Great Slave Lake (Preble 1908). Preble, in 1901, "met with it but once.... when a single bird was seen flying over the shallow lagoons between the mouth of Slave River (61° 18'N, 113° 39'W) and Stone Island." In 1903, he "frequently noted the species at Fort Resolution (61° 10'N, 113° 40'N) 20 June to 17 July, but seldom saw more than one or two at a time." He also saw several among the islands of the North Arm, between Yellowknife River and Fort Rae, and one on Marian Lake. Fairburn (1931) "noted one bird from Resolution" and Soper (1942) noted two near Fort Resolution on 6 July, 1932. William MacDonald observed Caspian Terns nesting near Trout Rock in June 1954 and also recorded them nesting on two islands (undetermined location) in Yellowknife Bay in 1958. His observation at Trout Rock probably refers to the large colony discovered during this survey. Two nests were also recorded on the West Mirage Islands in 1956 (Trauger and Bromley 1976). Three pairs nested annually on the islands from 1968 through 1973 (Weller et al. 1969, Trauger and Bromley 1976).

A total of 65 confirmed breeding pairs, at 16 sites, was observed during this survey (Fig. 2). Four additional territorial pairs (Table 1) may have been failed breeders or subadult paired birds. As subadult Caspian Terns exhibit strong philopatry and do

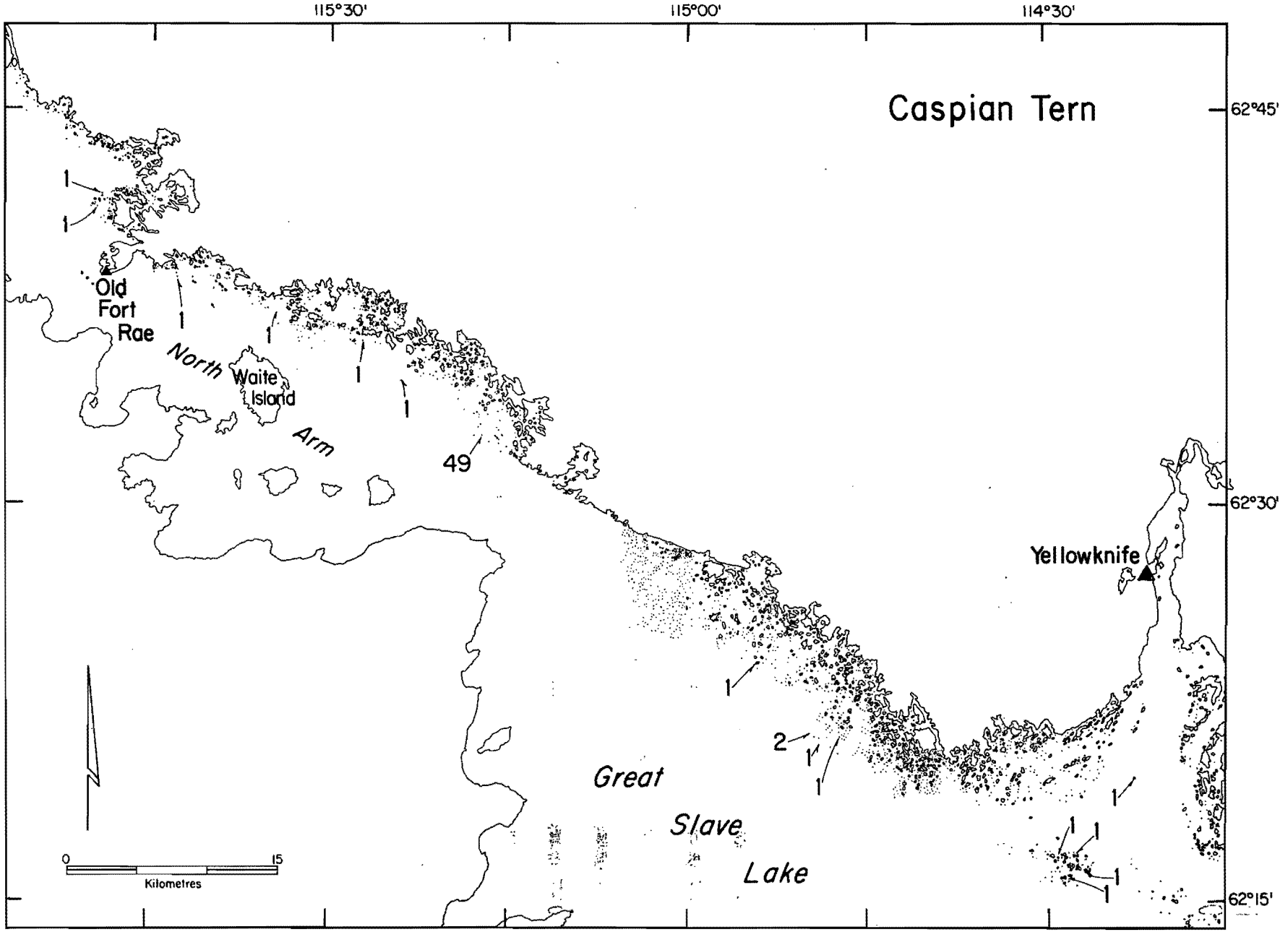

Figure 2. Distributiuon of Caspian Tern breeding pairs along the North Arm of Great Slave Lake.

Table 1. Observations of non-nesting Caspian Terns along the North Arm of Great Slave Lake, June 1986.

Location	Remarks
Mouth of Stagg River (62 44'N,115 44'W)	One adult in flight.
Site No. 7*	One adult in flight - five km east of site.
Site No. 10	Three adults present around nest.
Site No. 18	One adult near site - no nest found.
Site No. 26	One territorial pair - no nest found.
Site No. 29	One territorial pair - no nest found.
Site No. 35	One adult near site - no nest found.
Site No. 49	One adult near site - no nest found.
Sites No. 51,52	One territorial pair - no nest found.
Site No. 67	One territorial pair - no nest found.
Site No. 68	An abandoned nest was adjacent to the occupied nest. Five adults (including breeding pair) were present at the site and two other adults were in flight nearby.

* See Appendix 1 for location.

not breed until their third or fourth year (Ludwig 1968). a relatively large number of non-breeding birds would be expected in the area. The paucity of non-breeding birds suggests that the terns may forage far from their natal sites (Soikkeli 1973a) or possibly remain on their wintering grounds.

Three quarters of the pairs (49) were concentrated in a single colony whereas all but two of the remainder occurred as one pair per site (Fig. 2). Although single or small groups of nesting pairs are common in the Baltic Sea (Bergman 1980), the majority of Canadian Caspian Terns nest in colonies of up to 1000 pairs (Martin 1978). Solitary pairs and small groups seem to indicate an unstable period of colony establishment (Vaisanen 1973) or the response of a colony to disturbance or washout (Bergman 1980). Caspian Terns were associated with other breeding larids at 15 of 16 breeding sites. The associates were: Arctic-Common terns - nine sites, Herring Gull - eight sites, California Gull - four sites, Ring-billed Gull - two sites, and Mew Gull - two sites. Association with other breeding larids is a characteristic of Caspian Tern breeding biology. There are few records of solitary pairs of breeding Caspian Terns (Bergman 1980, Vermeer 1970) although a solitary pair nested near Drybones Bay (62° 09' N, 113° 48'W) in 1985 and 1986 (R. Bromley, pers. comm.)

The West Mirage Islands (Sites 58-68) supported two breeding pairs in 1956 and three pairs were recorded each year from 1968 through 1973 (Trauger and Bromley 1976). Four breeding pairs were observed during this survey although several additional birds were present (Table 1). These data would suggest extremely slow

population growth but could also reflect a year of poor production. Adequate conclusions cannot be drawn without annual monitoring of the breeding pairs.

4.1.2 Nest Sites and Materials

In North America, the majority of Caspian Tern colonies occur on islands, usually far from the mainland (Martin 1978, Ludwig 1965). These islands have little or no vegetation and nests tend to be on high ground to avoid flooding. Nest sites on the North Arm were, in part, consistent with the above descriptions. All nests were situated on exposed islands or islets on the outer fringe of the archipelago. Most islands were less than 100 m long and less than three m above water level. Site 25 (main colony), however, exceeded these dimensions considerably. Except at Sites 25 and 71, nests were less than one metre above water level leaving them subject to storm flooding and drifting ice. This may explain the relatively few nests found away from the main colony.

Nests in the Great Lakes were located on sand, gravel or limestone substrates with little or no vegetation (Ludwig 1965, Weseloh et al. 1986). Birds in other areas have nested on sand, shingle or cobblestone substrates, also with little or no vegetation (Evans et al. 1970, Webb 1973). Bent (1921) reported that nests at one colony were deep hollows lined with various sticks, straw and shells, whereas at another colony nests were slight depressions or hollows with no lining. Ludwig (1965) reported that nests were simple hollows in gravel, sometimes thinly lined with grasses. The amount and type of nest materials

recorded during this survey were variable, reflecting both the substrate and the readily available nest materials. Nests located in rock crevices or tufts of grass usually consisted of a scrape lined with fragments of grass and fish bones. Other nests, on smoother surfaces, consisted of substantial grass structures up to 20 cm high and 40 cm in diameter. This type of nest has not been previously reported. However, it is possible that they were abandoned or vacated gull nests. Two nests (Sites 43 and 68) were constructed of twigs.

4.1.3 Clutch Size and Nesting Phenology

On the Great Lakes, average clutch size of initial clutches was 2.81 eggs (Ludwig 1965) although a small colony on Lake Ontario had an average clutch size of 2.0 in 1977 (Haymes and Blokpoel 1977 in Martin 1978). Evans et al. (1970) reported an average of 1.73 eggs in Manitoba whereas Trauger and Bromley (1976) reported a mean of 1.8 eggs for nests at the West Mirage Islands. Sixty-five nests examined during this study averaged 1.8 eggs per clutch. However, as clutch size declines during the season, initial clutches may have been larger. The clutches usually contained two eggs (64.6%) although single-egg (24.6%) and three-egg clutches (10.7%) were also observed (Appendix 3). Average clutch size recorded during this study is consistent with earlier observations from the West Mirage Islands but considerably less than that reported by Ludwig (1965). Smaller clutches could be due to predation, renesting or the reduced availability of food (Soikkeli 1973b, Shugart et al. 1978). Further study is required to determine if these results are consistent from year to year.

Soikkeli (1973b) reported that, in the Baltic Sea, most eggs are laid by 20 May. In 1969, the onset of hatching near Spruce Island, Lake Winnepegosis, Manitoba occurred on June 14-15 (Evans et al. 1970). At the other extreme, O'Donoghue and Gowanlock (1919) reported that none of the eggs which they examined were less than one week from hatching on July 13. No evidence of hatching was noticed during this survey. Eggs are laid at two- or three-day intervals and incubation starts with the first egg (Bergman 1953 in Soikkeli 1973b). Incubation lasts for approximately 26 days (Ludwig 1965). As the last nest was examined on 26 June, incubation apparently did not begin before the first week of June. This phenology is consistent with Trauger and Bromley's (1976) observation of two newly hatched young on 4 July, 1970. However, further observations are required as the above reports suggest that there is considerable variation in duration of incubation and nesting phenology. In 1986, eggs near Drybones Bay (62° 09'N, 113° 48'W) hatched about 6 August (R. Bromley, pers. comm.).

4.2 Arctic-Common Terns

According to Preble (1908), the Common Tern "is rather rare north of Great Slave Lake, being largely replaced by the Arctic Tern, but occurs with that species in some localities." He saw a few, associated with Arctic Terns, among the islands of the North Arm on 24-26 July 1903. While crossing Great Slave Lake, north of Fort Resolution, Preble (1908) found Arctic Terns common among the islands. He also found it common elsewhere on Great Slave Lake, especially among the islands of the North Arm. Both tern

species have been reported from the West Mirage Islands but Arctic Terns appear to be the more abundant and persistent. No Common Terns were observed during the 1968-1973 period (Trauger and Bromley 1976). Allen and Ealey (1979) suggested that Arctic Terns are more common in the Yellowknife area than Common Terns.

Arctic-Common terns were the most abundant breeding larids in the study area. Five hundred and fifty-four pairs occupied 38 breeding sites. The breeding sites were dispersed throughout the study area (Fig. 3) and supported an average of 14.7 pairs (range:1-50) each. As it was not possible to identify the nests or number of individuals of each species at the breeding sites, the two species have been considered together. At each site however, we attempted to identify the breeding species by examining a number of individuals in flight around the breeding site.

As this is a first-order attempt at best, further discussion and interpretation must be considered tentative. The apparent breeding species was identified at 31 of the 38 observed breeding sites. Of this total, 16 sites (258 pairs) supported Common Terns and 10 sites (84 pairs) contained Arctic Terns. Five sites appeared to support both species (104 pairs). It would appear that Common Terns may be approximately three times as common as Arctic Terns. Clearly, this issue merits further investigation. Approximately one third (11) of the sites supported only terns. Other associates were Mew Gull - 12 sites, Ring-billed Gull - 10 sites, and Caspian Tern or Herring Gull - nine sites.

Terns were not evenly distributed throughout the study area.

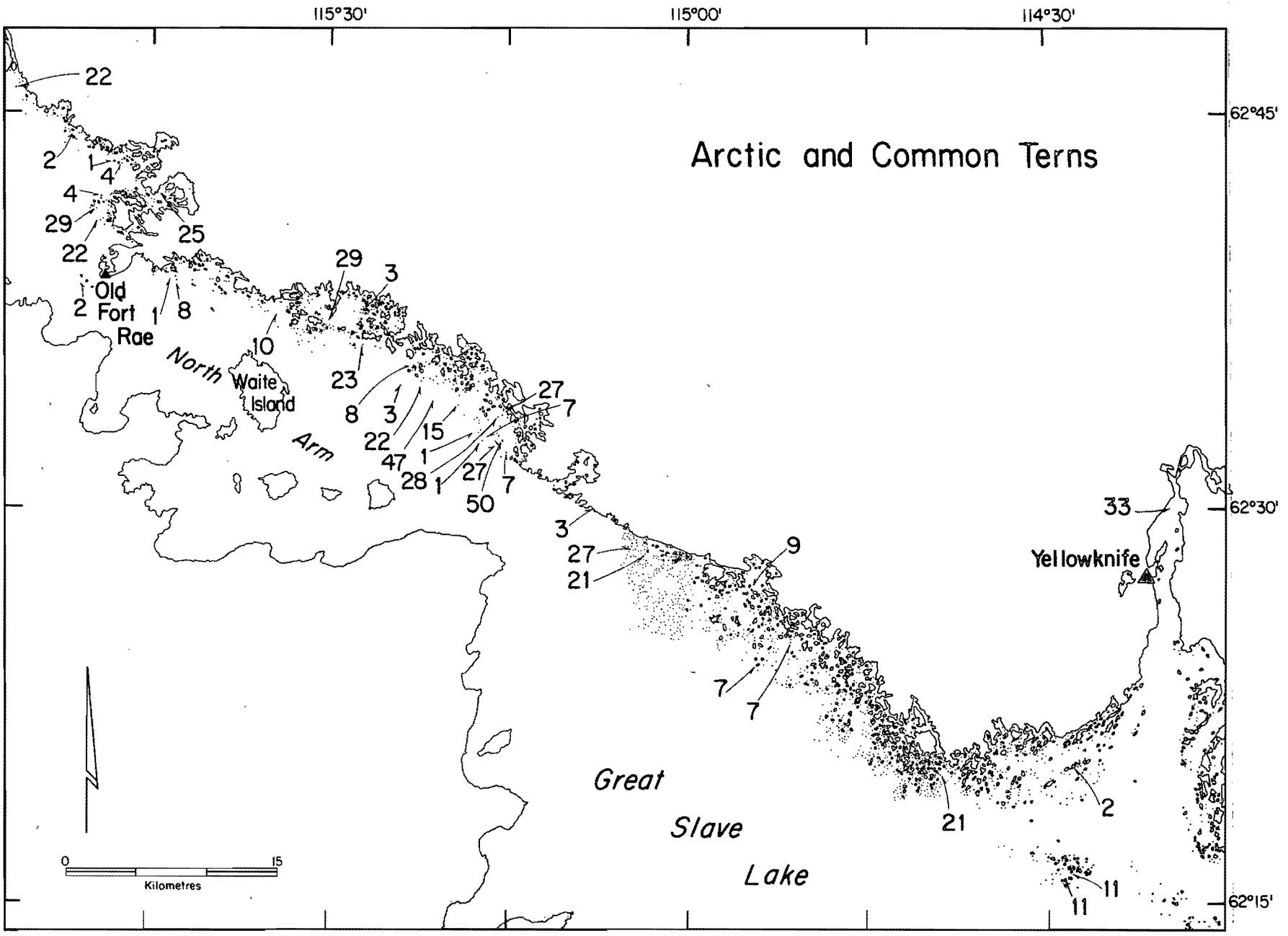

Figure 3. Distribution of Arctic-Common Terns breeding pairs along the North Arm of Great Slave Lake.

Twenty-seven breeding sites (71%) and 400 breeding pairs (72%) were recorded west of Whitebeach Point. This pattern of distribution and abundance was followed by Common Terns whereas Arctic Terns were almost equally distributed east and west of the Point. This apparent distribution, however, is subject to the tentative identifications mentioned above. The concentration of terns in the western portion of the North Arm is a probable response to the ice break-up pattern of Great Slave Lake (see Section 2.3) and the abundance of insects in adjacent wetlands.

Clutches contained predominantly three eggs (44.6%) or two eggs (39.3%) although single-egg clutches were also present (16.1%) (Appendix 3). Although approximately half of the clutches at Site 1 contained young, nestlings were observed at few other sites. One or a few were noted at Sites 3, 7, 14, 34, and 55. However, pipped eggs were observed at many of the other sites. According to Godfrey (1986), Common Terns incubate for approximately 26 days whereas Arctic Terns incubate for about 21 days. Our observations suggest that Common Terns began incubation about the first of June whereas the Arctic Terns began about one week later. The early nest initiation of Common Terns may be reflected in their concentration west of Whitebeach Point - where open water occurs earlier. All three Common Tern sites (39,55,73) located east of Whitebeach point are in comparatively sheltered locations where ice melts early.

4.3 Herring Gull

Preble (1908) indicated that Herring Gulls were common on Great

Slave Lake around Fort Resolution and between there and Fort Rae during the month of July. In 1968, Weller et al. (1969) reported 22 nests on the West Mirage Islands and 35 additional nests were were found there between 1969 and 1973. An estimated 40-60 pairs nested regularly on the islands during this period (Trauger and Bromley 1976).

The Herring Gull was the most abundant gull species in the study area. Forty-one breeding sites supported a total of 380 breeding pairs (Fig 4). An average of 9.3 pairs (range: 1-32) occurred at each site. More than half of the sites (22) supported Herring Gulls only; other associates were: Arctic-Common Tern - nine sites, Caspian Tern or Mew Gull - eight sites, California Gull - all five sites, and Ring-billed Gull - four sites.

Unlike the Common-Arctic terns, most of the Herring Gulls were concentrated in the eastern part of the study area (Fig. 4). Eight sites (25 pairs) were recorded west of Whitebeach Point whereas 33 sites and 355 pairs (93%) occurred east of this point. Evidence at the breeding sites provided some indication for the concentration of Herring Gulls in this area. From Site 35 eastward, the majority of breeding sites were littered with artifacts from the Yellowknife municipal dump. The most common items were "short-rib" bones which were probably discarded from local Chinese restaurants. Other items which had obviously been ingested included tinfoil, plastics, bottle caps and paper. Apparently, the dump is a major food source for individuals from breeding sites within commuting distance (up to 15 km). Up to

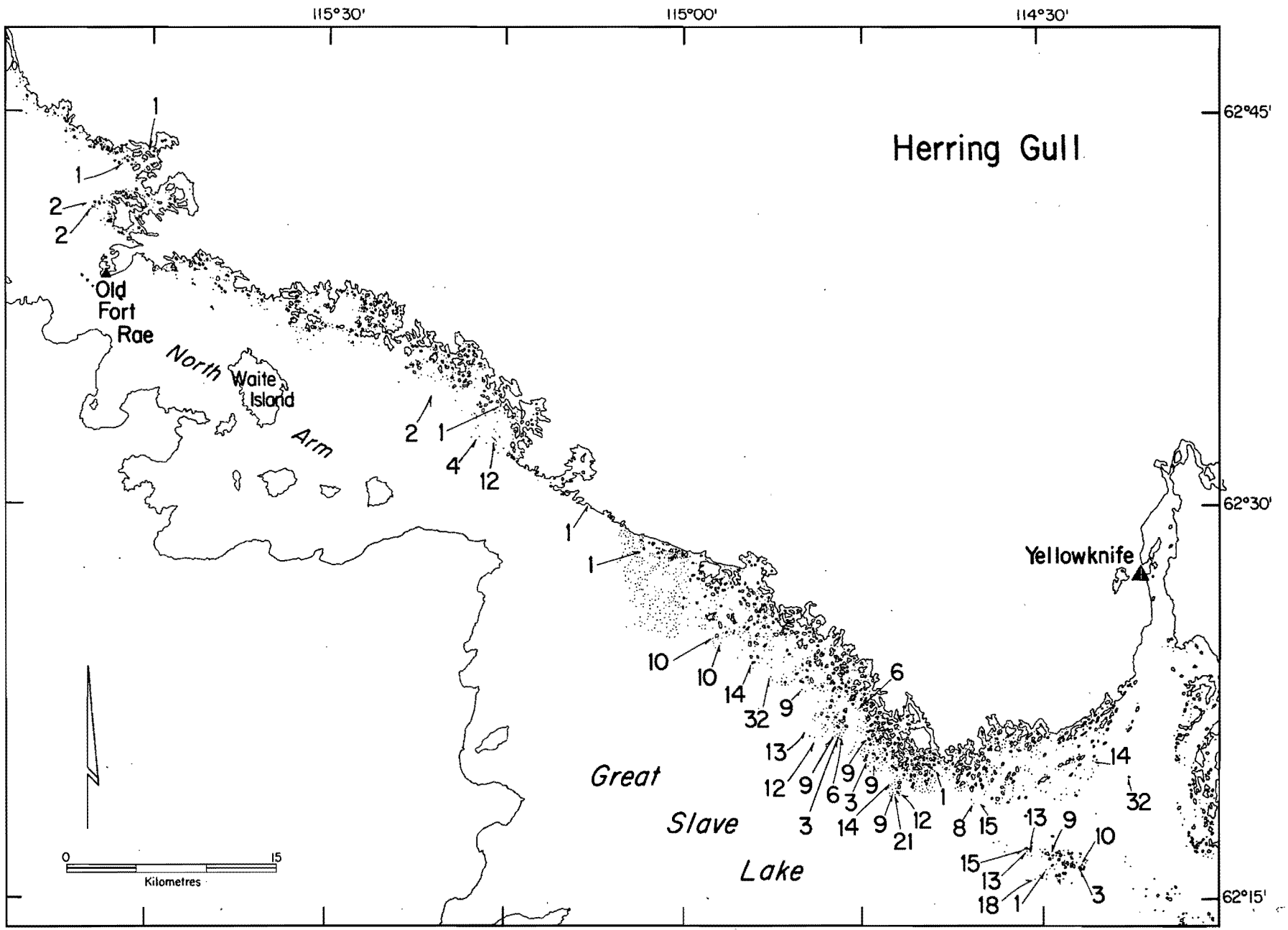

Figure 4. Distribution of Herring Gull breeding pairs along the North Arm of Great Slave Lake.

several hundred Herring Gulls may be seen daily at the dump during the summer months.

Weller et al. (1969) recorded 22 nests at the West Mirage Islands in 1968 and Trauger and Bromley (1976) indicated that 40-60 pairs nested there regularly from 1969-1973. Eighty-two pairs were recorded during this survey suggesting that numbers at these breeding sites have expanded over the last two decades. Without supporting evidence, it is unclear whether similar population growth has occurred throughout the study area.

Clutches contained predominantly two eggs (44%). One-egg (30%) and three-egg clutches (28%) were almost equally common (Appendix 3). Twenty-six breeding sites contained abandoned nests (51) and recently hatched chicks. Hatching, however, had not been completed at any of the sites. As incubation takes 25-28 days (Godfrey 1968), the birds must have begun about 1 June.

4.4 California Gull

Preble (1908) considered the California Gull to be a common breeder about Great Slave Lake. In 1901, he first noted it at Fort Resolution on 8 July. The species was abundant about Loon Island (undetermined location), 11-14 July, where 60 to 70 pairs were nesting on a small adjoining island. A few were seen near Trout Rock on 16 July and and at Fort Rae on 24 July. Many were seen near Hardisty Island (61° 44'N, 114° 37'W) on 30 July. In 1903, he observed this species several times among the islands between Fort Resolution and Fort Rae, from 17-26 July.

Trauger and Bromley (1976) reported that 150-200 pairs nested annually, in four colonies, on the West Mirage Islands between 1969 and 1973. Apparently the population was considerably larger in the past for an estimated 250 nests were recorded on the westernmost island in 1956. Smaller colonies also occurred on the eastern islands at that time.

Ninety-two nests, at five sites, were recorded during this survey. All sites were in or near Yellowknife Bay (Fig. 5). Breeding sites averaged 18.4 pairs (range: 1-44). California Gulls occurred only in association with Arctic-Common Terns (four sites) or Herring Gulls (all five sites). Only 17 breeding pairs were observed at the West Mirage Islands. This is a significant decline from the numbers observed during 1969-1973 but is consistent with the apparent decline from 1956.

Trauger and Bromley (1976) recorded a mean clutch size of 2.1 (114 nests) whereas Weller et al. (1969) noted an average clutch size of 1.9 (92 nests). The average clutch size of 2.1 (87 nests) recorded during this study is consistent with earlier observations. Clutch sizes were: two eggs (46.0%), three eggs (34.5%), and one egg (19.5%). One chick was observed at Site 43 and four abandoned nests were observed at Site 71. There was no evidence of hatching at any of the other sites.

Some speculation is warranted in light of the apparent decline in numbers at the West Mirage Islands. Although Preble (1908) suggested that California Gulls nest a bit later than Herring Gulls, Trauger and Bromley (1976) indicate that the hatching

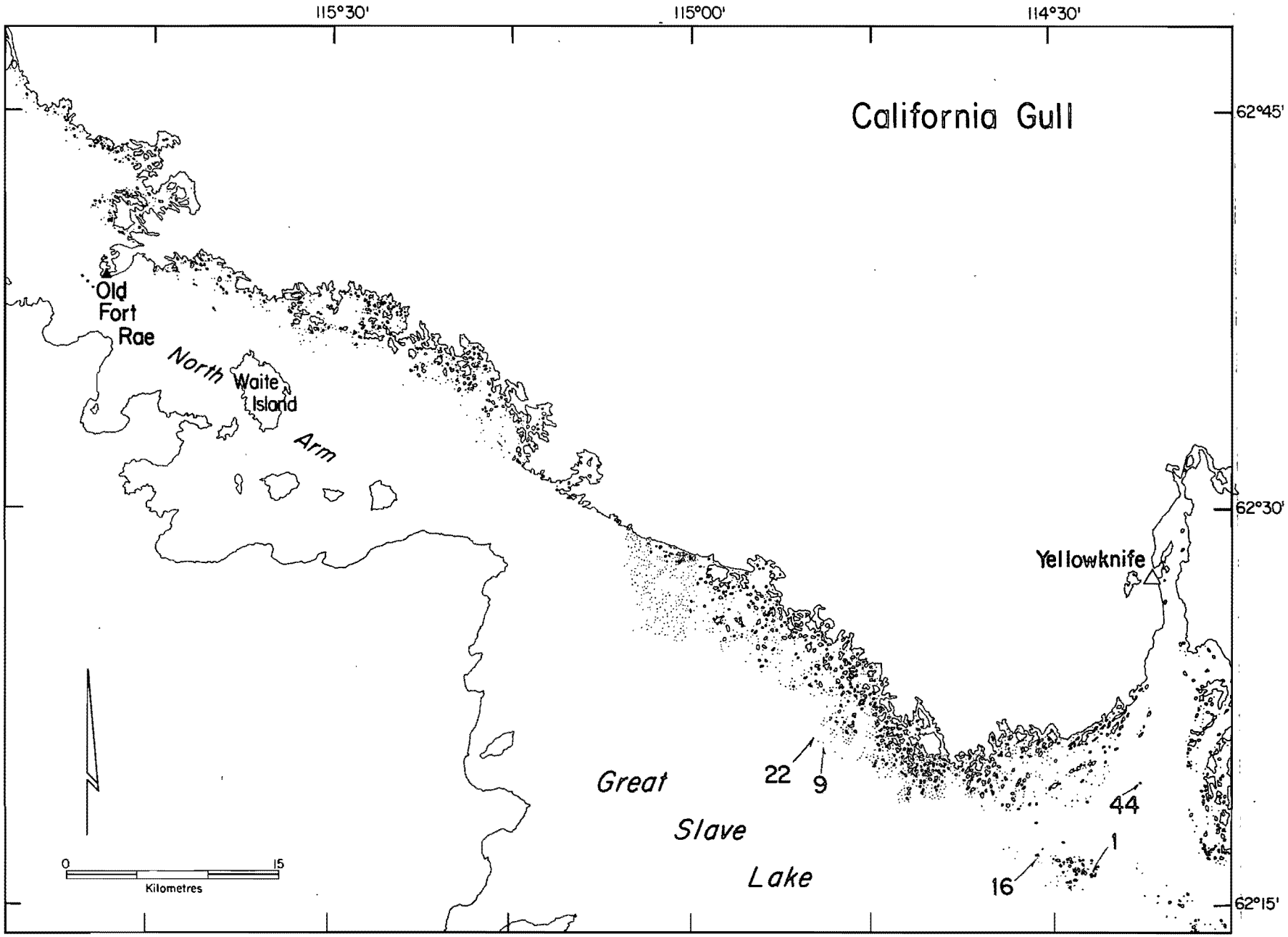

Figure 5. Distribution of California Gull breeding pairs along the North Arm of Great Slave Lake.

chronology of both species was similar at the West Mirage Islands. Herring Gulls occupied the higher, and more protected, portions of the islands. This suggests that they occupy the breeding sites first or that they are able to displace the California Gulls. It appears that Herring Gulls are expanding their numbers (at least at the West Mirage Islands) at the expense of California Gulls. Herring Gulls may be benefiting from the Yellowknife municipal dump where they seem to have proprietary use. Although California Gulls do scavenge around the city, they are not common at the dump. However, they were common at the dump during the early 1970s (R. Bromley, pers. comm). When present at the dump, they are easily displaced from feeding sites by the larger Herring Gulls. Clearly, more observations are required to substantiate this speculation.

4.5 Ring-billed Gull

Preble (1908) considered this species to be rare around Great Slave Lake. In 1903, the species was observed near Smith Landing (Fort Smith - 60° 00′ N, 111° 53′ W) on 10 June, two were noted near Desmarais Island (61° 01′N, 116° 28′W) on 1 July, and a single bird was seen near Fort Providence (64° 54′N, 125° 34′W) a few days later. This species has not been recorded at the West Mirage Islands but a colony did exist on Joliffe Island, in Yellowknife Bay, until the late 1940s (R. Bromley, pers. comm.).

A total of 241 nests were observed at 10 sites (Fig. 6). This species did not occur east of Whitebeach Point area. The sites averaged 24.1 pairs (range: 2 - 132 pairs). The largest

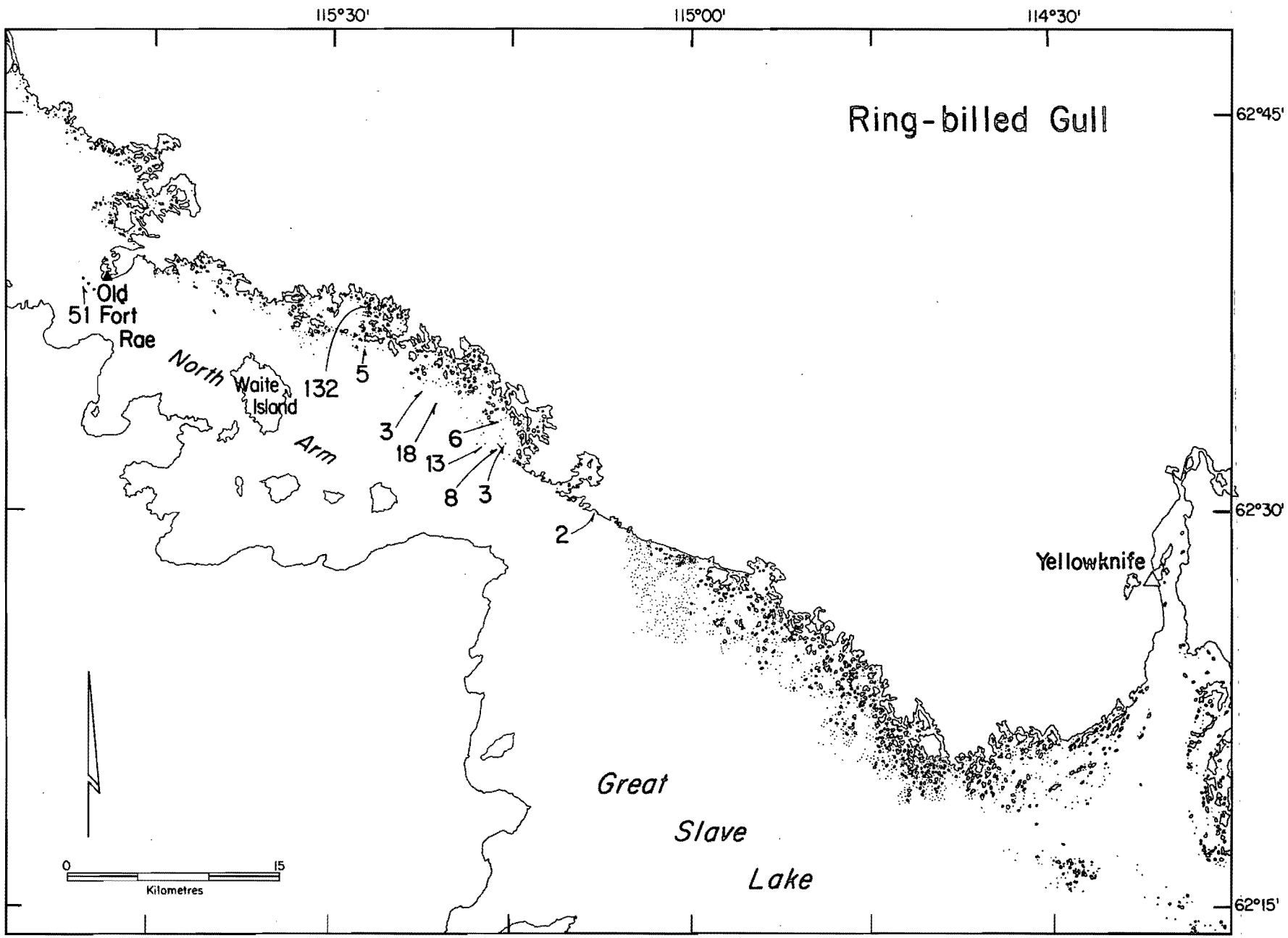

Figure 6. Distribution of Ring-billed Gull breeding pairs along the North Arm of Great Slave Lake.

colony (Site 18) was in a well protected bay and occupied three adjacent islands. The largest island was well covered with trees except for the breeding site which was bare rock. Breeding associates included: Arctic-Common Terns - all 10 sites, Herring Gull - four sites, Mew Gull - three sites. Caspian Tern - two sites.

Mean clutch size of 241 nests was 2.45. Clutch sizes were: three eggs, 56.8%; two eggs, 28.2%; and one egg, 14.1%. Two clutches contained five eggs. There was no evidence of hatching at any of the colonies.

4.6 Mew Gull

Preble (1908) passed by a large colony between Yellowknife Bay and Trout Rock. Many young birds, unable to fly, were present on 16 July, 1901. In 1903, he found the species common among the islands of the North Arm between 24-26 July. Many young birds were just commencing to fly. Trauger and Bromley (1976) reported that three to five pairs nested on the larger wooded islands in the West Mirage group.

We did not find any large colonies in the general area indicated by Preble. However, we may have missed some colonies as we concentrated our search on the outer islands of the archipelago. A total of 49 nests was encountered at 18 sites along the North Arm (Fig. 7). Sites were scattered throughout the study area although 71% of the breeding population occurred east of Whitebeach Point. Only four sites contained more than one pair and Site 69 supported the largest breeding aggregation (24

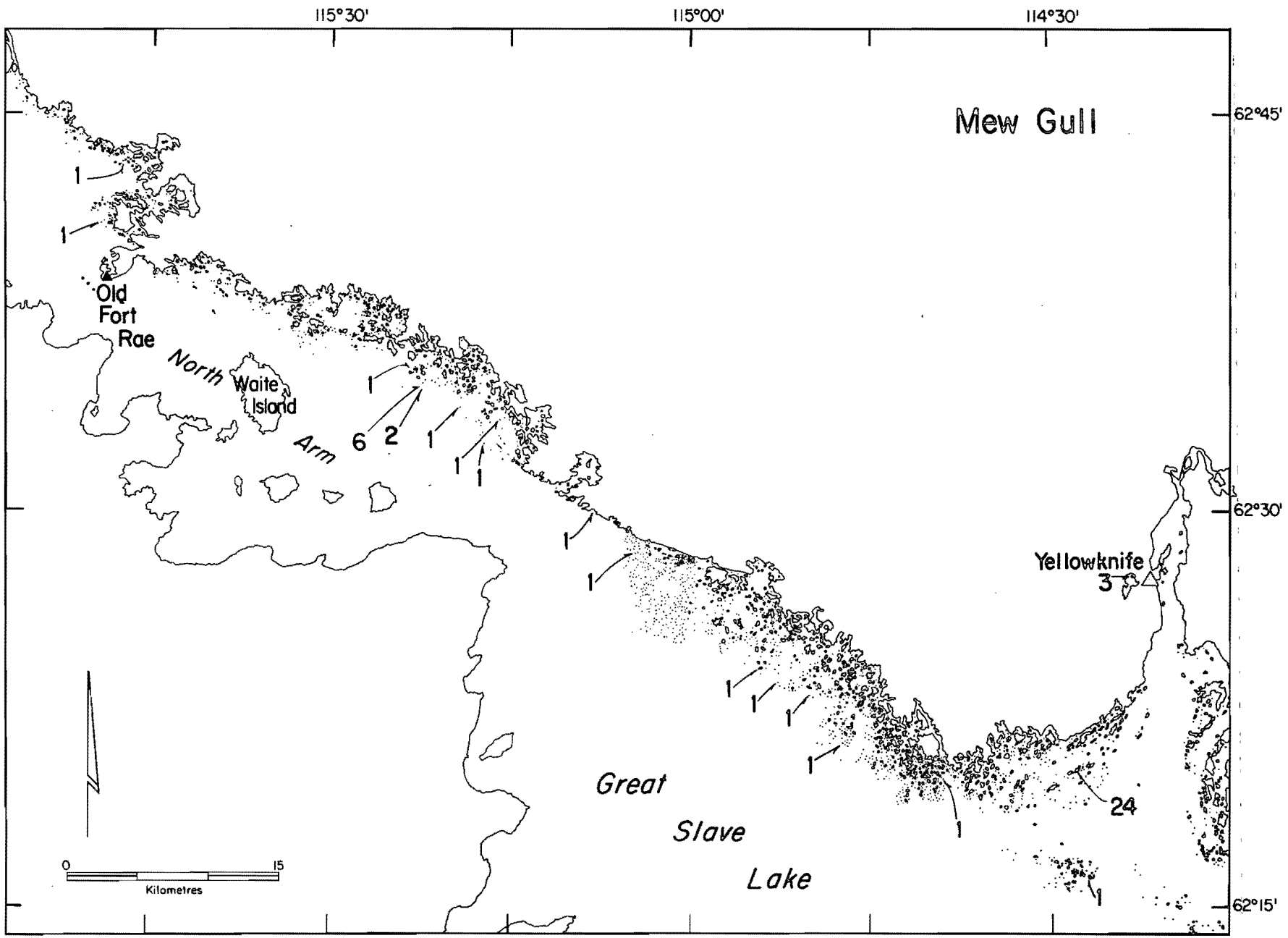

Figure 7. Distribution of New Gull breeding pairs along the North Arm of Great Slave Lake.

pairs). Only one breeding pair was seen at the West Mirage Islands during this survey. Associated breeding species included: Arctic-Common Terns - 12 sites, Herring Gull - eight sites, Ring-billed Gull - three sites, and Caspian Tern - two sites. Mew Gulls were the sole breeders at two sites.

The mean clutch size of 39 nests was 2.61. Observed clutch sizes were: three eggs, 69.2%; two eggs, 23.1%; and one egg, 7.7%. A predated nest and a dead chick were observed at Site 55 and 10 abandoned nests (six chicks observed) were recorded at Site 69. Hatching was not apparent at the other sites.

4.7 Bonaparte's Gull

One pair of Bonaparte's Gulls and their empty nest (no chick present) were observed at Site 69. A pair was observed at the same site during 1985 (J. Sirois, pers. obs.). As this species nests in trees, it would be more common among the inner islands of the North Arm - an area we did not intensively survey. This species is commonly observed around smaller wetlands adjacent to the North Arm. Flocks of 2-6 birds were regularly observed along the Yellowknife Highway between Fort Rae and Yellowknife during the summers of 1986 and 1987 (M. Fournier and G. Cameron, pers. comm.).

4.8 Other Birds

Observations on other birds are summarized in Table 2. Noteworthy observations include:

Table 2. Observations of other birds along the North Arm of Great Slave Lake. June 1986.

Site Number	Remarks
4	Scaup - 4*
6	Scaup - 12,6,16; pair of swans in nearby bay.
11	Scaup - 4,3,2,17,22,35+1 unidentified egg; 150 male Scaup and 12 male Buffleheads about 2.5 km northeast of this site.
14	Scaup - 9
16	Scaup - 7,7,12
17	Scaup - 13
18	Scaup - 7,15,8,10
19	Scaup - 6
21	Canada Goose - pair with three young; two large adults and one small adult.
23	Scaup - 7
24	Scaup - 11,9,11,12
25	American Wigeon - 6
26	Canada Goose - 6; Mallard - 9
29	Scaup - 9; Northern Pintail - 6
30	Scaup - 6,12
31	Scaup - 7
32	Scaup - 6; Northern Pintail - 11; about 300 male Red-breasted Mergansers nearby.
34	Scaup - 9,9; pair of Parasitic Jaegers on island midway between sites 33 and 34.
38	Scaup - 6, Northern Pintail - 5
40	Parasitic Jaeger - one seen.
42	Parasitic Jaeger - pair seen.
52	Parasitic Jaeger - one seen.
53	Scaup - 9
55	Scaup - 10,9,9
62	Parasitic Jaeger - pair seen.
63	Parasitic Jaeger - pair seen.
65	Parasitic Jaeger - four birds seen
70	Scaup - 15

* Size of clutches.

4.8.1 Scaup

A total of 38 scaup nests was discovered while searching for larid nests. However, it was not possible to identify the hens. Weller et al. (1969) and Trauger and Bromley (1976) indicated that Greater Scaup were common on the West Mirage Islands but Bromley (pers. comm.) suggests that Lesser Scaup are more common on the shoreward islands. Several reports suggest that ducks commonly nest in association with larids (Hilden 1964, Vermeer 1968, Dwernychuk and Boag 1971). Larids protect the duck nests from predation but extract a toll (gulls only) when the ducklings leave their nests.

A concentration of approximately 150 male scaup was also observed on 23 June. They were probably moulting birds from adjacent mainland breeding areas. As our survey was concentrated on the outer islands of the North Arm, considerably more birds may have been present among the shoreward islands. This area should be surveyed for moulting waterfowl.

4.8.2 Parasitic Jaeger

Fourteen Parasitic Jaegers, including four pairs, were observed during the survey (Table 2). Although no young were seen, one pair did demonstrate strong territorial behaviour. Five breeding pairs were recorded on the West Mirage Islands in 1970 and two or three breeding pairs were noted in subsequent years (Trauger and Bromley 1976). Preble (1908) encountered this species several times between Fort Resolution and Fort Rae. It is evidently a widespread resident on Great Slave Lake.

4.8.3 Swans

A pair of swans was seen near the mouth of the Stagg River (62° 44'N, 115° 44'W). These birds could have been Tundra Swans which did not complete their northward migration or Trumpeter Swans from the South Mackenzie District population. As a pair of swans (unidentified to species) nested near Calais Lake (61° 32' N, 116° 45' W) in 1986 (T. Chowns, pers. comm.), breeding Trumpeter Swans may be more widespread in the southern Mackenzie District than previously thought.

5.0 KEY HABITAT SITE

The 65 breeding pairs of Caspian Terns represent approximately 1.3 percent of the Canadian population of this species. (Martin 1978). Accordingly, the North Arm of Great Slave Lake is a Key Habitat Site for this species (McCormick et al. 1984). Additional surveys, to further define the Caspian Tern population on the North Arm and the remainder of Great Slave Lake are recommended.

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Appendix 1. Location of larid breeding sites on the North Arm of Great Slave Lake.

STAGG RIVER

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NORTHWEST TERRITORIES

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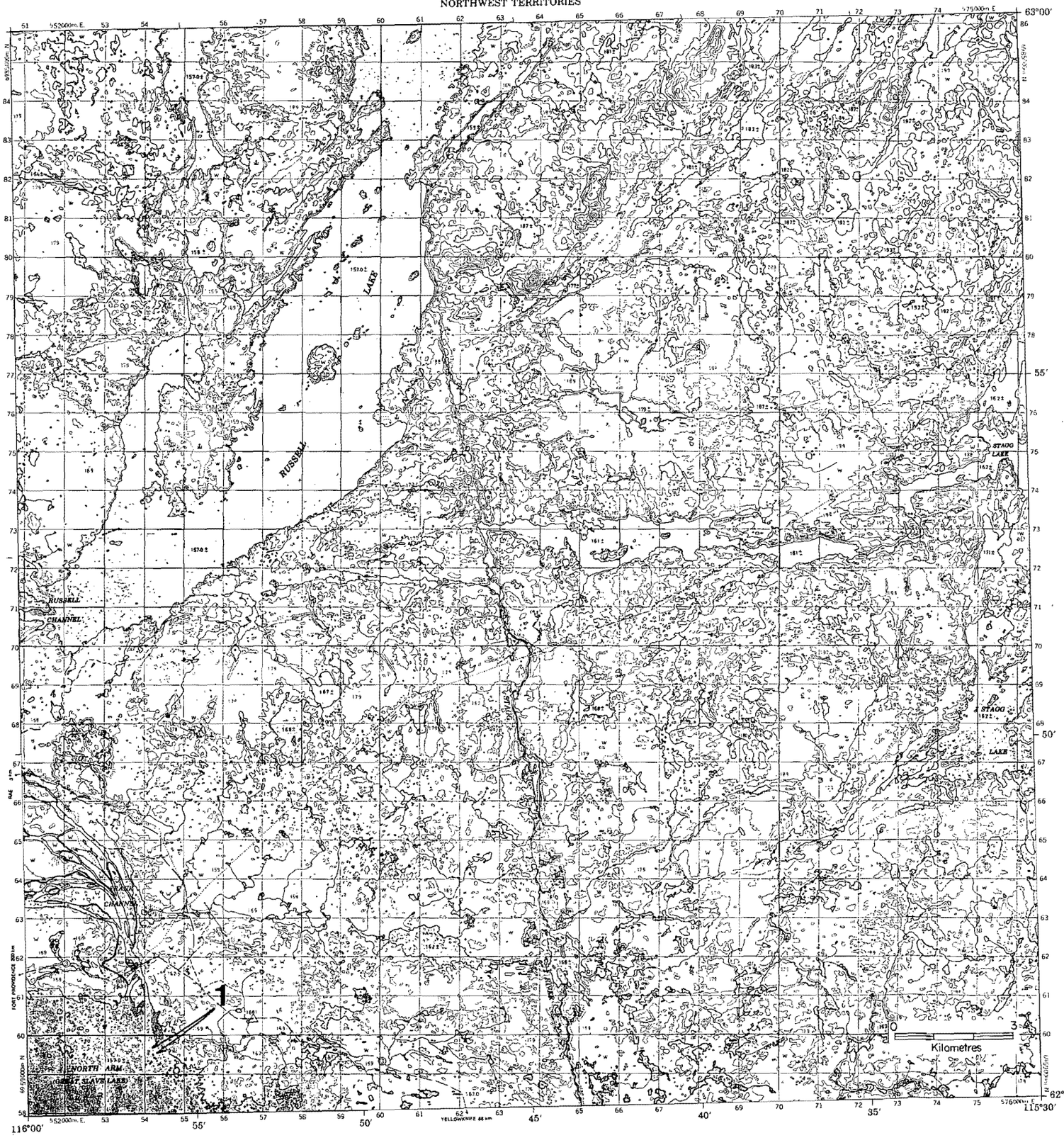

WAITE ISLAND

DISTRICT OF MACKENZIE

NORTHWEST TERRITORIES

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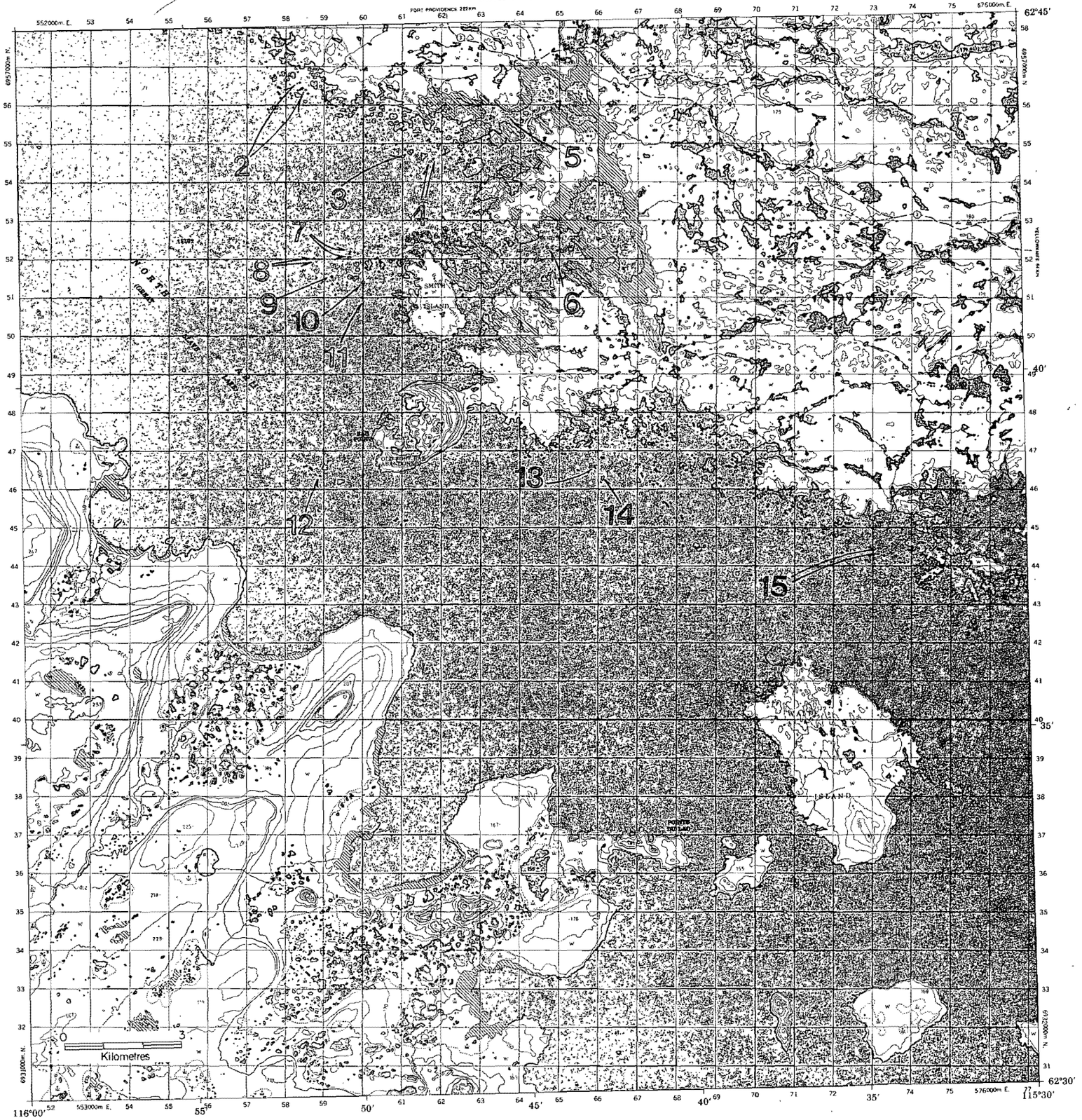

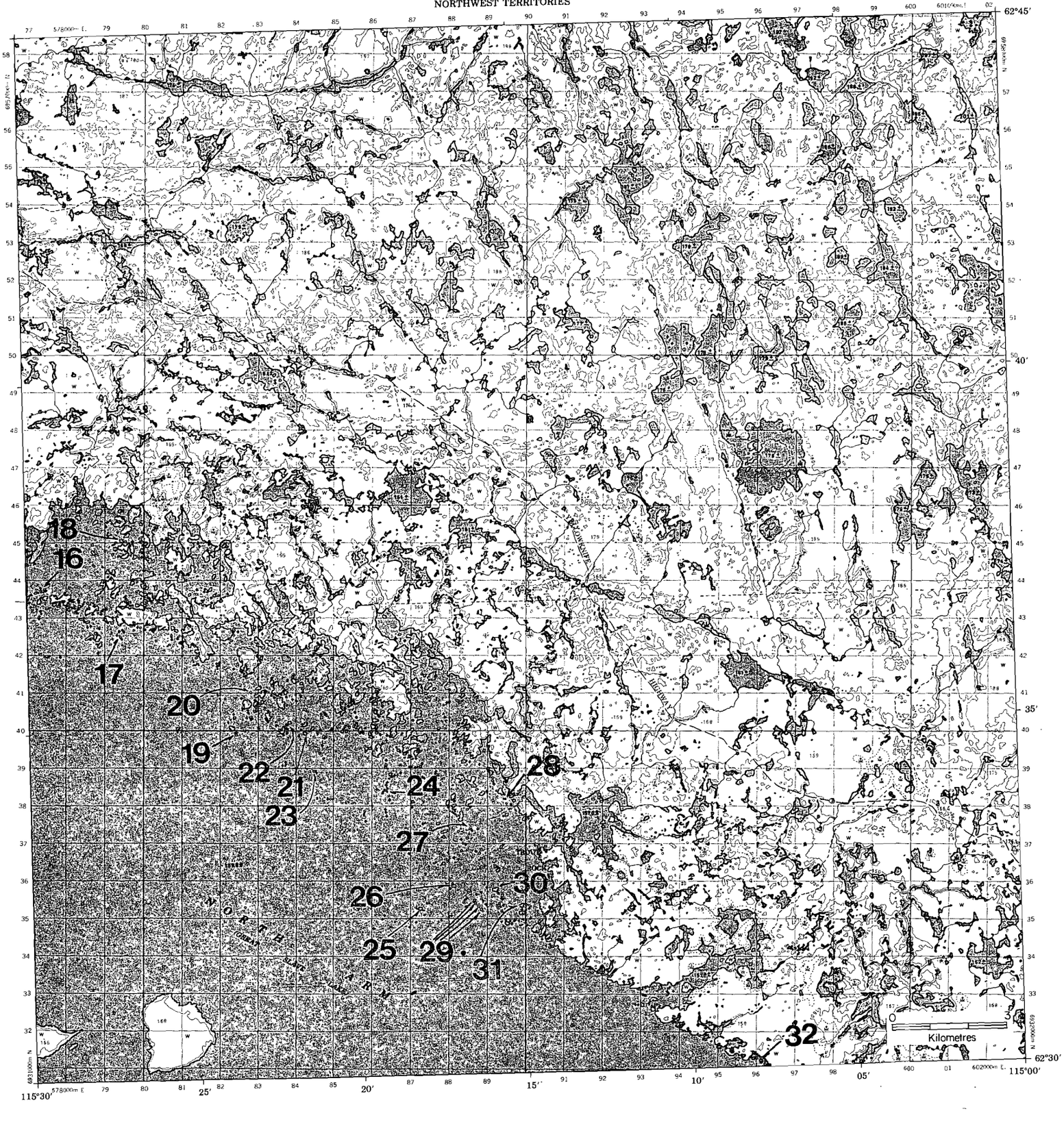
TROUT ROCK
DISTRICT OF MACKENZIE
NORTHWEST TERRITORIES
EDITION 1 85 J/11
62°45′
62°30′
115°30′
115°00′
40′
35′
25′
20′
15′
10′
05′
18
16
17
20
19
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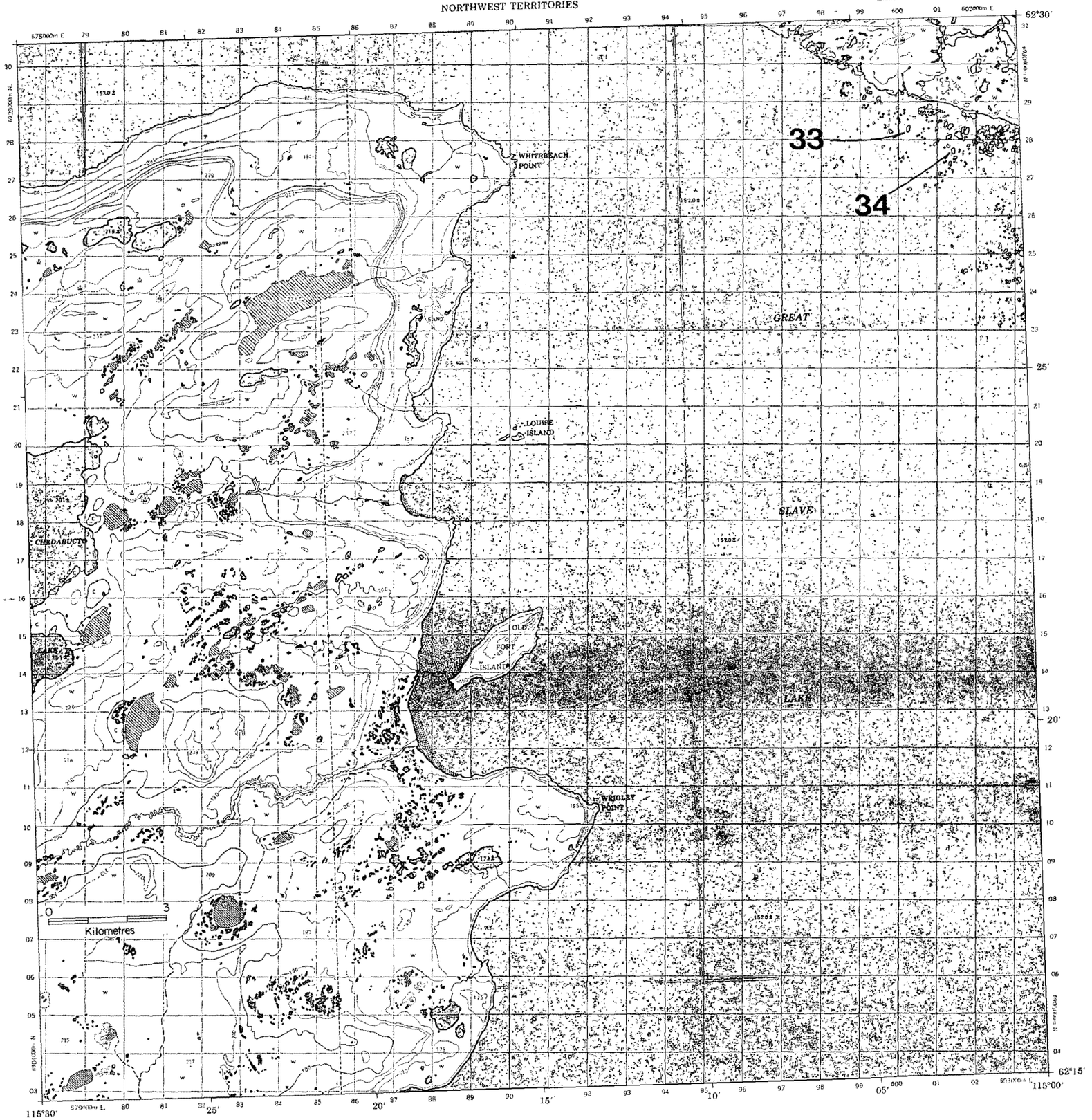
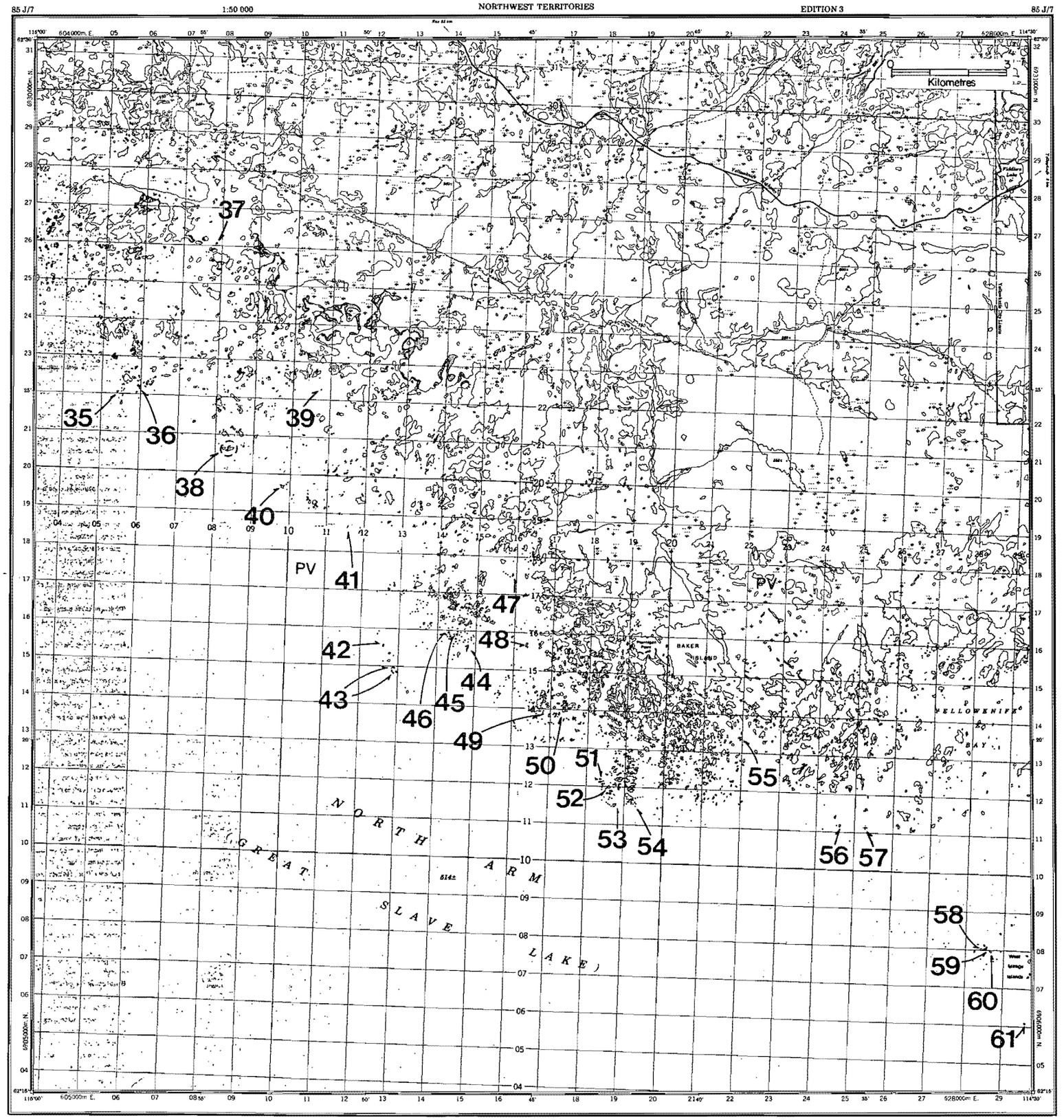
21
23
24
28
27
26
30
25
29
31
32
Kilometres


OLD FORT ISLAND
DISTRICT OF MACKENZIE
NORTHWEST TERRITORIES
EDITION 1 85 J/6
33
34
WHITEBEACH POINT
GREAT
SLAVE
LAKE
LOUISE ISLAND
CHEDABUCTO
OLD FORT ISLAND
WRIGLEY POINT
0 3
Kilometres
62°30′
62°15′
115°30′
115°00′

PTARMIGAN POINT

DISTRICT OF MACKENZIE
NORTHWEST TERRITORIES

85 J/7 | 1:50 000 | EDITION 3 | 85 J/7



YELLOWKNIFE BAY

DISTRICT OF MACKENZIE
NORTHWEST TERRITORIES

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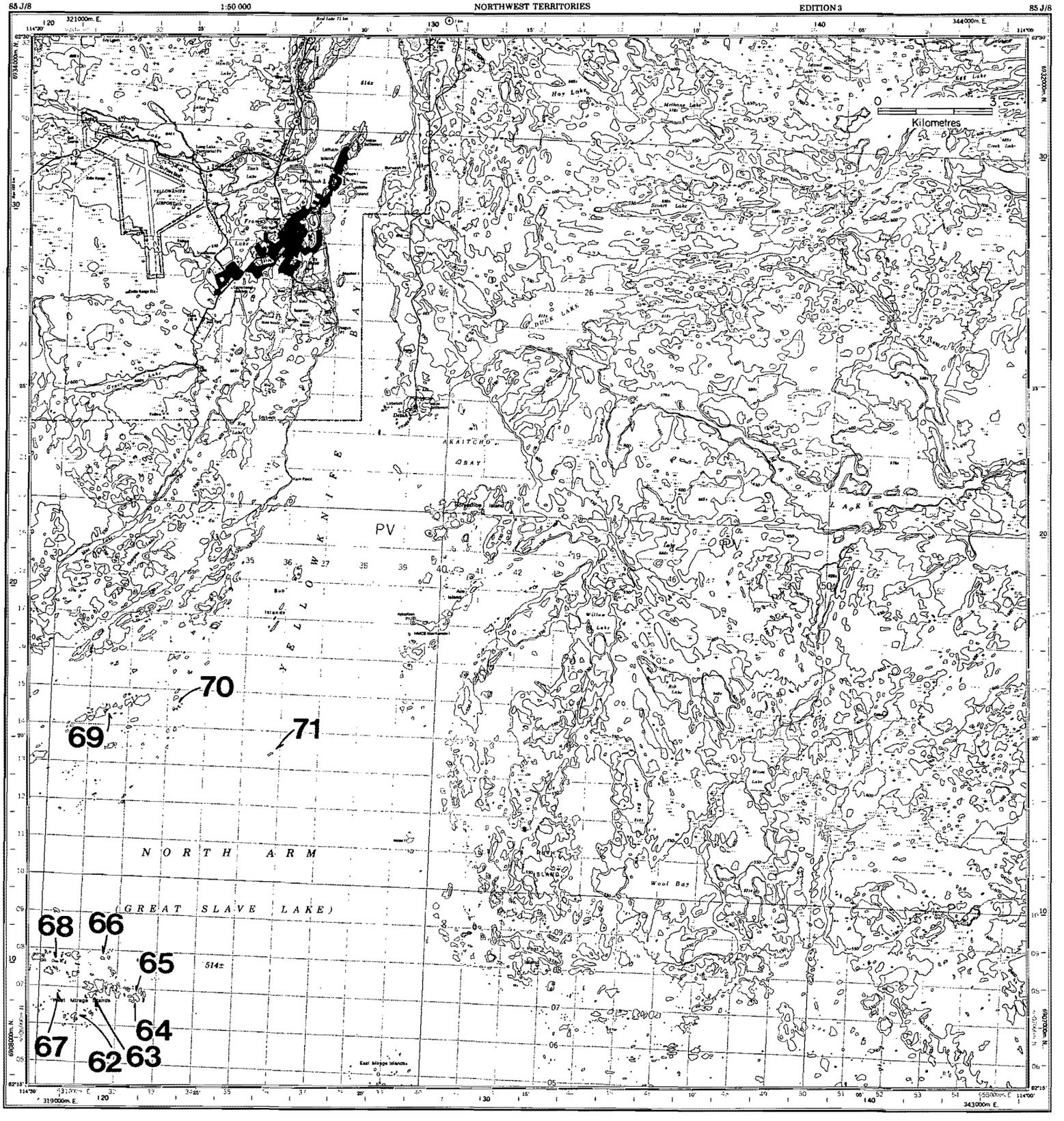
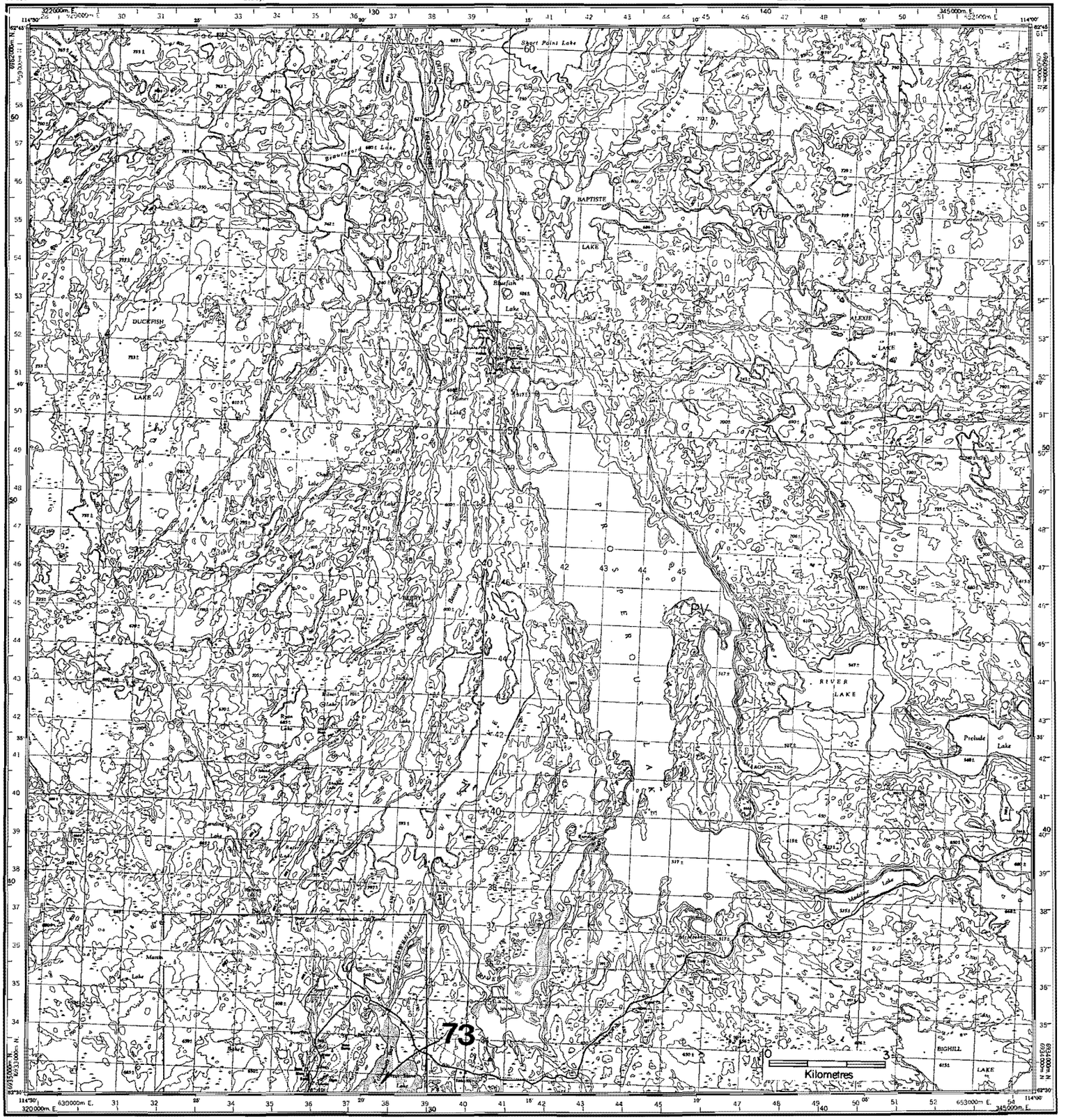


85 J/9 1:50,000 **PROSPEROUS LAKE** EDITION 2 85 J/9



Appendix 2. Number of nests of each species at larid breeding sites along the North Arm of Great Slave Lake, June 1986.

Site Number	Location UTM Grid	CATE	A-CTE	HEGU	CAGU	RBGU	MEGU
1	NV 5422 5975		22C*				
2	NV 5832 5656		2C				
3	NV 6120 5480		1A				
4	NV 6170 5455		4A	1			1
5	NV 6370 5570			1			
6	NV 6470 5230		25CA				
7	NV 5965 5205	1	4C				
8	NV 5875 5200			2			
9	NV 5920 5155			2			
10	NV 6000 5140	1	29A				
11	NV 6000 5090		22CA				1
12	NV 5893 4635		2C			51	
13	NV 4685 4660		1A				
14	NV 6615 4630	1	8C				
15	NV 7317 4440	1	10C				
16	NV 7745 4375		29C				
17	NV 7940 4250	1	23C			5	
18	NV 7950 4500		3C			132	
19	NV 8242 3990	1	3AC				
20	NV 8282 4100		8A				1
21	NV 8425 3990		22C			3	2
22	NV 8377 4010						6
23	NV 8450 3892		48	2		18	
24	NV 8637 3840		15C				1
25	NV 8725 3527	49	1	4		13	
26	NV 8815 3587		1				1
27	NV 8853 3740		28			6	1
28	NV 8945 3820		7	1			
29	NV 8877 3535		27CA	12		8	
30	NV 8920 3575		50C			3	
31	NV 8990 3535		7C				
32	NV 9615 3123		3A	1		2	1
33	PV 0025 2830		27AC				1
34	PV 0103 2782		21	1			
35	PV 0540 2205			10			
36	PV 0597 2215			10			
37	PV 0785 2607		9A				
38	PV 0835 2070	1	7A	14			1
39	PV 1073 2227		7C				
40	PV 0980 1990			32			1
41	PV 1157 1865			9			1
42	PV 1260 1555	2		13	22		
43	PV 1290 1482	1		12	9		
44	PV 1480 1560			6			
45	PV 1450 1590			3			
46	PV 1430 1595	1		9			1
47	PV 1592 1752			6			
48	PV 1632 1570			9			

Appendix 2. Continued.

Site Number	Location UTM Grid	CATE	A-CTE	HERG	CAGU	RBGU	MEGU
49	PV 1677 1385			3			
50	PV 1722 1390			9			
51	PV 1837 1220			14			
52	PV 1860 1200			9			
53	PV 1875 1150			21			
54	PV 1930 1155			12			
55	PV 2197 1340		21C	1			1
56	PV 2461 1120			8			
57	PV 2562 1115			15			
58	PV 2840 0800			15			
59	PV 2850 0804			13	16		
60	PV 2865 0797			13			
61	PV 2960 0610			18			
62	PV 3095 0630	1	11A				
63	PV 3140 0675		11A				
64	PV 3247 0665			3			1
65	PV 3250 0690	1		10	1		
66	PV 3165 0780	1					
67	PV 3055 0687			1			
68	PV 3040 0765	1		9			
69	PV 3145 1440		2				24
70	PV 3330 1455			14			
71	PV 3575 1340	1		32	44		
72	PV 3482 2800						3
73	PV 3765 3270		33C				

* Apparent Species: A - Arctic Tern, C - Common Tern.

Appendix 3. Clutch sizes of breeding larids along the North Arm of Great Slave Lake, June 1986.

Species	Number of Clutches	Number of Eggs			
		1	2	3	5
Caspian Tern	65	16	42	7	
Arctic-Common Tern	545	88	214	243	
Herring Gull	291	88	128	75	
California Gull	87	17	40	30	
Ring-billed Gull	241	34	68	137	2
Mew Gull	39	3	9	27	