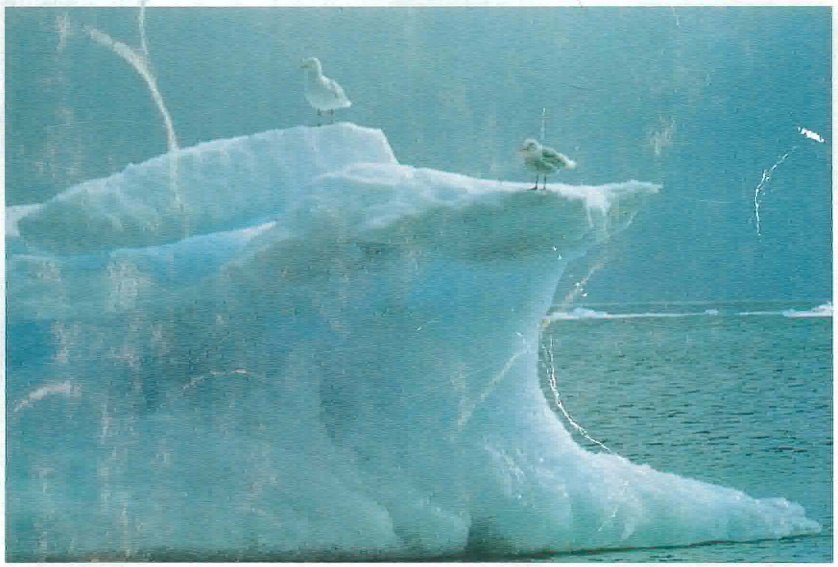
KEY AREAS FOR BIRDS IN COASTAL REGIONS OF THE CANADIAN BEAUFORT SEA



S.A. Alexander
T.W. Barry
D.L. Dickson
H. D. Prus
K. E. Smyth

Environment Canada
Canadian Wildlife Service

Environnement Canada
Service canadien de la faune

Canada

KEY AREAS FOR BIRDS IN COASTAL REGIONS OF THE CANADIAN BEAUFORT SEA

by

S.A. Alexander
T.W. Barry
D.L. Dickson
H.D. Prus
and
K.E. Smyth

CANADIAN WILDLIFE SERVICE
Edmonton, Alberta,

Project funded by the
Northern Oil and Gas Action Program
and
Canadian Wildlife Service

March 1988

Published by Authority of the
Minister of Environment
Canadian Wildlife Service

Catalogue No. CW66-93/1988E
ISBN 0-662-16165-3

Copies may be obtained from:
Canadian Wildlife Service
Western and Northern Region
4999-98 Avenue, 2nd. Floor
Edmonton, Alberta
T6B 2X3

Cover design: Susan Popowich
Photographs: Stuart Alexander
Left: King Eiders in lead off Banks Island
Top right: Red-necked Phalaropes feeding in pond
Bottom right: Glaucous Gulls on grounded ice

ABSTRACT

Information pertaining to avian distribution and abundance along the Canadian Beaufort Sea coast was summarized and used to evaluate the importance of the coastline to birds, in a regional context. Seasonal differences in the requirements of birds were considered through separate evaluations in each of four time-periods: spring migration (May to mid-June), nesting (June to mid-July), molting/broodrearing (mid-July to mid-August), and fall migration (mid-August to late September). The evaluations are presented in a series of ten maps as colour-coded delineations of regions of high, moderate, variable and low avian use. For each region in each time period there is a description of the major aspects of avian use (which may include comments on local population estimates, behaviour, year to year variation in numbers, and local movements of birds), and a listing of some of the data used in the evaluations. A general discussion on the limitations of the data used is presented in the introductory sections as an aid to the interpretation of information contained in the report.

RÉSUMÉ

Les données portant sur la distribution et l'abondance des oiseaux le long de la côte de la mer de Beaufort furent résumées et servirent à évaluer l'importance de la côte pour les oiseaux, dans un contexte régional. Les différences attribuables aux changements de saisons furent étudiées à travers quatre périodes d'évaluation: la migration du printemps (de mai à la mi-juin), la nidification (de juin à la mi-juillet), la mue/l'élevage des couvées (de la mi-juillet à la mi-août) et la migration de l'automne (de la mi-août à la fin septembre). Les résultats des évaluations sont représentés sur une série de dix cartes où les zones d'usage élevé, modéré, variable ou faible sont délimitées par des couleurs différentes. Pour toutes les zones, on décrit les principales tendances aviennes dans chaque période d'évaluation (qui peuvent comprendre des commentaires sur les prévisions sur l'importance des populations locales, le comportement, la variation numérique d'année en année et le mouvement local des oiseaux) et on dresse une liste de certaines données qui ont servi de base aux évaluations. Dans les chapitres d'introduction, on décrit les limites des données utilisées pour aider le lecteur à interpréter les renseignements contenus dans le rapport.

ACKNOWLEDGEMENTS

Joanne Barbeau conducted the initial literature search, and Kathy Smyth prepared the first edition of this report. Ernie Kuyt, Loney Dickson, Alan R. Smith, and Jim Hawkings, all of the Canadian Wildlife Service, kindly allowed us to use unpublished data. Sam Barry provided helpful advice on the design of the maps and on computer programming. Sam Barry, Roger Edwards, and Jim Hawkings provided many useful comments on the first two editions of this report. Susan Westover proofed final drafts of text and maps, and Audrey Lorincz helped with many of the chores. Susan Popowich provided graphical advice and direction, and prepared all figures.

Field work related to this project was conducted, at various times from 1985 to 1987, by: Stuart Alexander, Sam Barry, Jim Hawkings, Jacques Sirois, and Alan R. Smith, Canadian Wildlife Service; Dave Ealey and Bruno Croft, D.M. Ealey Environmental Services; Jill Pangman, Northwest Territories Renewable Resources; Pauline Proulx, Susan Westover and Vivian Wood; Victor Allen, Donald Arey, Frank Elanik, Colin Gordon, Lee John Meyook, Don Pattie, and Andy Tardiff, Herschel Island Territorial Park. Many of these people volunteered their time. Over the three years of field work, Antler Aviation in Inuvik has provided us with the best possible air service.

This project was funded by the Northern Oil and Gas Action Program and the Canadian Wildlife Service. Additional logistical support at various stages of the study has been provided by the Polar Continental Shelf Project of Energy, Mines and Resources Canada, and by the Inuvik Scientific Resource Centre, Indian and Northern Affairs Canada.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

INTRODUCTION

The southeastern Beaufort Sea coast provides marine and littoral habitat for hundreds of thousands of migrating, breeding and molting birds. Virtually the entire western Canadian Arctic population of some species migrate through the Beaufort Sea area. Oil and gas development could have major negative impacts on coastal habitats. Many of the necessary support facilities such as ports, airstrips, storage sites, and oil and gas processing plants will likely be located along the coast. Spilled oil and other toxic substances may contaminate coastal areas where birds tend to concentrate. In the Arctic ecosystem, such stressors could result in dangerous reductions in continental populations of some species.

Negative impacts could be minimized by setting certain restrictions for oil and gas development. For example: shore-based facilities could be located away from areas important to birds; high priority could be given for clean-up of toxic substances in areas important to birds.

The objective of this project was to develop a series of maps which identify the key areas for birds along the Beaufort Sea coast. This resulting atlas was primarily designed to enable quick responses to questions pertaining to bird distributions that may arise in the event of an oil spill in the Beaufort Sea region. However, this atlas is also a useful reference for advising various agencies on such issues as regional planning and industrial development.

The region covered by this atlas extends east along the Beaufort Sea coastline from the Alaska-Yukon border to the Baillie Islands off the tip of the Bathurst Peninsula. A section on spring migration through open water leads covers also Amundsen Gulf and Banks Island. Emphasis was placed on the nearshore waters of the Beaufort Sea and the land that is below the storm tide line. However, some information on birds using areas above the storm tide line was also reviewed and summarized.

METHODS

In order to determine which areas of the Beaufort Sea coastline were most important to birds, it was first necessary to evaluate which areas were important to individual species. The species considered are identified in Appendix A. In situations where there were insufficient data at the species level, the data were evaluated by species groups (geese, dabblers, divers and shorebirds).

For each species, all of the available information pertaining to its occurrence within the study area was plotted on seperate map overlays. The following information was included:

- the number and density of birds at specific locations on the map (densities were not used if the birds tended to be clumped, for example migrating geese);
- the date when the observation had been made (day, month and year);
- the type of survey (ground, boat, fixed-wing aircraft, or helicopter);
- the source of information.

A separate overlay was drafted for each major activity period for each species (spring migration, nesting, broodrearing, molting (waterfowl only), and fall migration). The base maps used were 1:250000 scale topographical maps.

A four-colour code system was developed to highlight which areas were most important to bird species: RED for areas used by a large number of individuals, YELLOW for moderate numbers, and GREEN for low numbers, including reports of non-presence. RED/YELLOW was assigned when numbers were normally moderate but were occasionally high. This will be discussed in more detail in the following sections.

1. Criteria for high, moderate, and low use (RED, YELLOW, and GREEN respectively) by individual species or species groups

All data points for a given species collected within a particular time/activity period were arranged in order from the highest to the lowest value (density or number of birds depending on the species). The highest 15 to 20% of these records delineated the range of values (densities or numbers) to be coded RED. For example, suppose there were the following 10 data points (density values) for some species of diving duck: 600, 500, 400, 300, 200, 100, 70, 30, 30, 20. The highest 20% of these records (600, 500) identify the range of values to be coded RED: values greater than or equal to 500.

Values less than the highest 15 to 20% of the records, and greater than or equal to the lowest 20 to 25% would be coded YELLOW. In the example given above, all densities from 70 to 499 would be in the YELLOW category.

The lowest 20 to 25% of values recorded delineated the range of values to be coded GREEN. In the example given above, all densities less than 70 would be in the GREEN category.

Beaufort Sea population estimates were available for some species. In such cases, observations of numbers of birds greater than or equal to 1% of the population were coded RED. The 1% level has been used previously to assess the value of ornithological sites (McCormick et al. 1984; Fuller 1980; Smart 1976).

Colonial groups of nesting birds were given a higher status because of the immobility of nesting sites and the clumped nature of the birds. For example, the lower RED value may be set at 200 (non-breeding) birds or 50 nesting pairs.

The Pacific and Red-throated Loons were ubiquitous in low densities throughout the Beaufort Sea region; thus, only YELLOW and GREEN categories were defined. The Black Guillemot nesting and broodrearing site on Herschel Island was rated RED because of its uniqueness and natural historical significance. Shorebird sightings were often difficult to rate due to the paucity of data on their distribution and habitat usage within the Canadian Beaufort Sea. In some

cases no rating was applied, but when a region was clearly being used by shorebirds, though the extent was unknown, a rating of YELLOW was applied.

2. Evaluation of the importance of separate localities to individual species or species groups

The data for a particular species were then organized by locality (for example, 9 data points for Workboat Passage, 5 for Phillip's Bay). The choice of boundaries for each locality was based on a combination of individual species' habitat requirements during each particular time/activity period, and the occurrence of geographical localities with natural boundaries (for example, smaller bays and islands). For each locality, an average value (average density or number) was computed. This average value was compared to the value ranges for high, moderate and low use established during step 1, and assigned the appropriate rating. If the average value fell into the YELLOW category, but in some years the densities or numbers of birds had been in the RED category, the locality for the species in question was coded RED/YELLOW. This rating emphasizes the variability in the presence of some species in some localities.

Objective rating systems sometimes yield unreasonable results. Therefore, all ratings were evaluated against the experience of researchers familiar with the Beaufort Sea area, the quality and type of data used in the objective process, and against additional data that could not be applied to the objective rating system.

3. Evaluation of the overall importance of separate regions to bird species

General regions of bird use were delineated based on a comparison of all localities outlined for individual species or species groups. The regions may be the same as the localities, or they may be a combination of a few localities. Each region was then assessed in terms of overall high, moderate or low numbers of birds, and assigned the appropriate colour code. The criteria used were as follows:

An area was designated as <u>RED</u> if it was:

- RED for one or more species
- RED/YELLOW for three or more species

An area was designated as <u>RED/YELLOW</u> if it was:

- RED/YELLOW for one or two species

An area was designated as <u>YELLOW</u> if it was:

- YELLOW for three or more species
- YELLOW for a nesting colony of one or more species (this applied during both the nesting and the broodrearing period)

An area was designated as GREEN if it was:

- GREEN for all species
- YELLOW for fewer than three species (except if a nesting colony)

As with individual species ratings, the overall ratings were evaluated against the experience of researchers familiar with the Beaufort Sea area, and against additional data not used in the objective processes.

A final set of maps was prepared illustrating the ratings of importance assigned to the various isolated localities along the southeastern Beaufort Sea coast, including some terrestrial portions. For the purpose of presentation, the study area was divided into three regions:

I. Yukon Coast,
II. Mackenzie Delta, and
III. Tuktoyaktuk Peninsula;

and three time periods:

A. Early June to mid-July,
B. Mid-July to mid-August, and
C. Mid-August to late September.

In addition, a separate map illustrating the ratings of importance of spring open water leads was drafted. This map included Amundsen Gulf and parts of Banks Island. Thus, there are ten maps in total (Figures 1 to 10).

For each area that was designated as RED, YELLOW or RED/YELLOW, and for a few of the GREEN areas, a descriptive paragraph and brief data summary are presented in the text that accompanies the maps. The paragraph discusses some of the geographical features of the area, the species present (including those present in low numbers), the activities of the birds, and if possible, the specific details of the birds' patterns of distribution within the region. The habitat preferences of each species, and the timing of each phase of its activities are presented in a summarized form in Appendix B. The paragraph provides a link between other time periods discussed elsewhere in the report.

The data summary is a listing of some of the data used in the objective rating process and in the evaluation of the ratings. The data presented were chosen to illustrate statements made in the descriptive paragraph (for example, about bird abundance or variability in the occurrence of birds) and to provide the reader with key references to studies conducted in each region. Some of the data has previously been unpublished. Each listing includes the species, number of birds observed or estimated, density of birds observed (for some species), activities of the birds, general time of year the data was collected, and the source. The species that used the area in high numbers (RED) are underlined, and those that sometimes used the area in high numbers (RED/YELLOW) are underscored by a broken line. Species using the area in moderate numbers (YELLOW) were usually listed in the data summaries, whereas species in the low use category are mentioned only in the descriptive paragraph.

SPECIAL NOTES

1. Observed versus actual numbers of birds

No attempt was made to derive population estimates for each region based on the data available in the literature. The number of birds presented in the data summaries for each species is usually the number of birds observed by the researcher. The actual number of birds will in most cases be much higher, and the discrepancy will be inversely proportional to the degree of coverage of the area by the researcher. In general, the discrepancies are most pronounced in areas of highly convoluted coastline, which are difficult to survey (such as along the northeast tip of the Tuktoyaktuk Peninsula), in the larger bays and sheltered areas (such as Hutchison Bay and Workboat Passage), in coastal wetland areas where nesting and broodrearing birds are well concealed (such as the Babbage River delta), and with all aerial sightings of shorebirds.

A few of the studies used for this atlas specifically attempted to estimate the populations of birds in particular regions. In such cases, population estimates are mentioned in the descriptive paragraph for the region, and may also be indicated in the data summaries (for an example, see the description for Hutchison Bay during mid-July to mid-August starting on page 97).

Certain species in some regions have been examined in many of the years between 1958 and 1987 by T.W. Barry. These species include Tundra Swans, Brant, Canada, Greater White-fronted and Lesser Snow Geese, Common Eiders, and Glaucous Gulls. This data has provided some site-specific population averages and population ranges. These values appear in the data summaries as, for example, "7000 birds, most years" and "2000 to 9000 birds, most years (Barry unpubl. data)".

2. Year to year variations in numbers of birds

Some species are present in some regions in very high numbers in the occasional year. Such regions have been coded RED/YELLOW for the particular species, and will have received the same overall rating if not RED for some other species. Some of the observed variability is likely due to inconsistent detection of migrating birds (see Note 3 below). In most cases, though, it is not known what causes these "unusual" mass congregations, and therefore, we are unable to provide a method for predicting their occurrence. However, there does appear to be a pattern to the regions involved, and the reader is cautioned against dismissing these areas as unimportant.

3. Numbers of birds during fall migration

Most reports of fall migrating ducks, shorebirds, gulls, and terns are from aerial surveys. Such observations are made over very short periods of time relative to the total migration period (for example, 20 minutes survey time versus a several week migration period). This relatively minute sampling effort gives extremely limited impressions of the total number of birds passing through specific regions, and the results must be interpreted with that in mind.

In other words, when reviewing regional descriptions and data summaries for fall migrating birds, it must be kept in mind that, over the entire migration period, each potential site can be visited by many separate flocks of birds, and that there may at times be large accumulations of birds due to such environmental factors as poor weather for migrating, food availability, and the condition of the young. The result is that the total number of birds visiting each site can potentially be quite large.

4. Artificial time/activity period boundaries

When consulting the atlas for information on bird use during a specific time period, as in an oil-spill situation, it is recommended that data for all time periods be reviewed for the region in question.

A review of all time periods provides a more complete impression of the dynamic nature of the bird distributions and abundances within each region. It will alert the reader to periods of change between absence and presence of birds, and it will discourage the reader from viewing seasonal changes as discreet, precisely timed jumps. For example, Workboat Passage, south of Herschel Island, harbours very few birds throughout most of June. In early July, post-breeding and non-breeding male Oldsquaw and scoters start to arrive in the area to undergo their annual feather molt. By late July there can be more than 10000 of these now-flightless birds in this sheltered marine habitat. Thus, Workboat Passage is rated GREEN in the 'Early June to mid-July' period but RED in all other periods. A reviewer examining only the first time period would be left with a false impression of the overall importance of Workboat Passage.

Reviewing all time periods enables the reader to determine whether effects from pollutants originating in the current time period will have major impacts in later seasons. For example, oil or other toxic substances spilled in late July may wash onto a relatively unused tidal marsh area without immediate threat to birds. However, the contaminated tidal flat may later in August and September provide staging habitat for numerous flocks of adult and young Brant and shorebirds.

Effects may be delayed between years. Toxic substances spilled in August or September may be deposited several kilometers inland by fall storms. Nesting grounds, such as the Anderson River delta, could become contaminated resulting in negative impacts on subsequent years' breeding bird populations. In addition, effects from oil spilled in winter ice would remain latent until the following spring break-up.

It is also important to realize that there is year to year variation in the chronology of the seasons. For example, an early spring may allow early nesting by diving ducks, and consequently males may be present on the molting grounds earlier than normally expected. Such two to three week variations in timing cannot be predicted by this atlas.

OFFSHORE OPEN WATER LEADS

SPRING MIGRATION ALONG OFFSHORE LEADS IN THE BEAUFORT SEA (FIGURE 1)

As many as 900 000 King Eiders, 150 000 Common Eiders and 240 000 Oldsquaw migrate in spring along open water leads in offshore areas of the Beaufort Sea (Woodby and Divoky 1982; Timson 1976; Johnson 1971). Most of the King Eiders choose a relatively straight, though broad front, path from Point Barrow, Alaska, to the west side of Banks Island, whereas most of the Common Eiders migrate along the open water lead that runs parallel to the Beaufort Sea coast (Barry 1986). The migration path of the Oldsquaw is not well known but appears to be similar to that of the Common Eider (Alexander et al. 1988; Richardson and Johnson 1981). Other bird species, particularly Glaucous Gulls, migrate through these areas, but in much lower numbers (Alexander et al. 1988; Barry et al. 1981; Barry and Barry 1982; Woodby and Divoky 1982).

Eiders and Oldsquaw migrating over the ice-covered Beaufort Sea are dependent on sections of open water for resting, feeding, and building fat reserves. This fuels long migration flights and ova development, and maintains the female during incubation. In 1964, there was a dramatic natural demonstration of the of dependancy on open leads when an estimated 100000 eiders died of starvation. In that year, the Beaufort Sea lead system did not begin to form until late in the summer (Barry 1968). Man-induced blockages or contamination of major staging sites could result in similar deaths, particularly in years when open water is scarce.

The recurrent Cape Bathurst polynya and adjoining lead system forms in the same general location most years (Smith and Rigby 1981; Marko 1975). However, the specific locations and sizes of offshore leads are highly variable between years. Unusual lead patterns may cause bird distributions to differ from the descriptions that follow. Very few studies have examined this relationship.

The evaluations presented in this report are based primarily on only four seasons of study, two by Alexander et al. (1988), and one each by Barry and Barry (1982) and Barry et al. (1981). Supporting data are drawn from Barry (1986), Richardson et al. (1975), and Searing et al. (1975). In each of the three primary studies, surveys were flown along the landfast ice-edge of most open water areas from Herschel Island to Banks Island. Alexander et al. (1988) flew two sets of surveys in 1986 (excluding Banks Island area) and five sets in 1987. Barry et al. (1981) and Barry and Barry (1982) flew one set each in 1980 and 1981. Approximately 1550 km of transects were flown in various locations off the Yukon coast from May 28 to June 26, 1975, by Richardson et al. (1975).

The line that depicts bird use in Figure 1 follows the usual location of the edge of the landfast ice. Actual locations of leads for a particular time period will have to be determined from the most recent satellite images of the Beaufort Sea (satellite images can be obtained from the Atmospheric Environment Service, Environment Canada). Caution is advised when applying the evaluations in this report to years when spring ice conditions are markedly different from those described in the sections to follow.

1. North of Komakuk Beach to Mackenzie Bay - Yellow

From May to mid-June, the position and structure of the Yukon portion of the recurrent southern Beaufort Sea lead tends to be less well-defined than sections further east. The lead, particularly west of Herschel Island, is often cluttered with large ice-pans resulting in a patchy and highly variable distribution of open water.

This area appears to be used minimally by all species. However, it is probable that tens of thousands of eiders, and Oldsquaw, migrate past this region. Thus, large congregations of Oldsquaw and eiders may be present from time to time, particularly if birds are met with unfavourable conditions for migration further east (such as extremely strong headwinds or dense fog). Moderate numbers of Glaucous Gulls are present from mid-May to early June. Loons are present in small numbers. Scoters are generally very scare until the latter part of June, at which time post-breeding males begin to congregate in preparation for molt. Black Guillemots from the Herschel colony (see page 24) likely feed in the leads around Herschel Island.

Data for 1986 and 1987 are from Alexander et al. (1988), and for 1975 from Richardson et al. (1975). There was very little open water in this area when surveys were flown in 1980 and 1981 (Barry et al. 1981; Barry and Barry 1982), and so this area was not surveyed in those years.

i. Common Eiders
   - 334 birds (10.7/km^2), 28 birds (0.7/km^2), and 185 birds (6.8/km^2), June 2, 9 and 15 1987
   - 279 birds (5.8/km^2), June 9-10 1986
   - 723, 120 and 33 birds, June 5, 15 and 26 1975

ii. King Eiders
   - 6 to 22 birds (0.2 to 0.8/km^2), June 2 to 15 1987
   - 47 birds (1.0/km^2), June 9-10 1986
   - 115, 163 and 20 birds, June 5, 15 and 26 1975

iii. Oldsquaw
   - 343 birds (10.9/km^2), 918 birds (24.6/km^2), and 100 birds (3.7/km^2), June 2, 9 and 15 1987
   - 147 birds (3.1/km^2), June 9-10 1986
   - 4274, 977 and 104 birds, June 5, 15 and 26 1975

iv. Glaucous Gulls
   - 165 birds declining to 13 (6.7 to 0.5/km^2), May 27 to June 15 1987
   - 111 birds (2.3/km^2), June 9-10 1986

2. North of the Mackenzie Delta - Yellow

This area appears to used minimally by all species. The Oldsquaw is the most abundant bird and at times, flocks of several hundred individuals are present. Eiders may also be present in large flocks, particularly if they are met with unfavourable conditions for migration to points further east. Migrating Glaucous Gulls are scattered along the ice edge in late May. Feeding loons are present in low numbers starting in early June.

Small, intermittent leads were sparcely distributed in this area during surveys in 1980 and 1981 (Barry et al. 1981; Barry and Barry 1982). Thus all data are from surveys in 1986 and 1987 (Alexander et al. 1988).

a. Northwest of Olivier Islands to Northwest of Pelly Island

i. Common Eiders
- 197, 885, 410 and 13 birds (5.1, 22.3, 9.2 and 0.3/km^2), May 27, June 2, 9 and 15 1987
- 715 and 854 birds (16.9 and 20.5/km^2), June 3 and 9 1986

ii. King Eiders
- 2 to 52 birds (0.1 to 1.3/km^2), May 27 to June 15 1987
- 35 and 141 birds (0.8 and 3.4/km^2), June 3 and 9 1986

iii. Oldsquaw
- 1037, 1649, 273 and 20 birds (27.0, 41.6, 6.1 and 0.5/km^2), May 27, June 2, 9 and 15 1987
- 110 and 441 birds (2.6 and 10.6/km^2), June 3 and 9 1986

iv. Glaucous Gulls
- 208 declining to 27 birds (5.4 to 0.7/km^2), May 27 to June 15 1987, and 37 birds (0.9/km^2), June 3 1986

b. Northwest of Pelly Island to North of Summer Island

i. Common Eiders
- 464, 274, 1097 and 128 birds (14.9, 8.0, 27.1 and 3.1/km^2), May 27, June 2, 9 and 15 1987
- 190 and 238 birds (9.0 and 6.8/km^2), June 3 and 9 1986

ii. King Eiders
- 20 to 57 birds (0.6 to 1.4/km^2), May 27 to June 15 1987
- 60 and 366 birds (2.8 and 10.5/km^2), June 3 and 9 1986

iii. Oldsquaw
- 222, 133, 632 and 116 birds (7.1, 3.9, 15.6 and 2.8/km^2), May 27, June 2, 9 and 15 1987
- 27 and 178 birds (1.3 and 5.1/km^2), June 3 and 9 1986

iv. Glaucous Gulls
- 209 declining to 24 birds (6.7 to 0.6/km^2), May 27 to June 15 1987, and 45 birds (1.3/km^2), June 9 1986

3. North of Kugmallit Bay to north of McKinley Bay - Yellow

Both Common and King Eiders are, in some years, present in moderately large numbers. Moderate numbers of Oldsquaw are also present. Migrating Glaucous Gulls are scattered along the ice-edge in late May. Feeding loons are found in small numbers. Scoters are scarce until late June, at which time post-breeding males begin to congregate in preparation for molt.

The lead in this area was distinct and wide during surveys in 1980, 1986 and 1987, whereas in 1981 it was restricted to a small area north of Hutchison Bay. Data for 1986 and 1987 are from Alexander et al. (1988), for 1981 from Barry and Barry (1982), and for 1980 from Barry et al. (1981).

i. Common Eiders
- 2539, 4617, 883, 1302 and 110 birds (56.2, 87.4, 17.7, 24.8 and 3.8/km^2), May 29, June 2, 9, 15 and 23 1987
- 331 and 1023 birds (7.8 and 20.9/km^2), June 3 and 9 1986
- 3 birds (0.1/km^2) on 9 June 1981
- 192 birds (6.3/km^2) on 5 June 1980

ii. King Eiders
- 40, 157, 99, 237 and 269 birds (0.9, 2.3, 2.0, 4.4 and 9.3/km^2), May 29, June 2, 9, 15 and 23 1987
- 798 and 2679 birds (18.9 and 54.8/km^2), June 3 and 9 1986
- 25 birds (1.0/km^2), June 9 1981
- 70 birds (2.3/km^2), June 5 1980

iii. Oldsquaw
- 308, 1036, 113, 186 and 265 birds (6.8, 19.6, 2.3, 3.4 and 9.2/km^2), May 29, June 2, 9, 15 and 23 1987
- 108 and 393 birds (2.6 and 8.0/km^2), June 3 and 9 1986
- 20 birds (0.8/km^2), June 9 1981
- 136 birds (4.5/km^2), June 5 1980

iv. Glaucous Gulls
- 307 declining to 3 birds (6.8 to 0.1/km^2), May 29 to June 23 1987
- 20 and 37 birds (0.5 and 0.8/km^2), June 3 and 9 1986
- 3 birds (0.1/km^2), June 9 1981
- 50 birds (1.6/km^2), June 5 1980

4. North of Mckinley Bay to north of Cape Dalhousie - Red

Large numbers of both Common and King Eiders may be present in this area, though Common Eiders are the more abundant of the two. Oldsquaw and Glaucous Gulls have been observed only in small numbers. Scoters are scarce until late June, at which time post-breeding males begin to congregate for the molt.

In 1980, 1986 and 1987 the lead was wide and continuous, whereas in 1981 the lead was self-contained but covered most of the region. Data for 1986 and 1987 are from Alexander et al. (1988), for 1981 from (Barry and Barry 1982), and for 1980 from Barry et al. (1981).

i. Common Eiders
- 1523, 1939, 7001, 6801 and 121 birds (49.6, 64.3, 254.4, 209.4 and 3.6/km^2), May 29, June 2, 9, 15 and 23 1987
- 1799 and 311 birds (85.2 and 15.0/km^2), June 3 and 9 1986
- 674 birds (28.0/km^2), June 9 1981
- 592 birds (10.7/km^2), June 5 1980

ii. King Eiders
- 41, 6735, 943, 632 and 839 birds (1.3, 22.3, 34.3, 19.5 and 25.0/km^2), May 29, June 2, 9, 15 and 23 1987
- 1961 and 1503 birds (92.8 and 72.7/km^2), June 3 and 9 1986
- 3085 birds (128.5/km^2), June 9 1981
- 154 birds (2.8/km^2), June 5 1980

iii. Oldsquaw
- up to 90 birds (2.8/km^2), May 29 to June 23 1987
- 183 birds (8.7/km^2), June 3 1986
- 468 birds (19.5/km^2), June 9 1981
- 115 birds (2.1/km^2), June 5 1980

iv. Glaucous Gulls
- 158 birds declining to 1 bird (5.1 to <0.1/km^2), May 29 to June 23 1987
- up to 27 birds (1.3/km^2), June 3 to 9 1986
- 6 birds (0.3/km^2), June 9 1981
- 38 birds (0.7/km^2), June 5 1980

5. North of Cape Dalhousie to the Baillie Islands - Red

Tens of thousands of Common Eiders may be present in this area at any time from mid-May to late June. On one day in late May, 1974, over 50 000 individuals were observed (Searing et al. 1975). The occurrence of so many birds at once may be unusual; however, it is likely that there is a high turnover of migrants, and that the overall number of Common Eiders passing through and stopping over would be in excess of 50 000. The reasons for such small numbers in 1980 and 1981 are not known, nor can it be determined for those years whether or not large numbers were present before or after the survey dates. Unfortunately there is no data on turnover rate. Nor is there any data on the activities of birds. Thus it is not known if, for example, birds are feeding extensively for several days, or if they stop primarily for a short period of resting. The activities of the birds and the duration of stay may vary yearly and weekly depending on such cues as ice conditions further east and the advancement of spring. Moderate numbers of King Eiders are also present. Oldsquaw tend to be abundant around the Baillie Islands and Cape Bathurst, but less numerous west of there. Again, the turnover rates of King Eiders and Oldsquaw are not known and large numbers may, afterall, pass through the area. In late June or early July, male eiders of both species begin their westward molt-migration, passing through this area in large numbers (Anderson 1913). However, the degree to which the molt-migrants utilize this area as a stop-over site is unknown. Small numbers of Glaucous Gulls are scattered along the ice-edge.

In 1980, 1986 and 1987 there was a wide and continuous lead, whereas in 1981 open water was restricted to a small area around the Baillie Islands. Data for 1986 and 1987 are from Alexander et al. (1988), for 1981 from (Barry and Barry 1982), and for 1980 from Barry et al. (1981).

a. North of Cape Dalhousie to west of the Baillie Islands

i. Common Eiders
- 6053, 11 496, 15 812, 3860 and 660 birds (243.3, 494.7, 254.4, 195.3 and 34.4/km^2), May 29, June 2, 9, 15 and 23 1987
- 9461 and 18708 birds (448.0 and 662.5/km^2), June 3 and 9 1986
- 134 birds (16.7/km^2), June 9 1981
- 304 birds (8.9/km^2), June 5 1980

ii. King Eiders
- 110, 263, 443, 380 and 2473 birds (4.4, 11.3, 19.7, 19.2 and 128.8/km^2), May 29, June 2, 9, 15 and 23 1987
- 302 and 2521 birds (14.3 and 89.3/km^2), June 3 and 9 1986
- 204 birds (25.5/km^2), June 9 1981
- 90 birds (2.6/km^2), June 5 1980

iii. Oldsquaw
- 160, 367, 843, 387 and 32 birds (6.4, 15.8, 37.4, 19.6 and 1.7/km^2), May 29, June 2, 9, 15 and 23 1987
- 897 and 58 birds (42.5 and 2.0/km^2), June 3 and 9 1986
- 277 birds (34.6/km^2), June 9 1981
- 34 birds (1.0/km^2), June 5 1980

iv. Glaucous Gulls
- 116 declining to no birds (4.7/km^2), May 29 to June 23 1987
- up to 6 birds (0.3/km^2), June 3 to 9 1986
- 25 birds (0.7/km^2), June 5 1980

b. Baillie Islands area

i. Common Eiders
- up to 415 birds (49.4/km^2) May 29 to June 23 1987
- 3300 and 1015 birds (234.4 and 73.8/km^2), June 3 and 9 1986
- 784 birds (98.0/km^2), June 9 1981
- 871 birds (31.9/km^2), June 5 1980

ii. King Eiders
- up to 327 birds (34.1/km^2), May 29 to June 23 1987
- 323 and 41 birds (22.9 and 3.0/km^2), June 3 and 9 1986
- 394 birds (49.2/km^2), June 9 1981
- 43 birds (1.6/km^2), June 5 1980

iii. Oldsquaw
- 7, 633, 337, 244 and 65 birds (1.4, 70.6, 77.3, 29.0 and 6.8/km^2), May 29, June 2, 9, 15 and 23 1987
- 6078 and 515 birds (431.7 and 37.4/km^2), June 3 and 9 1986
- 81 birds (10.1/km^2), June 9 1981
- 60 birds (2.2/km^2), June 5 1980

iv. Glaucous Gulls
- up to 13 birds (1.4/km^2), May 29 to June 23 1987
- up to 13 birds (0.9/km^2), June 3 to 9 1986
- 15 birds (1.9/km^2), June 9 1981
- 75 birds (2.7/km^2), June 5 1980

6. Franklin Bay - Broken Yellow

Use of this area by spring migrants is not well documented. Open water was not available at this location during surveys in 1980, 1981 and 1986, but was in 1987. Small numbers of eiders, Oldsquaw and Glaucous Gulls were were seen that year. Data are from Alexander et al. (1988).

i. Common Eiders
- up to 358 birds (6.7/km^2), June 1 to 16 1987

ii. King Eiders
- up to 599 birds (11.1/km^2), June 1 to 16 1987

iii. Oldsquaw
- up to 272 birds (14.6/km^2), June 1 to 16 1987

iv. Glaucous Gulls
- up to 26 birds (0.6/km^2), June 1 to 16 1987

7. Parry Peninsula - Red/Yellow

In some years, up to 20 000 eiders and Oldsquaw may be in this region, particularly around the north end of the peninsula (Barry and Barry 1982). Open water was not available at this location during surveys in 1980 (Barry et al. 1981), 1981 (Barry and Barry 1982), and 1986, but was abundant in 1987 (Alexander et al. 1988). In that year, Common Eiders were sparce in late May but increased to a few thousand by mid-June. Low numbers of King Eiders and Oldsquaw were seen. Glaucous Gulls were quite abundant in late May and early June. The regularity of and conditions for large build-ups of birds are not known. Data are from Alexander et al. (1988)

i. Common Eiders
- 7, 599, 1596 and 3213 birds (0.4, 26.1, 53.6 and 99.5/km^2), May 26, June 1, 12 and 16 1987

ii. King Eiders
- up to 166 birds (5.1/km^2), May 26 to June 16 1987

iii. Oldsquaw
- up to 375 birds (11.6/km^2), May 26 to June 16 1987

iv. Glaucous Gulls
- 591, 268, 108 and 52 birds (30.0, 11.7, 3.6 and 1.6/km^2), May 26, June 1, 12 and 16 1987

8. West Side of Amundsen Gulf - Green

This area appears to be used minimally by all species. The lead extended through Amundsen Gulf in 1980, 1986 and 1987 but was surveyed only in 1980 (Barry et al. 1981), and 1987 (Alexander et al. 1988). During surveys in 1981, the west Amundsen Gulf lead was not open (Barry and Barry 1982).

i. Common Eiders
- up to 9 birds (0.2/km^2), May 26 to June 16 1987
- 388 birds (7.1/km^2), June 5 1980

ii. King Eiders
- up to 9 birds (0.2/km^2), May 26 to June 16 1987
- 62 birds (1.1/km^2), June 5 1980

iii. Oldsquaw
- up to 10 birds (0.2/km^2), May 26 to June 16 1987
- 58 birds (1.1/km^2), June 5 1980

iv. Glaucous Gulls
- 256, 323 and no birds (5.6 and 7.3/km^2), May 26, June 1 and 16 1987
- 80 birds (1.5/km^2), June 5 1980

9. Southwest of Banks Island (Thesiger Bay) - Yellow

Use of this area is not well documented. In 1980 the landfast ice-shelf extended far offshore. In 1987 the lead was close to Banks Island but survey coverage was rendered inadequate by poor flying conditions. It is likely that King Eiders are present at times in much larger numbers than indicated by the data. Several hundreds of thousands of King Eiders nest on Victoria Island (Barry 1968). Their spring migration likely follows a route to Victoria Island via the Banks Island lead (Barry 1986). Birds from the main staging site (region 10 below) north of Cape Kellet may either cross over Banks Island or skirt around the south end of the island before heading into the Minto Inlet/Prince Albert Sound area of Victoria Island (Smith 1973). Thus very large numbers of King Eiders (and to a lesser extent, Common Eiders) may pass through this area. Data for 1987 are from Alexander et al. (1988), and for 1980 from Barry et al. (1981).

i. Common Eiders
- up to 463 birds (10.8/km^2), May 26 to June 16 1987
- 240 birds (5.0/km^2), June 5 1980

ii. King Eiders
- up to 1613 birds (37.8/km^2), May 26 to June 16 1987
- 40 birds (0.8/km^2), June 5 1980

iii. Oldsquaw
- up to 51 birds (1.2/km^2), May 26 to June 16 1987
- 50 birds (1.0/km^2), June 5 1980

iv. Glaucous Gulls
- 85 and 262 birds (8.6 and 11.4/km^2), May 26 and June 1 1987
- 219 birds (4.6/km^2), June 5 1980

10. North of Cape Kellet, Banks Island - Red

The southern two-thirds of the west coast of the island is an extremely important spring staging area for King Eiders. Up to 95 000 individuals have been observed in the area on a single day (Barry 1986). As many as 800 000 of these birds are thought to nest on Victoria Island, and 120000 on Banks Island (Barry 1968). Migration to Victoria Island is via the Banks Island lead (Barry 1986). Common Eiders are present in moderate numbers. Oldsquaw and Glaucous Gulls are present only in small numbers.

Open water can be found in the vicinity of Cape Kellett, Banks Island, in virtually all months of the year (Smith and Rigby 1981). Surveys were flown along the eastern edge of the Banks Island lead in 1980 (Barry et al. 1981) and 1981 (Barry and Barry 1982). The region was not surveyed in 1986 and only cursory coverage was made in 1987 (Alexander et al. 1988).

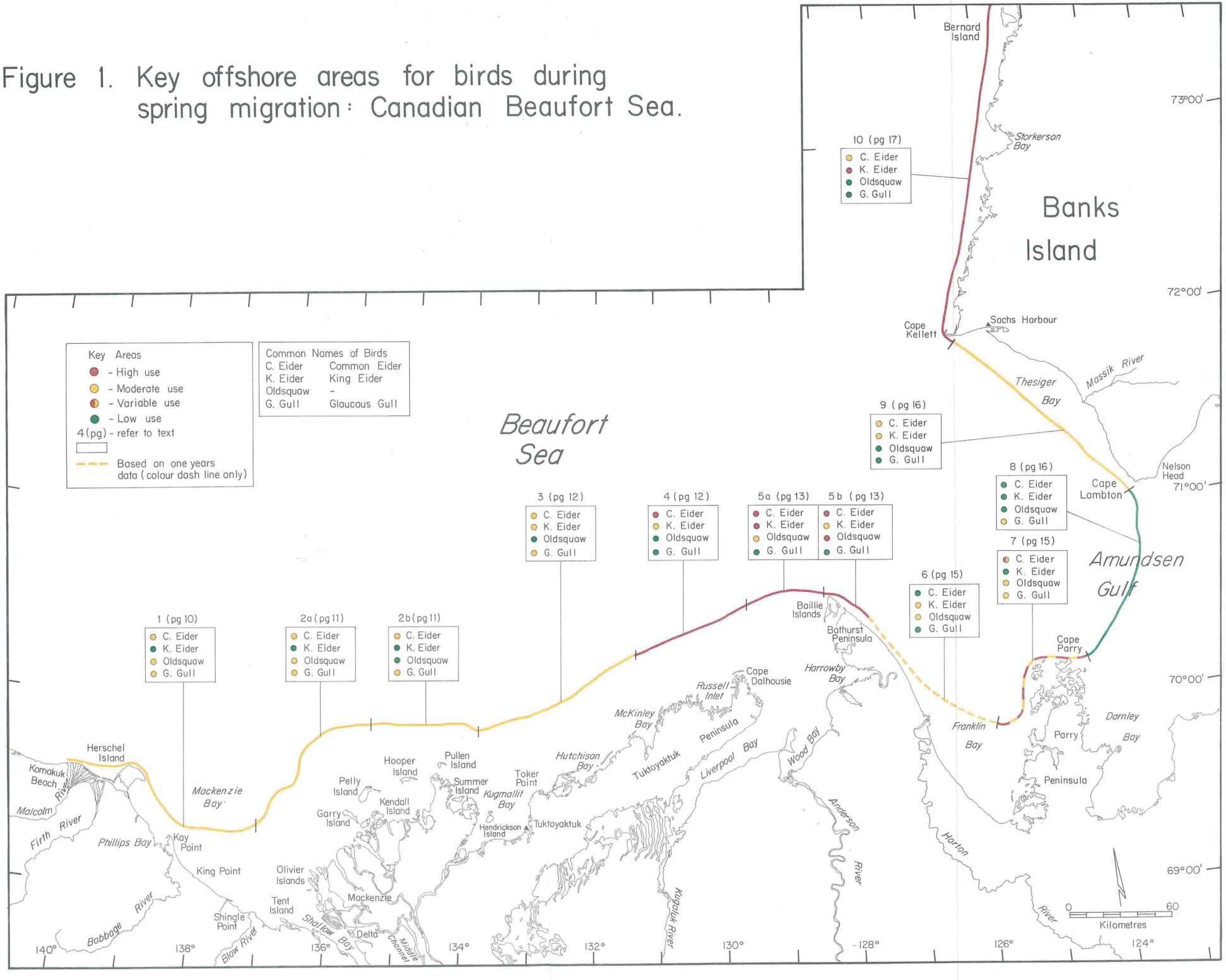
i. Common Eiders
- 18 and 166 birds (1.0 and 2.3/km^2), May 26 and June 1 1987
- 1082 birds (19.3/km^2), June 9 1981
- 197 birds (3.2/km^2), June 5 1980

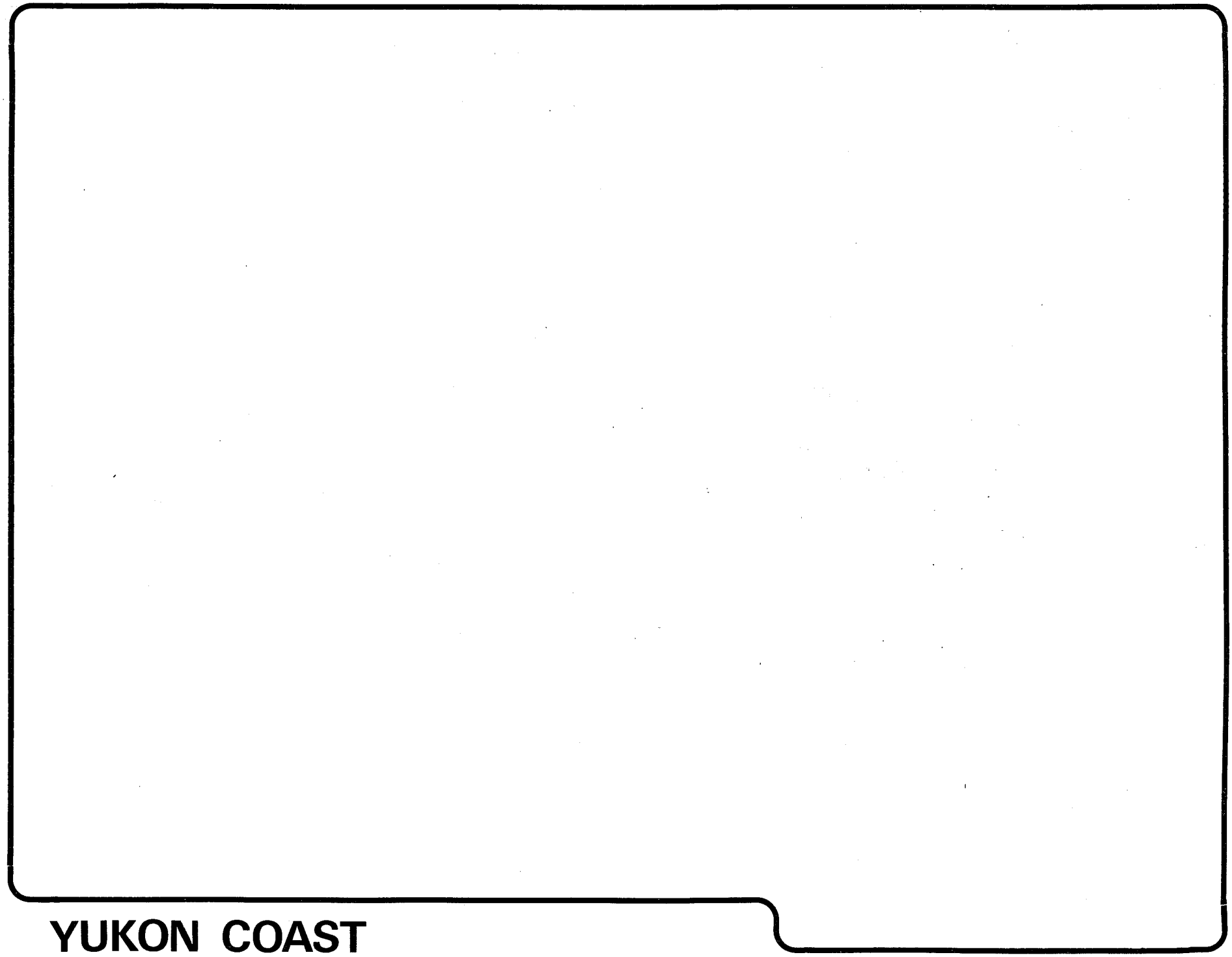
ii. King Eiders
- 1966 (plus 2000 predominantly King Eiders) and 1081 birds (114.0 and 15.2/km^2), May 26 and June 1 1987
- 16 461 birds (293.9/km^2), June 9 1981
- 5398 birds (87.8/km^2), June 5 1980

iii. Oldsquaw
- 5 and 23 birds (0.3/km^2), May 26 and June 1 1987
- 8 birds (0.2/km^2), June 9 1981
- 177 birds (2.9/km^2), June 5 1980

iv. Glaucous Gulls
- 15 birds (0.3/km^2), June 9 1981
- 42 birds (0.7/km^2), June 5 1980

Figure 1. Key offshore areas for birds during spring migration: Canadian Beaufort Sea.





YUKON COAST

A. EARLY JUNE TO MID-JULY (FIGURE 2)

1. Nunaluk Spit and adjacent islands - Yellow

On the four islands east of Nunaluk Spit there are several small nesting colonies of Common Eiders, Glaucous Gulls and Arctic Terns. These species also nest scattered along Nunaluk Spit. Small numbers of Tundra Swans and dabbling ducks (probably molting birds) are found on the spit and in the waters between the spit and the mainland. This area becomes more important in July (see page 31). Small numbers of Red-throated Loons feed in water seaward of the spit.

a. Entire spit, as well as the water between the spit and the Firth and Malcolm river deltas

i. Tundra Swans
- 25 birds, mid-July 1974 (Kuyt pers. comm.)

ii. Dabbling ducks
- 20 birds, early July 1974 (Kuyt pers. comm.)

iii. Arctic Terns - nesting
- approximately 14 birds at base of spit, late June 1971 (Schweinsburg 1974)

b. First island east of Nunaluk Spit

i. Arctic Terns - nesting
- 9 nests in 1972 (Gollop and Richardson 1974)
- approximately 50 adults and 7 nests (estimate of at least 24 nests on the island based on number of young and fledglings observed later in the season), June to early July 1971 (Schweinsburg 1974)

ii. Common Eiders - nesting
- 5 to 25 nests (Barry unpubl. data)
- 25 nests in 1972 (Gollop and Richardson 1974)
- 19 nests (71 eggs) and 27 adults, June to early July 1971 (Schweinsburg 1974)

iii. Glaucous Gulls - nesting
- 15 nests in 1972 (Gollop and Richardson 1974)
- 18 nests (20 eggs), late June 1971 (Schweinsburg 1974)

c. Second island east of Nunaluk Spit

i. Glaucous Gulls - nesting
- 24 nests in 1972 (Gollop and Richardson 1974)

d. Islands east of Nunaluk Spit

i. Glaucous Gulls - nesting
- 10 to 20 pairs (Barry unpubl. data)

2. Pauline Cove, Herschel town site - Red

This is the site of the only substantial Black Guillemot nesting colony in the Beaufort Sea region. A second minor site is located at Cape Parry: one nest was found among stacked fuel barrels in 1980 (Barry et al. 1981). These birds usually nest on talus slopes and cracks in cliffs, but this type of habitat is absent throughout most of the Beaufort Sea. At Herschel, bird nests are found primarily in man-made rubble (old buildings), but also in driftwood piles. Numbers of nests have ranged from 10+ in 1973 (Kuyt et al. 1976) to 31 in 1986 (Ward and Mossop 1986). Maximum numbers of adult birds recorded in the area between 1984 and 1986 were 107, 83 and 90 respectively (Ward and Mossop 1986). These birds feed in marine waters, but it is not known which areas around Herschel Island are used most extensively.

3. Phillips Bay - Yellow

Small groups of nesting Glaucous Gulls are found on both the spit seaward of the Spring River delta and the spit that extends into Phillips Bay off Kay Point. Nearshore terrestrial areas and sheltered waters of the bay are used by nesting and molting Tundra Swans. Dabbling ducks molt in nearshore ponds and in sheltered bay waters. Small numbers of Red-throated Loons feed in the bay.

a. Entire bay
   i. Tundra Swans - nesting, molting
      - 31 nesting and non-breeding birds, mid-June 1981 (Dickson 1985)

   ii. Dabbling and diving ducks - molting
      - 29 non-breeders (1.9/km^2), mid-June 1981 (Dickson 1985)
      - 125 birds (7.6/km^2), late June 1983 (Dickson et al. 1988)

b. Spring River delta
   i. Glaucous Gulls - nesting
      - 42 birds and several nests, mid-June 1981 (Dickson 1985)

   ii. Dabbling ducks - molting
      - 45 birds, early July 1974 (Kuyt pers. comm.)

c. Kay Point spit and islands
   i. Glaucous Gulls - nesting
      - 60 adults and 17 nests, mid-June 1981 (Dickson 1985)
      - 19 pairs in 1974 (Barry unpubl. data)
      - 8 nests on second island and undetermined number of nests on first island off Kay Point spit, mid-July 1973 (Gollop and Richardson 1974)

4. Babbage River delta - Yellow

The Babbage River delta is not used for nesting by large numbers of any particular species. However, the delta's ponds, channels, grass-sedge flats and mudflats are used by a diversity of species including Pacific Loons; Northern Pintails; American Wigeons; Northern Shovelers;

Green-winged Teal; Oldsquaw; scaup; and shorebirds, particularly Semipalmated Sandpipers and Red-necked Phalaropes. To date very few studies have been conducted. Ground surveys by Dickson et al. (1988), which are quoted below, covered only a small part of the delta and provide an impression of species composition, but not extent of use. (Numbers of birds are both on and off transect observations; density from on transect data only).

i. Pacific and Red-throated Loons - nesting
   - 15 birds (6.8/km^2), mid-June 1983

ii. Tundra Swans - nesting
   - 19 birds (4.6/km^2), mid-June 1983

iii. Brant - nesting
   - 31 birds (16.2/km^2), mid-June 1983

iv. Dabbling and diving ducks - nesting, molting
   - 583 birds (77.7/km^2) (mostly Northern Pintails, Oldsquaw, and American Wigeons), mid-June 1983

v. Shorebirds - nesting
   - 107 birds (45.79/km^2) (50 Semipalmated Sandpipers, 38 Red-necked Phalaropes), mid-June 1983

vi. Passerines - nesting
   - 857 birds (114.2/km^2), mid-June 1983

5. Escape Reef - Red

Escape Reef provides habitat for the largest colony of nesting Glaucous Gulls from Prudhoe Bay, Alaska, to Cape Bathurst. The core of the colony is situated on the high, more permanent and vegetated central portion of the reef, whereas scattered nests are found on the lower, gravel extensions of the reef. The coastline and marine waters surrounding the reef are considered to be important feeding grounds for the gulls during nesting and broodrearing. The gulls also feed on refuse from the Inuit hunting and fishing camps located along Shingle Point spit. Small numbers of Brant, Common Eiders, and Arctic Terns also nest on the reef.

i. Brant - nesting
   - 7 nests, late June 1984 (Dickson unpubl. data)
   - 12 nests, late June 1974 (Barry unpubl. data)

ii. Common Eiders - nesting
   - 5 nests, mid-July 1962 (Barry unpubl. data)

iii. Glaucous Gulls - nesting colony
   - 249 nests, late June 1987 (Alexander and Hawkings 1988)
   - 278 nests, late June 1984 (Dickson unpubl. data)
   - 150+ pairs, June 1979 (Barry unpubl. data)
   - 55 pairs, June 1974 (Barry unpubl. data)

6. Blow River and Shallow Bay area - Red

The ponds, channels, marshes, and grass-sedge delta flats in this area are important to a variety of nesting birds. Pacific Loons (but apparently few Red-throated Loons), Tundra Swans, and Arctic Terns nest throughout the area. Various duck species are also likely to be found nesting throughout the area. Hawkings (1986), for example, found nests of Northern Pintails, Northern Shovelers, Greater and Lesser Scaup, and Oldsquaw around Whitefish Station. Brant appear to be concentrated on the Blow River delta and near Whitefish Station. There is a colony of nesting Glaucous Gulls inland at Whitefish Station. The feeding radius for this colony is expected to extend into Shoalwater Bay and along the coast from the Blow River delta to eastern Moose Channel.

a. Entire area
   i. Pacific Loons - nesting
      - 127 birds (0.1/km^2), late June 1972 (Campbell and Weber 1973)
      - 110 birds (0.1/km^2), mid-July 1972 (Campbell and Weber 1973)

   ii. Tundra Swans - nesting, molting
      - 37 nests and 62 non-breeders, June 1984 (Barry unpubl. data)
      - 837 adults (including non-breeders) and 107 nests, late June 1972 (Campbell 1973; Campbell and Weber 1973)
      - 1045 adults (including non-breeders), 74 young and 16 nests, mid-July 1972 (Campbell 1973; Campbell and Weber 1973)
      - Campbell (1973) and Campbell and Weber (1973) observed these birds in a larger area including south of Shallow Bay in the Mackenzie Delta map area

   iii. Brant - nesting
      - 40 birds, late June 1972 (Campbell and Weber 1973)

   iv. Arctic Terns - nesting
      - 665 to 675 birds (undetermined number nesting but many apparent colonies noted), late June and mid-July 1972 (Campbell and Weber 1973) (these birds were observed in a larger area including south of Shallow Bay in the Mackenzie Delta map area)

b. Blow River delta
   i. Brant - nesting
      - 15 to 30 pairs, late June 1978, 1981 and 1983 (Barry unpubl. data)

c. Whitefish Station area
   i. Tundra Swans - nesting
      - 11 nests, late June 1985 (Hawkings 1986)

   ii. Brant - nesting
      - 21, 22 and 7 nests at 3 adjacent colonies, plus 7 dispersed nests, late June 1985 (Hawkings 1986)

iii. Glaucous Gulls - nesting
- 20 to 30 pairs (Barry unpubl. data)
- 27, 42 and 2 nests at 3 adjacent colonies, plus 7 dispersed nests, late June 1985 (Hawkings 1986)

- colonies of Brant and Glaucous Gulls reported by Hawkings (1986) are located on a lake approximately 1 km inland

d. Moose Channel

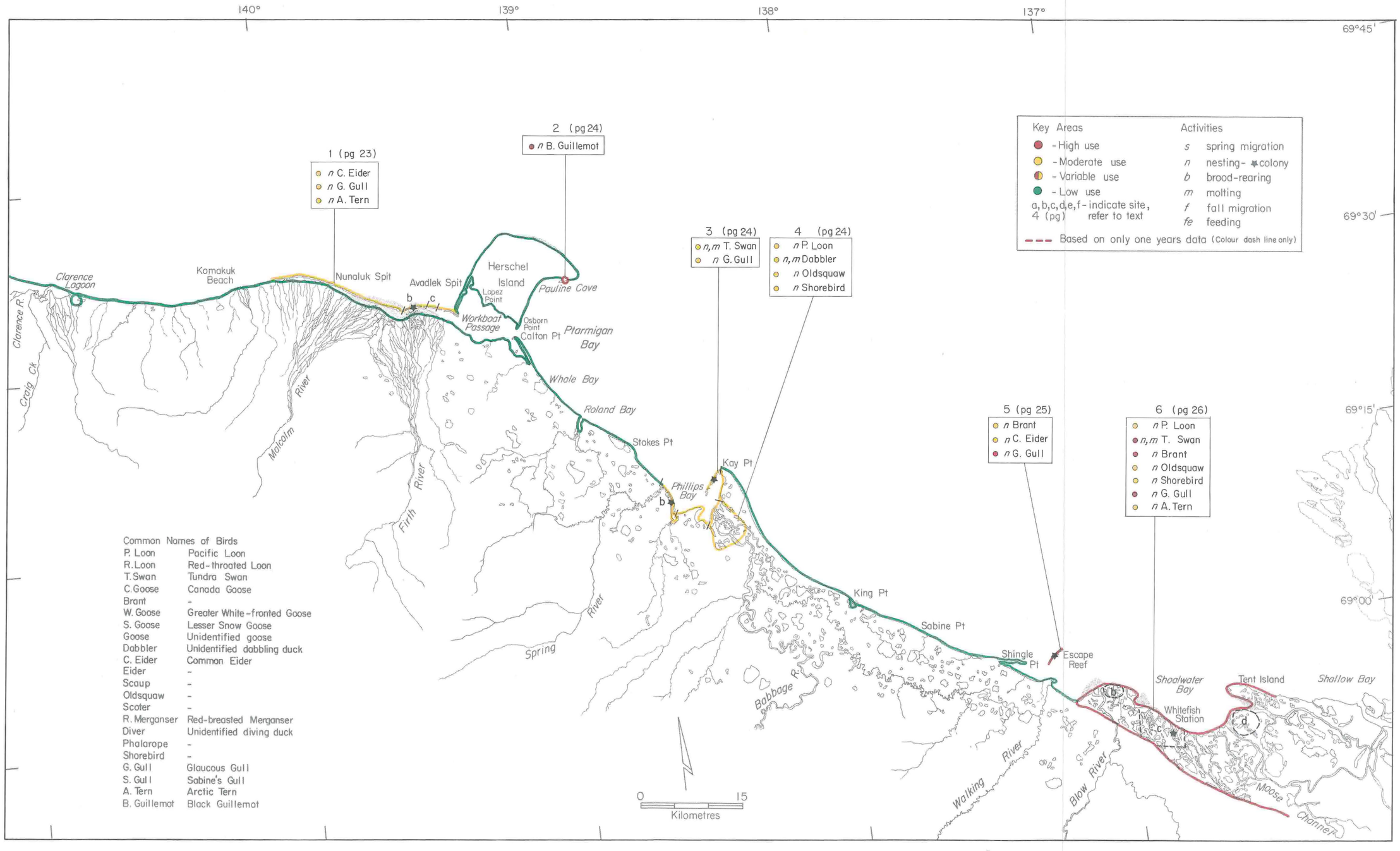
i. Pacific Loons - nesting
- 23 nests in 1972 (Campbell 1973)

ii. Tundra Swans - nesting
- 25 nests in 1972 (Campbell 1973)

iii. Oldsquaw - nesting
- 15 nests, July 1972 (Campbell 1973)

iv. Shorebirds - nesting
- 12 nests (Red-necked Phalarope), mid-June 1972 (Campbell 1973)

Figure 2: Key areas for birds during early June to mid-July: Yukon Coast.



Common Names of Birds

P. Loon	Pacific Loon
R. Loon	Red-throated Loon
T. Swan	Tundra Swan
C. Goose	Canada Goose
Brant	-
W. Goose	Greater White-fronted Goose
S. Goose	Lesser Snow Goose
Goose	Unidentified goose
Dabbler	Unidentified dabbling duck
C. Eider	Common Eider
Eider	-
Scaup	-
Oldsquaw	-
Scoter	-
R. Merganser	Red-breasted Merganser
Diver	Unidentified diving duck
Phalarope	-
Shorebird	-
G. Gull	Glaucous Gull
S. Gull	Sabine's Gull
A. Tern	Arctic Tern
B. Guillemot	Black Guillemot

B. MID-JULY TO MID-AUGUST (FIGURE 3)

1. Clarence Lagoon - Yellow

The grass-sedge flats of the Clarence River delta, Craig Creek delta, and Clarence Lagoon are used by moderate numbers of molting dabbling and diving ducks, and small numbers of molting and broodrearing Tundra Swans. Starting in mid to late August, migrating geese are found staging in the area (see page 43). Broodrearing and fall staging shorebirds are present in uncertain numbers (Mossop 1974; Schweinsburg 1974).

i. Dabbling and diving ducks - molting
- 330 birds, early August 1987 (Alexander unpubl. data)
- 180 birds, July 1969 (Barry unpubl. data)

2. Nunaluk Spit area - Red

This sand and gravel spit and particularly the protected water behind it are used by small numbers of molting diving ducks, most commonly Oldsquaw and scoters. Overall, use appears to be heaviest around the islands and the eastern portion of the spit, and to diminish west along the spit to its base. Small numbers of Tundra Swans use the river deltas and Nunaluk Lagoon.

Nunaluk Spit, along with Avadlek Spit, is a major staging site for migrating Red-necked Phalaropes. Red phalaropes are also present but in much lower numbers. Phalaropes are most abundant in the area from late July to early September with peak numbers in early to mid-August. However, large numbers have been observed in late August. Phalaropes are most likely to be found feeding within a few meters of either side of the spit, although they are more common along the north side. During moderate windy conditions these birds may be found feeding along windward beaches. Phalaropes are known both to concentrate along the first 2 km of the spit's tip, and to disperse along the spit's entire length to as far west as Komakuk Beach. Other shorebirds also use the spit, particularly the first 2 km, but appear to feed and rest in greater numbers on mudflats and tidal marshes of the Malcolm and Firth river deltas (Ealey et al. 1988).

Small numbers of Arctic Terns and Glaucous Gulls rear their young on the spit and barrier islands, and feed throughout the area. Both species migrate through the area in moderate to high numbers. The Arctic Tern migration takes place from early to late August, while Glaucous Gull migration is more spread out. Small numbers of Red-throated Loons feed in offshore waters seaward of the spit.

a. Spit and adjacent water

i. Tundra Swans
- 20 birds, late July to early August 1974 (Kuyt pers. comm.)

ii. Oldsquaw - molting
- small numbers throughout August 1987 (Ealey et al. 1988)
- 488 birds (45.2/km^2), mid-August 1986 (Alexander unpubl data)
- 104 birds (4.6/km^2), late July 1985 (Alexander 1986)

iii. Scoters - molting
- minor numbers throughout August 1987 (Ealey et al. 1988)
- 458 birds (30.9/km^2), mid-August 1985, and minor numbers mid-August 1986 (Alexander 1986; Alexander unpubl. data)

iv. Red-necked and unidentified Phalaropes - staging, migrating
- 11 102 birds undergoing both local and migratory flights, during 216 hours of observation from July 27 to August 30 1987 (estimated 42 639 birds for daylight hours; study could not discern individual birds and values presented likely include repeat sightings of some individuals; largest single count was 2612 birds early August; Ealey et al. 1988)
- 52 000 birds (estimated), mid-August 1986 (Alexander and S.J. Barry unpubl. data)
- 6253 birds (estimated to be about 12% of total number of birds present during survey), mid-August 1985 (Alexander 1986; Alexander and S.J. Barry unpubl. data)

v. Shorebirds - staging, migrating
- 2895 birds undergoing both local and migratory flights, during 216 hours of observation from July 27 to August 30 1987 (estimated 9370 birds for daylight hours; study could not discern individual birds and values presented likely include repeat sightings of some individuals; largest numbers recorded August 6 to 10; Ealey et al. 1988)
- 60 birds, mid-August 1974 (Kuyt pers. comm.)
- 81 birds, early July to mid-August 1971 (Schweinsberg 1974) (surveyed approximately one quarter of spit)

vii. Glaucous Gulls - broodrearing
- 45 birds (4.2/km^2), mid-August 1986 (Alexander unpubl. data)
- 32 birds (2.2/km^2), mid-August 1985 (Alexander 1986)

viii. Arctic Terns - broodrearing, staging
- 133 birds (12.3/km^2), mid-August 1986 (Alexander unpubl data)
- 430 birds (29.1/km^2), mid-August (only 1 bird observed late July) 1985 (Alexander 1986)

b. Base of Nunaluk Spit

Data presented below come from daily migration watches (4 to 14 hours per day) conducted in 1972 from July 10 to August 20 (Gollop and Davis 1974). The values presented are estimated totals. The study could not discern individual birds and values presented likely include repeat sightings of some individuals. Numbers of birds moving east and west are reported separately.

i. Loons - migrating
- 1964 east; 697 west

ii. Geese (mostly Brant) - migrating, staging
- 328 east; 1925 west

iii. Northern Pintails - migrating
- 2866 east; 1357 west

iv. Oldsquaw - molting, migrating
- 2361 east; 4022 west

v. Phalaropes (mostly Red-necked Phalaropes) - migrating, staging
- 17 058 east; 8900 west

vi. Shorebirds - migrating, staging
- 5109 east; 3033 west

b. Islands east of spit

i. Eiders - broodrearing
- 30 adults and 15 young on first island, mid-July to mid-August 1971 (Schweinsburg 1974)

ii. Glaucous Gulls - broodrearing
- continued use by broodrearing birds (see page 9)
- 46 adults, 8 young on first island in 1971 (Schweinsburg 1974)
- 16, 67, 24 and 1 bird on first 4 islands, respectively, east of spit in 1973 (Gollop and Richardson 1974)

iii. Arctic Terns - broodrearing
- approximately 50 adults, 22 young and 25 fledglings on first island, mid-July to mid-August 1971 (Schweinsburg 1974)

3. Workboat Passage - Red

The sheltered water south of Herschel Island is an important area for several species of molting diving ducks, particularly Surf Scoters and Oldsquaw. White-winged Scoters are also present but are considerably less abundant than Surf Scoters. Large numbers of molting scaup are present in some years. Broodrearing, migrating and possibly molting eiders are present in small numbers. The most consistently and heavily used portion of Workboat Passage can be roughly described as a triangle of water with apexes at the base and tip of Avadlek Spit and at Osborn Point. Moderate numbers of diving ducks are sometimes found in Thetis Bay. During periods with winds originating from northerly directions, birds are more likely to be found in tight concentrations along the sheltered shorelines within this triangle, although they may also be found in the rougher central waters (particularly Surf Scoters). On calm days, birds are dispersed throughout Workboat Passage. The south side of Workboat Passage appears to be of lesser importance to diving duck species; however, the effects on bird distribution of south winds are not clear.

The south shore of Herschel Island from the vicinity of Lopez Point to and including Avadlek Spit is a major staging site, along with Nunaluk Spit, for migrating Red-necked Phalaropes. This area's importance to other migrating shorebirds is unknown. Phalaropes are most abundant from late July to early September with peak numbers in mid to late August. At this time of year the phalaropes are often gregarious and may be found in large, tight flocks feeding in sea water along the shoreline. They may also be found strung out for several kilometers along shorelines. During windy conditions these birds may be found feeding along windward beaches.

The sand and gravel shoreline, and surrounding water is used by broodrearing and migrating Glaucous Gulls. Avadlek Spit appears to be a preferred resting and/or feeding site. Small numbers of Red-throated Loons feed in Workboat Passage.

i. Eiders - molting
- up to 79 birds (2.6/km^2), mid-July to early August 1981 (Barry and Barry 1982)

ii. Scaup - molting
- up to 822 birds (27.9/km^2), mid-July to early August 1981 (Barry and Barry 1982)
- up to 123 birds (10.3/km^2), mid-July to mid-August 1980 (Barry et al. 1981)
- 525 birds (72.9/km^2 est.), early August 1975 (Mossop 1975)

iii. Oldsquaw - molting
- 790 birds (49.4/km^2), mid-August 1986 (Alexander unpubl data)
- up to 275 birds/km^2, late July to early August 1985 (Ward and Mossop 1986)
- up to 3417 birds (63.3 birds/km^2, mid-July to early August 1981 (Barry and Barry 1982)
- 585 to 5570 birds (49.2 to 468.1/km^2), mid-July to mid-August 1980 (Barry et al. 1981) (a small portion of these were in the Nunaluk Spit area)
- 5700 birds (791.7/km^2 est.), early August 1975 (Mossop 1975)
- 1285 to 2133 birds (up to 224.5/km^2 est.), early to mid-August 1973 (Vermeer and Anweiler 1975)

iv. Scoters - molting
- 1650 birds (103.1/km^2), mid-August 1986 (Alexander unpubl data)
- 6165 birds (385.3/km^2), late July 1985 (Alexander 1986)
- up to 2644 birds (89.6/km^2), mid-July to early August 1981 (Barry and Barry 1982)
- 3030 to 8745 birds (254.6 to 734.9/km^2), mid-July to mid-August 1980 (Barry et al. 1981) (a small portion of these were in the Nunaluk Spit area)
- 8600 birds (1194.4/km^2 est.), early August 1975 (Mossop 1975)
- 1500 to 3205 birds (up to 445.1/km^2 est.), early to mid- August 1973 (Vermeer and Anweiler 1975)

v. Phalaropes - staging
- 2170 birds around Avadlek Spit, mid-August (Ealey et al. 1988)
- 2000 birds at the tip of Avadlek Spit, late July 1985 (Alexander 1986)
- 500+ birds in nearshore water at base of Avadlek Spit (SW corner of Herschel Is.), early to mid-August 1985 (Ward and Mossop 1986)
- 5000 birds (97% Red-necked Phalarope, est.), mid-August 1973 (Vermeer and Anweiler 1975)

vi. Glaucous Gulls
- up to 57 birds (4.7/km^2), mid-July to mid-August 1985 and 1986 (Alexander unpubl. data; Alexander 1986)
- up to 278 birds (9.4/km^2), mid-July to early August 1981 (Barry and Barry 1982)

4. Pauline Cove, Herschel town site - Red

Continued use by the only substantial Black Guillemot nesting colony in the Beaufort Sea (see page 24 for a more detailed discussion). The shoreline and waters of Pauline Cove are also used at times by as many as 100 feeding Glaucous Gulls (Ward and Mossop 1986).

5. Stokes Point Lagoon - Yellow

This small lagoon provides habitat for moderate numbers of molting Oldsquaw and other ducks.

i. Diving and dabbling ducks - molting
- up to 452 birds (226.0/km^2), mid-August 1983 (Dickson et al. 1988)

6. Phillips Bay - Yellow

The Phillips Bay area is not used by large numbers of any particular bird species (except perhaps shorebirds as a group) in a consistent manner; however, the sheltered waters, coastal tundra vegetation, and Spring River delta are used by a diverse collection of birds: feeding and broodrearing Pacific and Red-throated Loons; molting and broodrearing Tundra Swans and Canada Geese; migrating Brant; molting Northern Pintails, American Wigeons, Oldsquaw, scaup, Red-breasted Mergansers, and other ducks; broodrearing Glaucous Gulls; migrating Arctic Terns.

a. Entire bay

i. Red-throated Loons - feeding
- 20 birds (1.2/km^2), early August 1983 (Dickson et al. 1988)
- 7 birds (0.3/km^2), late July 1981 (Dickson 1985)

ii. Tundra Swans - molting, broodrearing
- 15 birds, late July 1981 (Dickson 1985)

iii. Dabbling and diving ducks - molting
- 184 birds (4.6/km^2) (mostly Northern Pintails, Oldsquaws, and Surf Scoters), on both the Babbage River delta and Phillips Bay, mid-August 1983 (Dickson et al. 1988)

iv. Scaup - molting
- zero birds observed mid-August 1986 and late July to mid-August 1985 (Alexander unpubl. data; Alexander 1986)
- 250 birds (10.8/km^2), early August 1981 (Barry and Barry 1982)
- 228 birds (13.0/km^2), mid-August 1980 (Barry et al. 1981)

v. Red-breasted Mergansers - molting
- 40 birds (1.5/km^2), late July 1981 (Dickson 1985)

vi. Glaucous Gulls - feeding
- 103 birds (12.9/km^2), mid-August 1986 (Alexander unpubl data)
- 94 birds (11.7/km^2), mid-August 1985 (Alexander 1986)
- Note: during both surveys, most birds were seen in the small bay south of Kay Point, around Kay Point spit and along the east edge of the bay

vii. Arctic Terns - feeding
- 53 birds (4.1/km^2), mid-August 1986 (Alexander unpubl. data)
- 115 birds (14.4/km^2), mid-August 1985 (Alexander 1986)

b. West side of Phillips Bay including Spring River delta

i. Tundra Swans - molting, broodearing
- 10 birds, late July to early August 1974 (Kuyt pers. comm.)

ii. Canada Geese - broodrearing
- 3 adults and 25 goslings, on pond in delta, early August 1983 (Dickson et al. 1988)

iii. Unidentified geese (probably Brant (Barry and Barry 1982) or Greater White-fronted Geese (Hogg et al. 1986)) - molting
- 60 birds, mid-August 1986 (Alexander unpubl. data)

iv. Glaucous Gulls - broodrearing
- 85 birds (15.2/km^2), mid-August 1986 (Alexander unpubl. data)
- 21 birds (3.7/km^2), late July 1981 (Dickson 1985)

c. Kay Point spit

i. Tundra Swans - molting
- up to 100 non-breeders, mid to late July 1973 (Gollop and Richardson 1974)

ii. Glaucous Gulls - broodrearing
- 58 adults and 15 young, mid to late July 1972 (Gollop and Richardson 1974)
- 20 birds, late July 1981 (Dickson 1985)

7. Babbage River delta - Red

The Babbage River delta is not used, at this time of year, by large numbers of any particular species, except perhaps shorebirds as a group. However, the delta's mudflats, channels, ponds, and wetlands are used by a diversity of species: broodrearing Pacific and Red-throated Loons; molting and broodrearing Tundra Swans and Greater White-fronted Geese; migrating Brant; molting dabbling ducks, scaup, Oldsquaw and Red-breasted Mergansers; broodrearing and migrating shorebirds and Arctic Terns. This area increases in importance to Brant in late August. Ground transects by Hogg et al. (1986) covered a small portion of the delta's SW edge. Shorebirds appear to be heavy users of this area both as resident broodrearing birds and as staging migrants. This view although not clearly documented is supported by other researchers (J. Hawkings pers. comm.).

i. Pacific Loons - brgodrearing
   - 19 birds (3.6/km^2), late July to mid-August 1982 (Hogg et al. 1986)
   - 3 birds (0.5/km^2), late July 1981 (Dickson 1985)

ii. Tundra Swans - molting, broodrearing
   - 10 birds, late July to mid-August 1982 (Hogg et al. 1986)
   - 41 birds, late August 1976 (Koski 1977b)
   - 75 birds, late August 1975 (Koski 1977a)
   - 129 birds, late August 1975 (Mossop 1975)

iii. Greater White-fronted Geese - molting, broodrearing
   - 23 adults and 30 young, late July to mid-August 1982 (Hogg et al. 1986)

iv. Dabbling ducks - molting
   - 49 birds (17.9/km^2), late July to mid-August 1982 (Hogg et al. 1986)

v. Shorebirds - broodrearing, staging
   - 140 birds, mid-August 1985 (birds observed along outer delta mudflats; Alexander 1986)
   - 937 birds (23.3/km^2), early August 1983 (Dickson et al. 1988) (survey covered Phillips Bay area as well, but most birds were on Babbage River delta)
   - 301 birds (33% Semipalmated/Baird's Sandpipers, 22% Pectoral Sandpipers), late July to mid-August 1982 (Hogg et al. 1986)

vi. Arctic Terns - broodrearing
   - 18 birds, broodrearing, late July to mid-August 1982 (Hogg et al. 1986)

8. King Point to Shingle Point - Yellow
   Shingle Point spit - Red

The shoreline consists of a narrow gravel beach at the base of eroding mud cliffs. Molting diving ducks may at times be found just offshore, although this appears to be more the exception than the rule. Later in August when birds have regrown flight feathers, migrating flocks of diving ducks may stop-over intermittently.

Feeding Glaucous Gulls are found dispersed along the shoreline from Kay Point to Shingle Point, with major concentrations of birds around the Shingle Point gravel spit starting in early to mid-August. These birds are likely associated with the Escape Reef gull colony. Birds may be attracted to the spit by the presence of Inuit hunting and fishing camps. The gulls appear to rarely feed in open sea water except when whales are present (Alexander pers. obs.), although they often forage along shorelines. Feeding Red-throated Loons are also scattered throughout this area.

Migrating phalaropes (unidentified) feed along the Shingle Point spit. The cumulative use by phalaropes is unknown, and it is not clear if birds stop at the spit for extended periods of time. During moderate windy conditions birds may be found feeding on the windward side of the spit.

a. Kay Point to Shingle Point
   i. Scaup - molting
      - 70 birds (3.4/km^2), late July 1980 (Barry et al. 1981)

   ii. Red-breasted Mergansers
      - 60 birds (2.9/km^2), molting, late July 1980 (Barry et al. 1981)

   iii. Glaucous Gulls - feeding
      - 530 to 536 birds (18.7/km^2), mid-July to early August 1981 (Barry and Barry 1982)
      - 107 to 111 birds (5.4/km^2), late July to mid-August 1980 (Barry et al. 1981)

b. Shingle Point to Escape Reef
   i. Scoters - molting
      - 610 birds (69.3/km^2), late July 1981 (Dickson 1985)

c. Shingle Point spit
   i. Glaucous Gulls - feeding
      - 118 birds (42.1/km^2), mid-August 1986 (Alexander unpubl. data)
      - 250 birds (89.3/km^2), mid-August and 9 birds, late July 1985 (Alexander 1986)

   ii. Phalaropes - staging
      - 552 birds early August, 806 birds mid-August, and no birds late August 1987 (most birds near tip of spit and along outer beach) (Ealey et al. 1988)
      - 1000+ birds (windward side), mid-August 1983 (Dickson et al. 1988)

9. Escape Reef - Red

This gravel spit is used by molting and broodrearing Brant, and broodrearing Glaucous Gulls and Arctic Terns. This is the largest colony of nesting Glaucous Gulls in the Beaufort Sea (see page 25 for a more detailed discussion). Data suggest that as the young Glaucous Gulls fledge from early to mid-August, Shingle Point spit becomes more important to these birds than Escape Reef. Unidentified phalaropes stage along the reef during migration. The cumulative use by phalaropes is unknown, and it is not clear if birds stop at the reef for extended periods of time. During moderate windy conditions birds may be found feeding along the windward side of the reef.

   i. Brant - molting, broodrearing
      - 12 birds, late July 1981 (Dickson 1985)

ii. Glaucous Gulls - broodrearing
- 77 birds, mid-August 1986 (Alexander unpubl. data)
- 167 birds, late July, and 92 birds mid-August 1985 (Alexander 1986)
- 313 adults and 12 young, late July 1981 (Dickson 1985)
- 150 birds, mid to late July 1973 (Gollop and Richardson 1974)

iii. Arctic Terns - broodrearing
- 12 birds, late July 1981 (Dickson 1985)

iv. Phalaropes - staging
- 158 birds early August, but no birds in mid or late August 1987 (Ealey et al. 1988)
- 400+ birds, late August 1983 (Dickson et al. 1988)

10. Blow River delta - Yellow

The delta flats, ponds, channels, and wetlands are used by broodrearing Pacific and Red-throated Loons (small numbers), Brant, shorebirds, and Glaucous Gulls, and by molting Brant and dabbling ducks. Nearshore waters are virtually unused by all species except Glaucous Gulls. It is likely that large numbers of migrating shorebirds pass through the area but this has yet to be documented (see discussion on Whitefish Station and Tent Island area, page 40). Very little data is available for this region and studies by Hogg et al. (1986) cover only a small part of the total area.

a. West delta

i. Red-throated Loons - broodrearing
- 6 birds (3.4/km^2), late July to mid-August 1982 (Hogg et al. 1986)

ii. Dabbling ducks - molting
- 104 birds (120.7/km^2), late July to mid-August 1982 (Hogg et al. 1986)

iii. Shorebirds - broodrearing, staging
- 265 birds (62% Pectoral Sandpipers, 11% Semipalmated/Baird's Sandpipers; 305.5/km^2 based on 158 birds seen on-transect), late July to mid-August 1982 (Hogg et al. 1986)

iv. Glaucous Gulls - broodrearing
- 75 birds (6.9 birds/km^2), late July to mid-August 1982 (Hogg et al. 1986)

b. East delta

i. Brant - molting, broodrearing
- 30 to 60 birds, molting, most years (Barry unpubl. data)

11. Whitefish Station and Tent Island area - Red

Glaucous Gulls rear young at several colonies near Whitefish Station, and feed in surrounding areas. It appears, however, that once the young have fledged in early to mid-August that the colony site is not used very heavily. The coastal tundra vegetation, channels, and wetlands of this area are used by molting (and some broodrearing) Tundra Swans and dabbling ducks. Continued use by broodrearing Pacific Loons, Oldsquaw and Arctic Terns is expected. Nearshore waters in this area are virtually unused by all species.

Based on studies by Hogg et al. (1986) at the Blow River delta, the area is probably used heavily by nesting and broodrearing shorebirds. Data by Campbell (1973) indicate that there is a major passage of eastward migrating shorebirds from late July to early September with peak movements from mid to late August. However, it is not clear to what extent the birds use the area for staging.

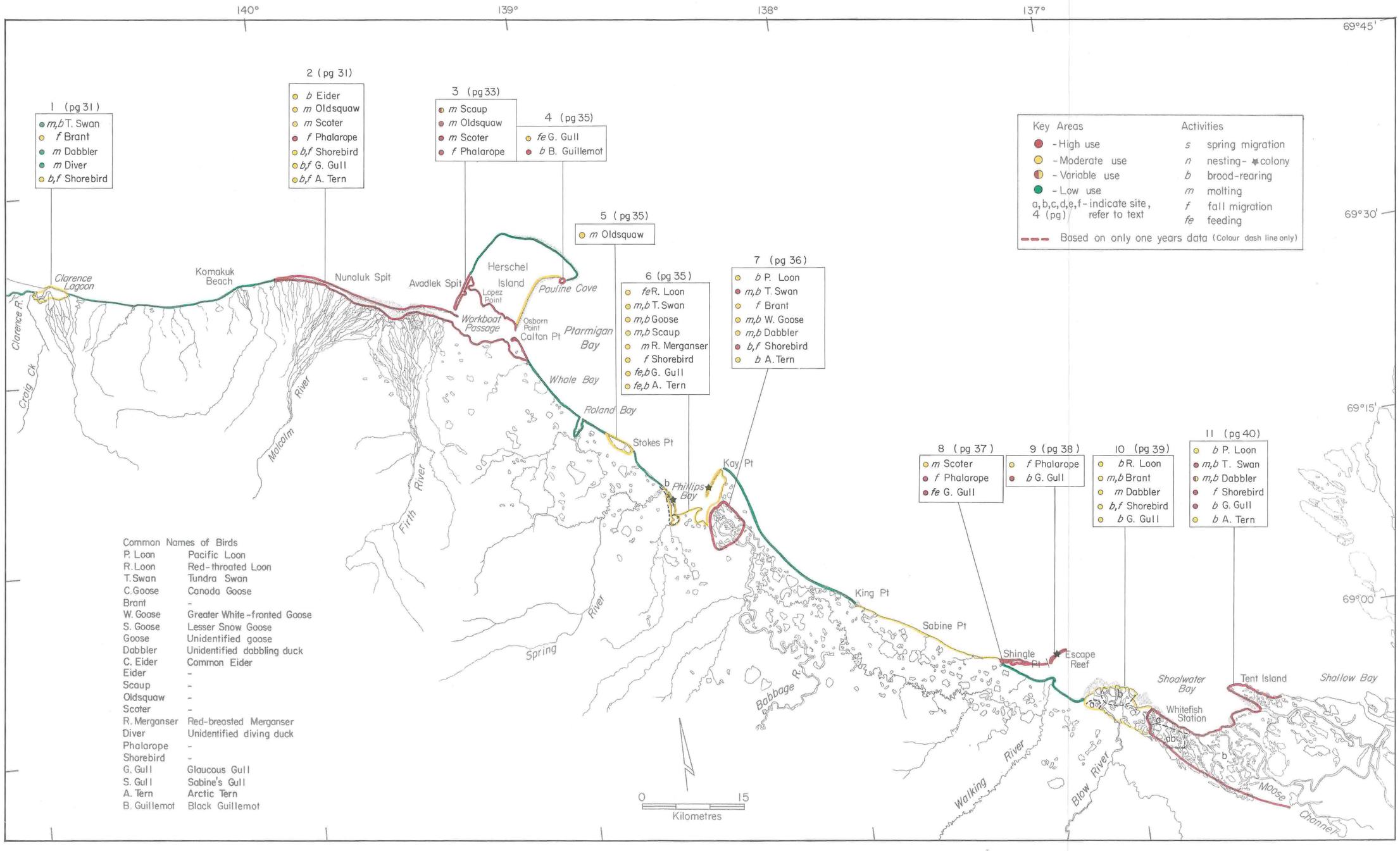
a. Whitefish Station area
   i. Glaucous Gulls - broodrearing
      - 155 birds in vicinity of colony, late July, and 5 birds, mid-August 1985 (Alexander 1986)

b. Moose Channel/Tent Island area
   i. Tundra Swans - molting
      - 100 to 200 non-breeders, most years (Barry unpubl. data)
      - 102 birds, late August 1975 (Koski 1977a)
      - continued use expected by birds reported for June by Campbell (1973) and Campbell and Weber (1973)

   ii. Dabbling ducks - molting
      - 1400 birds, July and August 1971 (Barry unpubl. data)

   iii. Shorebirds - migrating
      - 14 790 birds (6472 Lesser Golden-Plovers; 6123 Pectoral Sandpipers), from 30 July to 19 September 1972 (287.5 hours of observation) (Campbell 1973)

Figure 3. Key areas for birds during mid-July to mid-August: Yukon Coast.



Common Names of Birds

P. Loon	Pacific Loon
R. Loon	Red-throated Loon
T. Swan	Tundra Swan
C. Goose	Canada Goose
Brant	-
W. Goose	Greater White-fronted Goose
S. Goose	Lesser Snow Goose
Goose	Unidentified goose
Dabbler	Unidentified dabbling duck
C. Eider	Common Eider
Eider	-
Scaup	-
Oldsquaw	-
Scoter	-
R. Merganser	Red-breasted Merganser
Diver	Unidentified diving duck
Phalarope	-
Shorebird	-
G. Gull	Glaucous Gull
S. Gull	Sabine's Gull
A. Tern	Arctic Tern
B. Guillemot	Black Guillemot

C. MID-AUGUST TO LATE SEPTEMBER (FIGURE 4)

Brant migration along the Yukon coast

Brant nesting in the western Canadian arctic migrate during mid to late August and September along the Beaufort Sea coastline, heading west around Alaska. The spring population of Brant along the Yukon coast is estimated at 25 900 birds (Richardson and Johnson 1981), and the fall population is undoubtedly larger due to the addition of the current year's young. Birds migrating through the Yukon stop to feed and rest at numerous tidal marshes, river and creek deltas, and lagoons along the coastline. Each stop-over is generally of a short duration. There are no traditional sites with major extended build-ups of staging birds. However, over the entire migration period, each potential site can be visited by many separate flocks of birds. The result is that the total number of birds visiting each site can be large enough to represent a significant proportion of the fall population.

1. Clarence Lagoon - Yellow

Clarence River and Craig Creek form a delta on the west side of Clarence Lagoon. The grass-sedge delta and lagoon are moderately important to Greater White-fronted Geese and Lesser Snow Geese during fall migration. Small numbers of broodrearing Tundra Swans are found in the area (Mossop 1974; Koski 1977b). Migrating Brant have been observed to stop-over in this area (Koski 1977b) (see general comments on Brant above).

i. Greater White-fronted Geese - staging
   - 60 birds, early September 1975 (Koski 1977a)

ii. Lesser Snow Geese - staging
   - 260 birds, late August 1976 (Koski 1977b)
   - 450 to 1500 birds, late August 1974 (Koski 1975)

2. Nunaluk Spit area - Red

This area includes Nunaluk Spit and 200 to 300m inland on the Firth and Malcolm river deltas. The grass-sedge vegetation and mudflats on the fan-shaped deltas, and most of the mainland as far east as Calton Point (Catton Point) are extremely important to fall migrating Brant (see general comments on Brant migration above), and to a lesser extent, Greater White-fronted Geese. Large numbers of shorebirds migrate through the area. Molting and broodrearing Tundra Swans, and staging dabbling ducks and loons are found in this area (Schweinsburg 1974).

The protected waters behind Nunaluk Spit are at times used by moderately large flocks of staging diving ducks, particularly Oldsquaw. Having regained flight in August, Oldsquaw and scoters appear to disperse and migrate further offshore (Schweinsburg 1974). There may be a substantial movement of Oldsquaw in late September, but this is not well documented (Vermeer and Anweiler 1975). Oldsquaw and scaup use the spit for roosting. Geese, particularly Brant, staging on the river deltas venture into these waters. Staging Glaucous Gulls are present in moderate to large numbers.

Nunaluk Spit, along with Avadlek Spit, is a major staging site for migrating Red-necked Phalaropes, and is likely important to other fall migrating shorebirds. Red phalaropes stage along with the Red-necked Phalaropes, though in apparently much lower numbers. Phalaropes become less abundant after mid-August (Ealey et al. 1988), but large numbers have been seen in late August around Avadlek Spit and may also occur at Nunaluk Spit at this time (see area 3 below). See page 31 for a more detailed discussion.

a. Nunaluk Spit lagoon and shoreline along the Firth and Malcolm river deltas
   i. Unidentified geese (probably Brant (Koski 1975 and 1977b; Mossop 1975)) - staging
      - 1750 birds, early September 1974 (Kuyt pers. comm.)

   ii. Dabbling ducks
      - 150 birds (Northern Pintails and American Wigeons), late August 1975 (Mossop 1975)

   iii. Unidentified diving ducks (probably mostly Oldsquaw (Vermeer and Anweiler 1975; Alexander 1986))
      - 850 birds, early September 1974 (Kuyt pers. comm.)

   iv. Shorebirds
      - 484 birds (19.9/km^2), late August 1983 (Dickson et al. 1988)
      - 70 birds, late August 1974 (Kuyt pers. comm.)

b. Nunaluk Spit and water along either side of spit
   i. Oldsquaw - staging
      - 57 birds (5.3/km^2), early September 1986 (Alexander unpubl. data)
      - 281 birds (12.3/km^2), early September 1985 (Alexander 1986)

   ii. Glaucous Gulls - staging
      - 302 birds (20.7/km^2), early September 1981 (Barry and Barry 1982)
      - 438 birds (18.0/km^2), late August 1983 (Dickson et al. 1988)

c. Malcolm and Firth river deltas
   i. Brant - staging
      - 850 birds on Malcolm River delta, late August 1976 (Koski 1977b)
      - 1050 birds on Firth River delta, late August 1974 (Koski 1975)
      - 815 birds on Malcolm and Firth river deltas, late August 1975 (Mossop 1975)

ii. Greater White-fronted Geese - staging
- 212 birds, early September 1975 (Koski 1977a)

iii. Unidentified geese (probably Brant or Greater White-fronted Geese (Koski 1975; Koski 1977b; Mossop 1975))
- 197 birds, early September 1975 (Koski 1977a)

d. Base of Nunaluk Spit
Data presented for 1971 come from daily 12-hour migration watches conducted from August 24 to September 6 (first and last days were half-days) (Schweinsburg 1974). Data for 1972 are from 10 to 14-hour migration watches conducted once every two days from August 21 to September 17 (Gollop and Davis 1974). The studies could not discern individuals and the values presented likely contain repeat sightings of some individuals. Values from Gollop and Davis (1974) are estimated totals. Numbers of birds moving east and west are reported separately.

i. Loons - staging, migrating
- 413 east; 157 west in 1972
- 109 east; 267 west in 1971

ii. Brant - staging, migrating
- 697 east; 5621 west in 1972
- 40 east; 14806 west in 1971

iii. Greater White-fronted Geese - staging, migrating
- 3485 east; 0 west in 1972
- 2209 east; 6 west in 1971

iv. Lesser Snow Geese - staging
- 42 738 east; 79 457 west in 1972
- 1982 east; 70 889 west in 1971 (most were inland 3 to 8 km)

v. Oldsquaw - migrating
- 351 east; 792 west in 1972
- 28 east; 997 west in 1971

vi. Phalaropes - staging, migrating
- 2652 east; 400 west in 1972

vii. Shorebirds - migrating
- 9440 east; 660 west in 1972
- 2063 east; 100 west in 1971 (there were no phalaropes among those birds identified to species)

viii. Glaucous Gulls - staging, migrating
- 2630 east; 3010 west in 1972
- 196 east; 509 west in 1971

3. Workboat Passage - Red

The sheltered water south of Herschel Island is an important area for several species of staging diving ducks, particularly Oldsquaw and Surf Scoters. Moderate numbers of diving ducks may also be present in Thetis Bay. Use diminishes into late September, although there may be a late September wave of migrating Oldsquaw (Vermeer and Anweiler 1975). See page 33 for a more detailed discussion.

Brant are found staging in potentially large numbers in littoral areas of south Herschel Island and the mainland coast (see general comments on Brant migration, page 43). The south shore of Herschel Island from about Lopez Point to and surrounding Avadlek Spit is a major staging site, along with Nunaluk Spit, for migrating Red-necked Phalaropes from late July to early September. See page 33 for a more detailed discussion.

a. Entire area
   i. Brant - staging
      - 77 birds, late August 1975 (Koski 1977a)
      - 235 birds, early September 1973 (Vermeer and Anweiler 1975)

   ii. Unidentified geese (probably Brant (Koski 1977a; Vermeer and Anweiler 1975)) - staging
      - 390 birds late August, and 110 birds early September 1973 (Kuyt pers. comm.)

   iii. Oldsquaw - staging
      - 4250 birds, late August, and 6050 birds (244.0/km^2 estimated), early September 1974 (Mossop 1974)
      - 2450 birds (257.9/km^2 estimated), mid-August, declining steadily to 190 birds in early September 1973 (along south shore of Herschel Island) (Vermeer and Anweiler 1975)

   iv. Scoters - staging
      - 511 birds (31.1/km^2), early September 1985 (Alexander 1986)
      - 1075 birds (149.3/km^2 estimated), mid to late August, and 1050 birds, early September 1974 (Mossop 1974)
      - 740 birds (77.9/km^2 estimated), mid-August, declining steadily to virtually zero birds in early September 1973 (along south shore of Herschel Island) (Vermeer and Anweiler 1975)

   v. Unidentified diving ducks (probably mostly Oldsquaw and scoters (Mossop 1974; Vermeer and Anweiler 1975) - staging
      - 1600 birds, early September 1974 (Kuyt pers. comm.)

   vi. Shorebirds
      - 280 birds, late August 1974 (Kuyt pers. comm.)

b. Lopez Point to and surrounding Avadlek Spit
   i. Lesser Golden-Plovers - resting
      - 600 birds (one flock) on Avadlek Spit, mid-August 1973 (Vermeer and Anweiler 1975)

ii. Phalaropes - staging
- 2020 birds (81.2/km^2), late August and declining numbers thereafter to 61 birds in mid-September 1986 (Talarico and Mossop 1986)

4. Calton Point (Catton Point) to Spring River delta - Yellow

The coastline is generally unprotected narrow sand and gravel beaches, with vegetated littoral flats and wetlands on portions of the inner edges of Whale Bay, Roland Bay and Stokes Point lagoon. The salt marsh areas are used by potentially large numbers of staging Brant (see general comments on Brant migration, page 43), and the wetland areas by molting and broodrearing Tundra Swans (Koski 1975; 1977a; 1977b). Small numbers of dabbling ducks and diving ducks are found in these three areas. The offshore water is used occasionally by large flocks of migrating Oldsquaw and scoters (Alexander 1986; Alexander unpubl. data; Barry and Barry 1982; J. Hawkings pers. comm.; Mossop 1975). Migrating phalaropes feed in sometimes large numbers along the barrier beaches particularly at Stokes Point Lagoon.

a. Whale Bay
  i. Brant - staging, migrating
    - 215 birds, late August 1983 (Dickson et al. 1988)

  ii. Unidentified diving ducks (probably Oldsquaw, scoters and scaup (Mossop 1975)) - staging
    - 109 birds (37.8/km^2) (mostly Oldsquaw and scaup), early September 1983 (Dickson et al. 1988)
    - 100 birds, late August, and 125 birds, early September 1974 (Kuyt pers. comm.)

b. Roland Bay
  i. Greater White-fronted Geese - staging
    - 159 birds, early September 1983 (Dickson et al. 1988)

c. West of Stokes Point
  i. Brant - staging
    - 150 birds, late August 1974 (Koski 1975)

d. Stokes Point lagoon
  i. Brant - staging
    - 140 birds, staging late August 1975 (Koski 1977a)

  ii. Dabbling and diving ducks - staging
    - up to 679 birds (176.8/km^2) (mostly Oldsquaw), late August to early September 1983 (Dickson et al. 1988)
    - 75 birds, early September 1974 (Kuyt pers. comm.)

  iii. Phalaropes - staging
    - 82 birds early August, and 184 birds mid-August 1987 (Ealey et al. 1988)
    - 650 birds, late August 1986 (J. Hawkings unpubl. data)

5. Phillips Bay, and the Spring and Babbage river deltas - Red

Key habitats are within the littoral zone, particularly the tidal flats of the Babbage and Spring river deltas. These tidal flats are extremely important to staging Brant during fall migration. The number of staging birds varies between years, and can at times exceed 45% of the estimated spring population (see general comments on Brant migration, page 43). The mudflats appear to be important to staging shorebirds. The wetlands and flats of the Babbage River delta are used by molting, broodrearing and staging Tundra Swans, and staging Greater White-fronted Geese. The entire area is used by molting and staging dabbling ducks. Offshore water in Phillips Bay is used occasionally by large flocks of migrating Oldsquaw and scoters (Alexander 1986; Alexander unpubl. data; Barry and Barry 1982; J. Hawkings pers. comm.; Mossop 1975). Staging Glaucous Gulls are present, as are small numbers of Red-breasted Mergansers and Red-throated Loons (Dickson 1985).

a. Entire area
   i. Brant - staging
      - 600 birds, late August 1984 (Barry unpubl. data)
      - 12 000 birds (some birds seen on beach area between Spring River delta and Stokes Point), mid-September 1980 (Barry et al. 1981)
      - 1175 birds, late August 1975 (Mossop 1975)

   ii. Unidentified geese (probably Brant (Barry et al. 1981; Mossop 1975)) - staging
      - 4100 birds, late August, and 600 birds early September 1974 (Kuyt pers. comm.)

   iii. Dabbling ducks - staging
      - 255 Northern Pintails and American Wigeons, late August 1975 (Mossop 1975)

   iv. Oldsquaw - staging
      - 1000 birds, late August 1975 (Mossop 1975)

   v. Shorebirds - staging
      - 440 birds, early September 1974 (Kuyt pers. comm.)

   vi. Glaucous Gulls - staging
      - 122 birds, early September 1986 (Alexander unpubl. data)
      - 64 birds, early September 1981 (Dickson 1985)

b. Spring River delta
   i. Brant - staging
      - 225 birds, late August 1975 (Koski 1977a)

c. Babbage River delta
   i. Brant - staging
      - 765 birds, late August, early September 1975 (Koski 1977a)

   ii. Greater White-fronted Geese - staging
      - 1500 birds, early September 1986 (J. Hawkings pers. comm.)
      - 500 birds (estimated), August and September 1975 (Koski 1977a)

iii. Lesser Snow Geese - staging
- 1511 birds (107.3/km^2), early September 1983 (Dickson et al. 1988)

iv. Tundra Swans - molting, broodrearing, staging
- 129 birds, late August 1975 (Mossop 1975)
- 75 birds, late August, and 27 birds early September 1975 (Koski 1977a)

v. Shorebirds - staging
- 800 birds plus a second flock of similar size on mudflats, early September 1986, plus appeared to be several hundred birds on mudflats much of the time during August and early September 1986 (J.Hawkings pers. comm.)

6. Kay Point to Escape Reef - Yellow
Shingle Point spit - Red

The offshore water in this area is used periodically by migrating flocks of scoters, Red-breasted Mergansers, and likely also Oldsquaw. Glaucous Gulls feed all along the coastline during migration. Phalaropes stage along Shingle Point spit and Escape Reef (see page 37 for further discussion).

a. Entire area
i. Scoters - staging
- 400 birds, early September 1985 (Alexander 1986)

ii. Red-breasted Mergansers - staging
- 174 birds, early September 1981 (Barry and Barry 1982)

iii. Glaucous Gulls - staging
- 62 birds (2.1/km^2), early September 1986 (Alexander unpubl. data)
- 45 birds (2.1/km^2), early September 1981 (Dickson 1985)
- 222 birds (15.6/km^2), early September 1981 (later date than Dickson (1985)) (Barry and Barry 1982)

b. Shingle Point area
i. Phalaropes - staging, migrating
- 550+ birds, early September 1983 (Dickson et al. 1988)

ii. Shorebirds - staging, migrating
- 225 birds,early September 1974 (Kuyt pers. comm.)

c. Escape Reef
i. Phalaropes - staging, migrating
- 400+ birds, late August 1983 (Dickson et al. 1988)

ii. Glaucous Gulls - staging, migrating
- 392 birds, late August 1983 (Dickson et al. 1988)

7. Blow River delta and Shallow Bay area - Red

This area extends from the Blow River delta to the Yukon-Northwest Territories border and as far inland as the channels, ponds, and marshes of the Mackenzie River delta. Storm tides can inundate a large part of the grass-sedge flats, hence a wide band is considered to have a littoral influence. Geese and swans use part or all of the area in high numbers during fall migration (see general comments on Brant migration, page 43). Pacific Loons are present throughout the wetland area, with numbers diminishing into September. Continued use by various duck species that were reported in the July/August period (pages 39 and 40) is expected.

a. Entire area
   i. Pacific loons - broodrearing
      - 221 birds (0.2/sqkm), early September 1972 (Campbell and Weber 1973) (these birds were observed in a larger area including south of Shallow Bay in the Mackenzie Delta map area)

   ii. Tundra Swans - molting, broodrearing, staging
      - 778 adults and 171 young, early September 1972 (Campbell and Weber 1973) (these birds were observed in a larger area including south of Shallow Bay in the Mackenzie Delta map area)

   iii. Greater White-fronted Geese - staging
      - 855 birds, early September 1972 (Campbell and Weber 1973) (these birds were observed in a larger area including south of Shallow Bay in the Mackenzie Delta map area)

   iv. Lesser Snow Geese - staging
      - 31 000 birds, mid-September 1983 (Barry and Barry in prep.)

   v. Unidentified geese (probably Greater White-fronted Geese and Brant (Koski 1977b)) - staging
      - 385 birds, early September 1975 (Koski 1977a)

b. Coastline from Blow River delta to Whitefish Station
   i. Glaucous Gulls - staging
      - 93 birds (14.5/km^2), early September 1986 (Alexander 1986)

c. Blow River delta
   i. Canada Geese - staging
      - 300 birds, early September 1965 (Barry unpubl. data)

   ii. Brant - staging
      - 250+ birds, late August and September 1976 (Koski 1977b)
      - 359 birds, early September 1975 (Koski 1977a)
      - 500+ birds, late August and September 1975 (Koski 1977a)
      - 500 birds, late August 1971 (Barry unpubl. data)

   iii. Greater White-fronted Geese - staging
      - 500+ birds, late August and September 1975 (Koski 1977a)
      - 450 to 800 birds, late August and September 1973 and 1974 (Koski 1975)

iv. Lesser Snow Geese - staging
- 5452 birds, mid-September, and 2369 birds later in September 1975 (Koski 1977a)

v. Unidentified geese (probably Brant and Greater White-fronted Geese (Koski 1975; Koski 1977a; Koski 1977b))
- 500+ birds, late August and September 1976 (Koski 1977a)

d. Whitefish Station
i. Brant - staging
- 600 birds, early September 1975 (Koski 1977a)

e. Tent Island area
i. Tundra Swans - molting, broodrearing, staging
- 102 birds, late August 1975 (Koski 1977a)

ii. Canada Geese - staging
- referred to as a concentration area, August-September 1976 (Koski 1977b)
- up to 50 birds, late August and September 1973 and 1974 (Koski 1975)

iii. Brant - staging
- 500+ birds, late August and September 1975 (Koski 1977a)
- 51 to 200 birds, late August and September 1973 and 1974 (Koski 1975)
- 500 birds, late August 1971 (Barry unpubl. data)

iv. Greater White-fronted Geese - staging
- 500+ birds, late August and September 1975 (Koski 1977a)
- 200 to 750 birds, late August and September 1973 and 1974 (Koski 1975)

8. Yukon Coastal Plain (Terrestrial) - Red

The entire Yukon Coastal Plain above the storm tide line is used during fall migration by large numbers of Lesser Snow Geese. Greater White-fronted Geese concentrate at more localized sites. All data is for late August and September, unless specified otherwise.

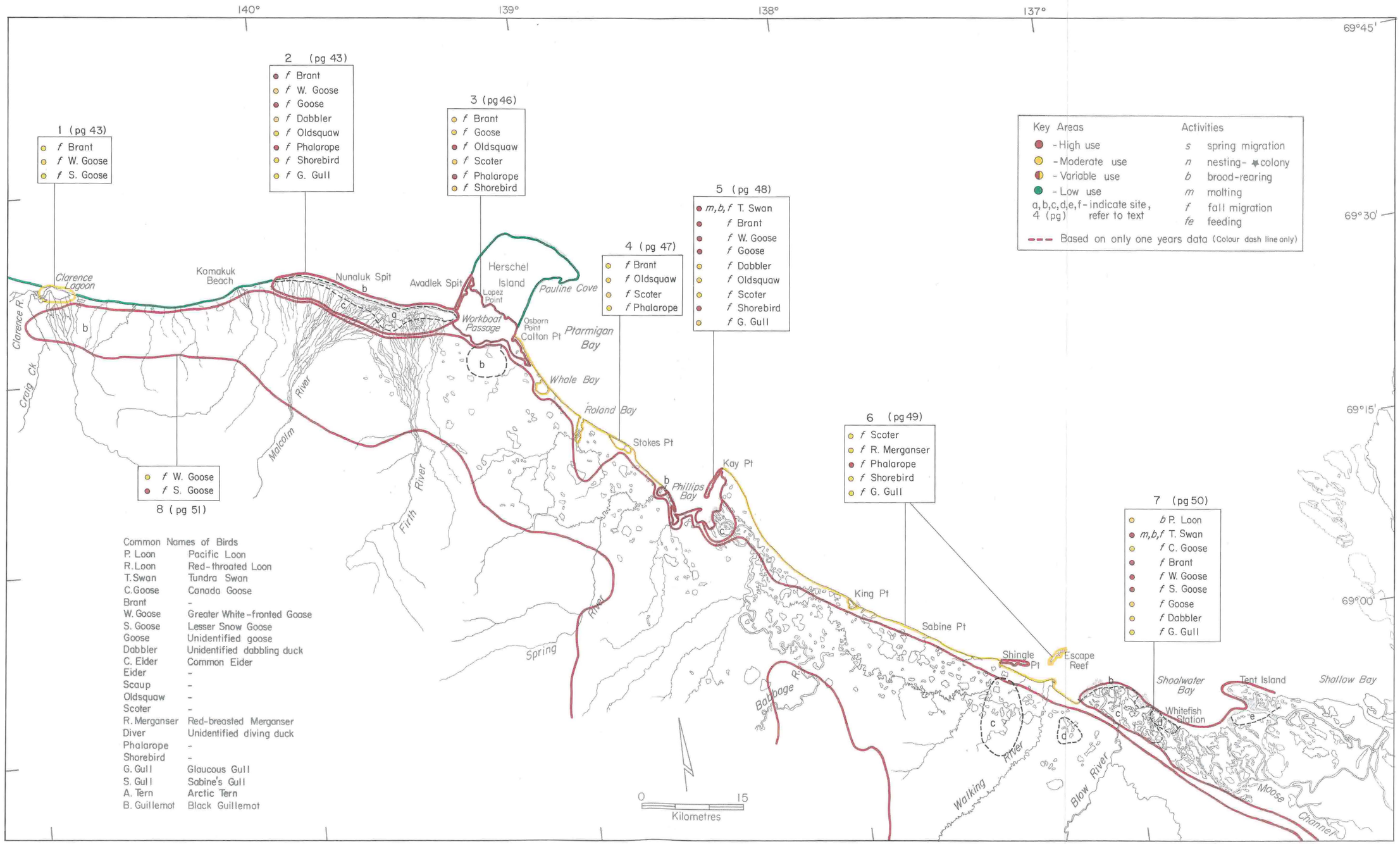
a. Entire Yukon Coastal Plain
i. Lesser Snow Geese - staging
- 300 651 birds, 1983 (Barry and Barry in prep.)
- 118 000 birds, 1982 (Barry and Barry in prep.)
- 80 000 birds, 1981 (Barry and Barry in prep.)
- 7500 birds, 1980 (Barry and Barry in prep.)
- 41 000 birds, 1979 (Barry and Barry in prep.)
- 224 401 birds, 1976 (Koski 1977b)
- 20 972 birds, 1975 (Koski 1977b)
- 37 435 birds, 1974 (Koski 1977b)
- 126 960 birds, 1973 (Koski 1977b)

b. Southwest of Calton Point
   i. Greater White-fronted Geese - staging
      - 250 birds, late August 1976 (Koski 1977b)

c. South of Shingle Point
   i. Greater White-fronted Geese - staging
      - 250+ birds, 1976 (Koski 1977b)

d. South of Walking River delta
   i. Greater White-fronted Geese - staging
      - 51 to 250 birds, 1973 and 1974 (Koski 1975)

Figure 4. Key areas for birds during mid-August to late September: Yukon Coast.



Common Names of Birds

P. Loon	Pacific Loon
R. Loon	Red-throated Loon
T. Swan	Tundra Swan
C. Goose	Canada Goose
Brant	-
W. Goose	Greater White-fronted Goose
S. Goose	Lesser Snow Goose
Goose	Unidentified goose
Dabbler	Unidentified dabbling duck
C. Eider	Common Eider
Eider	-
Scaup	-
Oldsquaw	-
Scoter	-
R. Merganser	Red-breasted Merganser
Diver	Unidentified diving duck
Phalarope	-
Shorebird	-
G. Gull	Glaucous Gull
S. Gull	Sabine's Gull
A. Tern	Arctic Tern
B. Guillemot	Black Guillemot

MACKENZIE DELTA

A. EARLY JUNE TO MID-JULY (FIGURE 5)

1. Southwest of Shallow Bay - Red and Yellow

The ponds, channels, marshes, and grass-sedge delta flats in this area are used extensively by nesting and non-breeding molting Tundra Swans, dabbling ducks and Arctic Terns. Based on studies by Slaney (1974a,b), Tundra Swans during late June are predominantly found in floodplain grass-sedge meadows and on lakes and ponds. During late May and early June a sizable proportion of the population may be found in open areas along river channels. Although Tundra Swans are found throughout the area, the highest densities of both nesting and molting birds are in the northern part (the Red area on Figure 5). Shorebirds are likely to be found nesting throughout this region but there have been no studies to indicate the extent. Other water bird species such as Pacific and Red-throated Loons, scaup and Oldsquaw are expected to nest in the area.

i. Tundra Swans - nesting, molting
   - 40 non-breeders and 4 nests, June 1984 (Barry unpubl. data) (only a small part of the total area was surveyed)
   - 837 adults (including non-breeders) and 107 nests, late June 1972 (Campbell 1973; Campbell and Weber 1973)
   - 1045 adults (including non-breeders), 74 young and 16 nests, mid-July 1972 (Campbell 1973; Campbell and Weber 1973)
   - Campbell (1973) and Campbell and Weber (1973) observed these birds in a larger area including the Blow River delta and Shallow Bay region in the Yukon Coast map area (Figure 2)

ii. Dabbling ducks - nesting, molting
   - 400+ birds, mostly Northern Pintails and American Wigeons, nesters and non-breeders, most years (Barry unpubl. data)

iii. Arctic Terns - nesting
   - 665 to 675 birds (undetermined number nesting but many apparent colonies noted), late June and mid-July 1972 (Campbell and Weber 1973) (these birds were observed in a larger area including the Blow River delta and Shallow Bay region in the Yukon Coast map area (Figure 2)

2. East of Ellice Island to east edge Kendall Island Bird Sanctuary - Yellow

This area consists of low lying coastal tundra vegetation and wetlands. Aerial surveys June 18 to 21, 1974, covering a portion of this area (indicated as area a on Figure 5) suggest that the habitat is used by nesting Pacific and Red-throated Loons, Tundra Swans, dabbling ducks, scaup, shorebirds, and Arctic Terns in moderate to high numbers (Slaney 1974a). Some locations within this region are important for nesting Long-billed Dowitchers, Stilt Sandpipers, Hudsonian Godwits, and Whimbrel (H.L. Dickson and A.R. Smith unpubl. data), all of which have limited breeding ranges.

Area c is predominantly low lying sedge/grass marsh. Specific data is not available, but several species of birds have been noted using this area: breeding and non-breeding Tundra Swans, Northern Pintails, American Wigeons, and other dabblers but apparently not diving ducks; breeding Sandhill Cranes, Whimbrel, and probably other shorebirds, and Arctic Terns.

a. West side of Kendall Island Bird Sanctuary
   i. Pacific Loons - nesting
      - 17 birds (0.3/km^2), mid-June 1973 (Slaney 1974a)

   ii. Red-throated Loons - nesting
      - 13 birds (0.2/km^2), mid-June 1973 (Slaney 1974a)

   iii. Tundra Swans - nesting
      - 37 to 40 birds, mid-June 1973 (Slaney 1974a)

   iv. Dabbling ducks - nesting
      - 326 birds (5.6/km^2) (60 suspected nesting, 266 non-nesting male pintails) mid-June 1973 (Slaney 1974a)

   v. Scaup - nesting
      - 98 birds (1.7/km^2), mid-June 1973 (Slaney 1974a)

   vi. Shorebirds - nesting
      - 2010 birds (estimated), mid-June 1973 (Slaney 1974a)

   vii. Arctic Terns - nesting
      - 16 birds, mid-June 1973 (Slaney 1974a)

3. Garry Island - Red/Yellow

Nesting groups of Glaucous Gulls and Arctic Terns are found on the low, gravel and sand spit at the northeast end of the island. Feeding is expected in the surrounding marine waters. Large numbers of Tundra Swans have been seen on the island but the type and consistency of use is not known. It is possible that flocks of molting swans swim to Garry Island from other areas of the delta resulting in intermittent use of the island and periodic high vulnerability as swans cross between islands.

a. Entire island
   i. Tundra Swans
      - 300 birds, early July 1974 (Kuyt pers. comm.)

b. Northeast spit
   i. Brant - nesting
      - 5 to 15 pairs, June most years (Barry unpubl. data)
      - 13 pairs (estimate), 1974 (Slaney 1975)

ii. Glaucous Gulls - nesting
- colony of 30 to 40 pairs, most years (Barry unpubl. data)
- 62 birds (nesting apparent), late July 1985 (indicative of use in June/July; Alexander 1986)
- colony of 13 pairs (estimate), 1974 (Slaney 1975)

iii. Arctic Terns - nesting
- 5 pairs, 1974 (Slaney 1975)

4. Pelly Island - Red/Yellow

A sand spit extends eastward from the northeast edge of the island. Patches of vegetated tidal flats occur on the east side of the island and in a lagoon system which extends inland from the west side. Nesting and non-breeding molting Tundra Swans use the main part of the island, while two colonies of nesting Brant, Glaucous Gulls, and Arctic Terns are found on the offshore spit (one colony at each end). Glaucous Gulls also nest on the spit along the north end of the island. Small numbers of dabbling ducks nest on the island. The shoreline and offshore waters around Pelly Island are used by feeding Arctic Terns and Glaucous Gulls.

a. Entire island

i. Tundra Swans - nesting, molting
- 24 nests and 18 non-breeders, June 1984 (Barry unpubl. data)
- 500 birds, early July 1974 (Kuyt pers. comm.)

ii. Unidentified geese (probably Brant (Slaney 1974a; Barry unpubl. data))
- 100 birds, early July 1974 (Kuyt pers. comm.)

b. Spit

i. Brant - nesting
- colony of 20 to 40 pairs, most years (Barry unpubl. data)
- two colonies, total of 34 pairs (estimated), 1973 (Slaney 1975)
- two colonies, total of 38 pairs (estimated), 1972 (Slaney 1975)

ii. Glaucous Gulls - nesting
- 40 pairs (nesting colonies of 20 pairs on nearshore spit and 20 pairs on offshore spit), most years (Barry unpubl. data)
- two colonies, total of 28 pairs (estimated), 1974 (Slaney 1975)
- two colonies, total of 40 pairs (estimated), 1973 (Slaney 1975)
- two colonies, total of 36 pairs (estimated), 1972 (Slaney 1975)
- colonies reported by Slaney (1975) all located on offshore spit

iii. Arctic Terns - nesting
- two colonies, total of 24 pairs (estimated), 1973 (Slaney 1975)
- two colonies, total of 20 pairs (estimated), 1972 (Slaney 1975)

5. Island west of Kendall Island - Green

This small sand and gravel island is the site of a minor colony of nesting Glaucous Gulls: 9 pairs noted in 1972 (Slaney 1975).

6. South and west of Kendall Island - Red and Yellow

The coastal tundra vegetation in this area provides nesting habitat for Brant, and for one of the two major colonies of Lesser Snow Geese that occur in the southeastern Beaufort Sea. Although Snow Geese during the nesting period (late May through June) restrict most of their activities to terrestrial parts of the colony site, they do go to water near nest sites for preening and bathing, including marine waters. Once goslings have hatched (starting late June and into July) the birds disperse to feeding sites east and west along the outer Mackenzie Delta, and the adults enter into molt becoming flightless. At this time birds are likely to swim across areas of marine water between feeding sites and to enter water if disturbed making them susceptible to water-borne pollutants. Nesting and non-breeding molting Tundra Swans use part of this area and, in lower numbers, areas to the east and west. Most of this region lies within the Kendall Island Migratory Bird Sanctuary.

a. South and west of Kendall Island
   i. Tundra Swans - nesting, molting
      - 23 nests, 17 non-breeders, June 1984 (Barry unpubl. data)

b. South of Kendall Island
   i. Brant - nesting
      - 10 to 40 pairs, June most years (Barry unpubl. data)

   ii. Lesser Snow Geese - nesting
      - colony of 1042 breeding birds and 111 non-breeding birds (200 nests/km^2), June 1981 (Kerbes 1983)
      - colony of 832 breeding birds and 745 non-breeding birds (67 nests/km^2), June 1976 (Kerbes 1983)
      - colony of 2500 birds (estimate), late June 1973 (Slaney 1974a)
      - colony of 6800 birds, early July 1971 (Barry and Spencer 1976)

7. Rae Island - Yellow

The north shore of the island is a sand and gravel beach, whereas the south shore of the island is a mudflat. The area between is upland shrub, and there is a narrow gravel spit on the northeast side of the island (Slaney 1975). The island is used by nesting colonies of Brant, Glaucous Gulls, and small numbers of Arctic Terns.

   i. Brant - nesting
      - colony of 14 pairs (estimate), 1972 (Slaney 1975)

   ii. Glaucous Gulls - nesting
      - colony of 21 pairs (estimate), 1972 (Slaney 1975)

8. Spit south of Hooper Island - Red/Yellow

This area is largely mudflat with a small gravel spit used in some years by moderately high numbers of nesting Glaucous Gulls while in other years not at all. Feeding grounds likely extend to the main delta islands. Small numbers of Arctic Terns have been reported nesting on the gravel spit that extends off the northeast end of the island (Slaney 1975).

i. Glaucous Gulls - nesting
- 101 nests, late June 1987 (Alexander and Hawkings 1988)
- colony of 20 pairs (estimate), 1974 (Slaney 1975)
- colony of 85 pairs (estimate), 1972 (Slaney 1975)
- none nesting in some years (Barry unpubl. data).

9. West side of Mallik Bay - Red

The coastal tundra vegetation of this area is important mainly for nesting and non-breeding molting Tundra Swans. High numbers of molting Greater White-fronted Geese are found in parts of the area during July. These birds are rarely found in marine waters. High numbers of molting dabblers have been reported for other time periods (see pages 65 and 75). These birds probably nest throughout this region and begin gathering into molting flocks in July. Shorebirds are expected to nest throughout.

i. Tundra Swans - nesting, molting
- 400 breeders plus 1100 non-breeders, June most years (Barry unpubl. data)

ii. Greater White-fronted Geese - nesting, molting
- 1500 to 4500 birds, mostly non-breeders, late June to late July most years (Barry unpubl. data)

iii. Unidentified geese (probably Greater White-fronted Geese (Barry unpubl. data)) - molting
- 800 birds, early July 1974 (Kuyt pers. comm.)

10. Pullen Island spit - Yellow

This gravel spit and associated mudflat is the site of nesting groups of Brant and Glaucous Gulls.

i. Brant - nesting
- 3 to 25 scattered pairs, June most years (Barry unpubl. data)
- colony of 17 pairs (estimated), 1974 (Slaney 1975)

ii. Glaucous Gulls - nesting
- 10 to 25 pairs, most years (Barry unpubl. data)
- 65 birds (nesting apparent), late July 1985 (indicative of use in June/July; Alexander 1986)
- colony of 17 pairs (estimated), 1974 (Slaney 1975)

11. Small island in Kidluit Bay - Red

This island, which has colonies of nesting Brant, Common Eiders, and Glaucous Gulls, is elevated above the storm tide line and completely vegetated with grasses and sedges. Glaucous Gulls may be found feeding in surrounding waters and in nearby coastal wetlands on Richards Island and possibly Hendrickson Island.

i. Brant - nesting
   - 15 to 20 pairs, June most years (Barry unpubl. data)

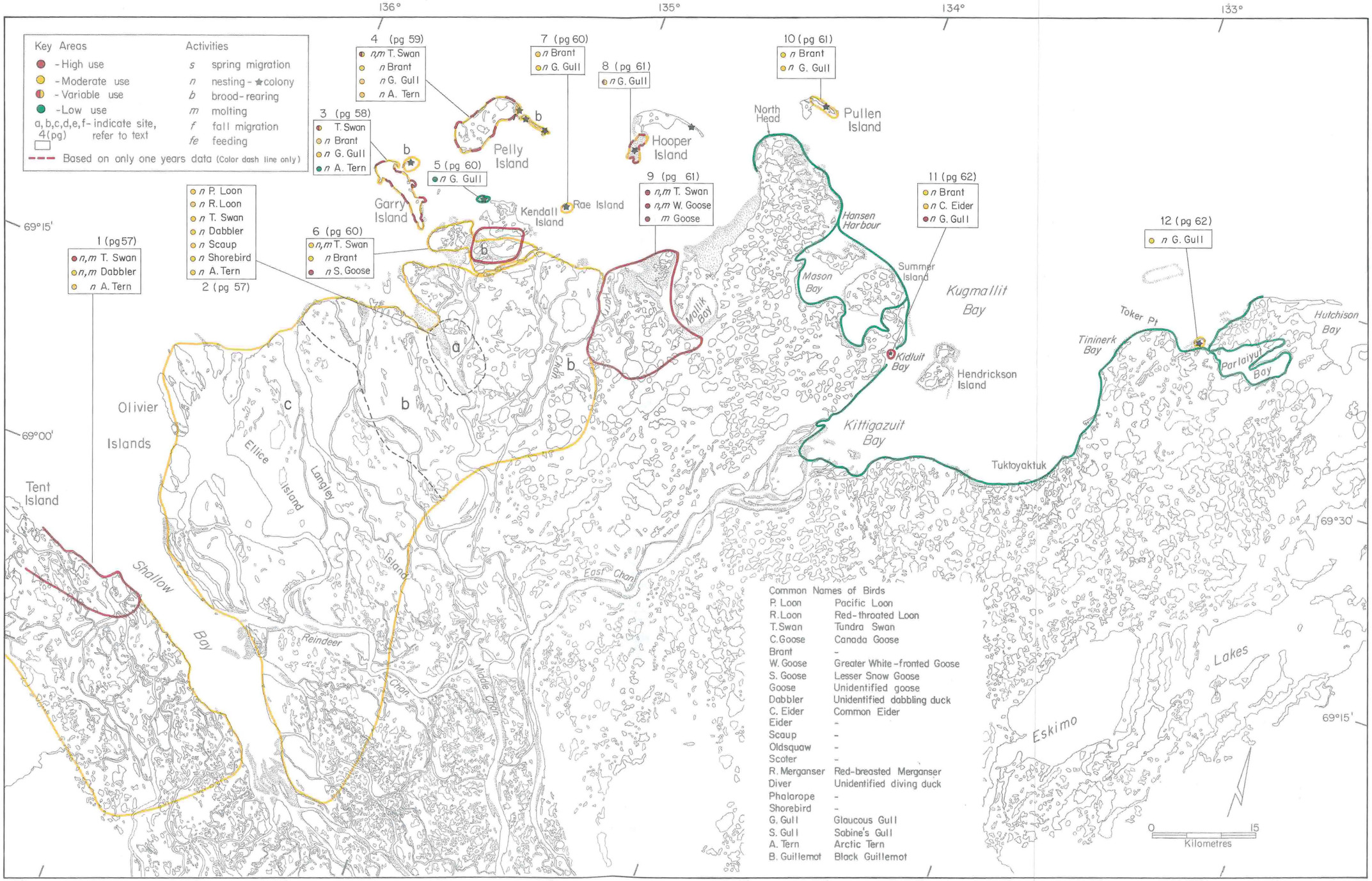
ii. Common Eiders - nesting
   - 5 to 25 nests, 2 out of 5 years (Barry unpubl. data)

iii. Glaucous Gulls - nesting
   - colony of 40 to 80 pairs, most years (Barry unpubl. data)

12. Mouth of Parlaiyut Bay - Yellow

Most years, about 20 pairs of Glaucous Gulls nest on the island outside the mouth of Parlaiyut Bay (Barry unpubl. data).

Figure 5. Key areas for birds during early June to mid-July: Mackenzie Delta.



B MID-JULY TO MID-AUGUST (FIGURE 6)

1. South of Shallow Bay - Red and Yellow

The coastal tundra vegetation, channels, and wetlands of this area are used by molting and broodrearing Tundra Swans. Most use appears to be restricted to terrestrial wetlands. Birds are found infrequently and in small numbers in the waters of Shallow Bay. Continued use by bird species present in June to mid-July is expected (see page 57).

a. North part of area
   i. Tundra Swans - molting, broodrearing
      - 200 non-breeders and breeders, most years (Barry unpubl. data)

2. Northwest Shallow Bay to east of Ellice Island - Yellow

This area is predominantly low lying sedge/grass marsh. Specific data is not available, but several species of birds have been noted using the area: molting, broodrearing and non-breeding Tundra Swans; broodrearing dabbling ducks, shorebirds, and Arctic Terns; and molting and staging geese (Barry pers. obs.). Snow Geese from the Kendall Island colony sometimes use the northern part of this area (discussed in area 3 below).

3. Ellice Island to Mallik Bay - Red

The coastal tundra vegetation, channels, and wetlands are used by molting and broodrearing Tundra Swans, Brant, Greater White-fronted Geese, and Lesser Snow Geese; molting Canada Geese, dabbling ducks, and scaup; broodrearing and fall staging shorebirds; and broodrearing Arctic Terns. Tundra Swans and Greater White-fronted Geese are particularly abundant in the wetlands, lakes and channels southwest of Mallik Bay, around the Swan and Harry channels. Molting swans often gather in large flocks in certain areas; although rarely offshore, the molting sites are often directly influenced by marine waters. Coastal salt marshes are extremely important feeding sites for Brant. Lesser Snow Geese move east and west from the Kendall Island colony during this period (see page 60 for further discussion). Large numbers of molting dabbling ducks have been observed in the wetland areas southwest and west of Mallik Bay, but it is unclear if such gatherings are unique to this region or representative of most wetland areas of the Mackenzie Delta. Broodrearing and fall staging shorebirds are likely found throughout this region, particularly in sedge wetlands, but the extent of use is not known.

a. Langley Island to Swan Channel (includes areas b, c, d, e, g, and part of f)
   i. Lesser Snow Geese - molting, broodrearing
      - about 2000+ adults and young, most years (Barry unpubl. data)
      - 139 adults and 150 young, mid-July 1974 (Slaney 1974a)

b. Kendall Island area
   i. Brant - molting, broodrearing
      - 20 to 80 birds, most years (Barry unpubl. data)

c. Kendall Island area
   i. Tundra Swans - molting
      - 200+ birds, most years (Barry unpubl. data)

d. Lake south of Kendall Island
   i. Tundra Swans - molting
      - 80 birds, mid-August 1974 (Kuyt pers. comm.)

   ii. Shorebirds - broodrearing, staging
      - 90 birds, mid-August 1974 (Kuyt pers comm.)

e. East of Kendall Island
   i. Brant - molting, broodrearing
      - 55 birds, late July 1985 (Alexander 1986)

f. Mallik Bay area (includes areas g, h, i, and part of a)
   i. Tundra Swans - molting, broodrearing
      - 400 adults plus young and 500 to 1200 non-breeders, most years (excluding southwest portion of area) (Barry unpubl. data)

   ii. Canada Geese - molting
      - 250 non-breeders, July 1971 (observed in southwest portion of area) (Barry unpubl. data)

   iii. Greater White-fronted Geese - molting, broodrearing
      - 1500 to 4500 non-breeders, late June to late July most years (excluding northeast offshore portion of area) (Barry unpubl. data)
      - 800 adults, early August 1987 (on island in north part of area) (Alexander unpubl. data)
      - 25 adults and young, late July 1985 (observed in part of coastal area) (Alexander 1986; Alexander unpubl. data)

   iv. Dabbling ducks - molting
      - 920 birds (mostly American Wigeons), early August 1987 (on island in north part of area) (Alexander unpubl. data)
      - about 4000 birds, July and August 1968 (excluding northeast offshore portion of area) (Barry unpubl. data)

g. Swan channel area
   i. Tundra Swans - molting, broodrearing
      - 504 non-breeders, late July to mid-August 1982 (Hogg et al. 1986)
      - 294 adults and 12 young, mid-August 1974 (Slaney 1975)

   ii. Canada Geese - molting
      - 120 birds, late July to mid-August 1982 (Hogg et al. 1986)

iii. Brant - molting
- 75 birds, mid-August 1985 (Alexander 1986)

iv. Greater White-fronted Geese - molting
- 93 adults, late July to mid-August 1982 (Hogg et al. 1986)
- 150 birds, mid-August 1974 (Slaney 1975)

v. Dabbling ducks - molting
- 196 birds, late July to mid-August 1982 (Hogg et al. 1986)

vi. Scaup - molting
- 50 birds, mid-August 1974 (Slaney 1975)

vii. Shorebirds - broodrearing, staging
- 220 birds (40% Red-necked Phalarope), late July to mid-August 1982 (Hogg et al. 1986)
- many hundreds of birds in marshes, early August 1987 (observed from helicopter, estimates not feasible) (Alexander unpubl. data)

viii. Arctic Terns - broodrearing
- 16 birds, late July to mid-August 1982 (Hogg et al. 1986)

h. Lake southwest of Mallik Bay
i. Tundra Swans - molting, broodrearing
- 340 birds, mid-July to mid-August 1974 (Kuyt pers. comm.)

ii. Unidentified geese (probably Canada Geese and Greater White-fronted Geese (Barry unpubl. data; Slaney 1974a; Hogg et al. 1986)) - molting
- 1200 birds, late July to early August 1974 (Kuyt pers. comm.)
- 500 birds, mid-August 1974 (Kuyt pers. comm.)

i. Denis Lagoon
i. Greater White-fronted Geese - molting
- 600 birds in 1973 (Slaney 1974a)
- 250 birds in 1972 (Slaney 1974a)

4. East of Ellice Island to east edge of Kendall Island Bird Sanctuary - Yellow

This is an extensive area of low-lying wetlands. Aerial surveys 19 to 25 July, 1974 (Slaney 1975), covering a portion of the area (indicated as area a on Figure 5) suggest that the habitat is used by broodrearing Pacific and Red-throated Loons, Tundra Swans, and Arctic Terns. Molting and broodrearing dabbling ducks, and broodrearing and fall staging shorebirds are likely present in the area (see page 57).

a. West side of Kendall Island Bird Sanctuary
   i. Pacific Loons - broodrearing
      - 28 adults and 1 young (0.5/km^2), late July 1973 (Slaney 1974a)

   ii. Red-throated Loons - broodrearing
      - 8 adults and 1 young (0.4/km^2), late July 1973 (Slaney 1974a)

   iii. Tundra Swans - molting, broodrearing
      - 53 adults and 11 young, late July 1973 (Slaney 1974a)

   iv. Arctic Terns - broodrearing
      - 63 birds (1.1/km^2), late July 1973 (Slaney 1974a)

5. Garry Island - Yellow

Broodrearing Glaucous Gulls and Arctic Terns are found on the low, gravel and sand spit at the northeast end of the island. The area is used less as young of both species fledge from early to mid-August. Molting and broodrearing Brant and Tundra Swans are present on the island. Brant will be found in salt marsh areas along the shoreline. Small numbers of Pacific Loons also use the island.

   i. Tundra Swans - molting, broodrearing
      - 25 birds, mid-July, and 55 birds, early to mid-August 1974 (Kuyt pers. comm.)

   ii. Brant - molting, broodrearing
      - 100 birds (about 50% young), late July 1985 (Alexander 1986; Alexander unpubl. data)

   iii. Glaucous Gulls - broodrearing
      - 62 birds on spit and 7 birds around island, late July 1985 (Alexander 1986)

6. Island east of Garry Island - Red

This small gravel island is used for feeding and resting by as many as 200 Glaucous Gulls (Barry unpubl. data).

7. Pelly Island - Red

A sand spit extends eastward from the northeast edge of the island. Patches of vegetated tidal flat occur on the east side of the island and in a lagoon system which extends inland from the west side. Broodrearing Pacific Loons (small numbers), molting and broodrearing Tundra Swans and Brant, and molting dabbling ducks use most of the island, but especially the lagoon system and spit. Broodrearing Glaucous Gulls are present on the island spits (see page 59 for numbers of nesting birds), but dependence diminishes as the young fledge from early to mid-August.

a. Entire island
   i. Tundra Swans - molting, broodrearing
      - 100 to 200 birds, most years (Barry unpubl. data)
      - 130 birds, mid-July, and 140 birds, mid-August 1974 (Kuyt pers. comm.)

   ii. Brant - molting, broodrearing
      - 68 adults and 12 young, mid-August 1974 (Slaney 1975)

   iii. Dabbling ducks - molting
      - 320 birds, mid-August 1974 (Kuyt pers. comm.)

b. Lagoon system and spit
   i. Brant - molting, broodrearing
      - 40 to 80 birds, most years (Barry unpubl. data)
      - 20 adults, late July 1985 (Alexander 1986)

8. Spit south of Hooper Island - Red/Yellow

This area is largely mudflat with a small gravel spit used in some years by moderately high numbers of nesting Glaucous Gulls while in other years not at all. There is no data for this time period, but continued use by birds observed in earlier parts of the season is expected (see page 61).

9. Hansen Harbour to Kidluit Bay - Red

The sheltered bays in this area are important most years for molting scaup and Red-breasted Mergansers, and to a lesser extent, molting Oldsquaw and scoters. Red-throated Loons feed in this area. Brant and Greater White-fronted Geese molt and feed in salt marsh areas along the shoreline, particulary south of Summer Island and around Kidluit Bay. (Note: although surveys conducted in 1980 and 1981 extended along the coast from Hansen Harbour to Tuktoyaktuk, most birds were found in the Hansen Harbour area).

a. Entire area
   i. Red-throated Loons - feeding
      - 25 birds (1.1/km^2), late July 1985 (Alexander 1986)

   ii. Scaup - molting
      - 1162 birds (50.1/km^2), mid-August 1986 (Alexander unpubl. data)
      - 85 birds (3.8/km^2), late July, and 46 birds mid-August 1985 (Alexander 1986)
      - 519 to 1241 birds (13.8 to 33.2/km^2), early to mid-August 1981 (Barry and Barry 1982)
      - 582 to 761 birds (24.1 to 31.6/km^2), late July to mid-August 1980 (Barry et al. 1981)

   iii. Oldsquaw - molting
      - 6 birds (0.3/km^2), mid-August 1986 (Alexander unpubl. data)
      - 461 birds (20.6/km^2), late July 1985 (Alexander 1986)
      - 864 birds (23.1/km^2), mid-July 1981 (Barry and Barry 1982)

iv. Scoters - molting
- 189 birds (8.1/km^2), mid-August 1986 (Alexander unpubl. data)
- 422 birds (22.0/km^2), late July 1985 (Alexander 1986)
- 408 birds (10.9/km^2), mid-August 1981 (Barry and Barry 1982)

v. Red-breasted Mergansers - molting
- 50 birds (2.1/km^2), mid-August 1986 (Alexander unpubl. data)
- 1801 birds (93.8/km^2), mid-August 1985 (Alexander 1986)
- 966 birds (25.9/km^2), mid-August 1981 (Barry and Barry 1982)

b. Mason Bay
i. Greater White-fronted Geese - staging
- 250 birds, mid-August 1985 (Alexander 1986)

c. Bay south of Summer Island
i. Brant - molting
- 215 birds, mid-August 1986 (Alexander unpubl. data)

ii. Unidentified geese (probably Brant or Greater White-fronted Geese) - staging
- 250 birds, mid-August 1985 (Alexander 1986)

10. Small island in Kidluit Bay - Red

The Glaucous Gulls that nest on the island rear their young there, and feed in surrounding waters and terrestrial areas (see page 62 for a discussion of colony size). Molting and broodrearing Brant are found in salt marsh areas along the shoreline of the island.

i. Brant - molting, broodrearing
- 30 to 40 birds, most years (Barry unpubl. data)

ii. Glaucous Gulls - broodrearing
- 80 birds, mid-August 1986 (Alexander unpubl. data)
- 120 birds, mid-August 1985 (Alexander 1986)

11. Hendrickson Island - Broken Red

This island may be important to large numbers of broodrearing and fall staging shorebirds. Very little data is available but high use is suggested by observations reported in Hogg et al. (1986) (data from ground surveys of area a (Figure 6) from late July to mid-August 1982). Glaucous Gulls are present on and around the island but it is not known if these are nesting/broodrearing birds or just feeding birds. Small numbers of Pacific and Red-throated Loons, and dabbling ducks breed on the island.

i. Shorebirds - broodrearing, staging
- 502 birds (40% Semipalmated/Baird's Sandpipers, 24% Pectoral Sandpipers), late July to mid-August 1982 (Hogg et al. 1986)

ii. Glaucous Gulls - feeding
- 35 birds (only south end of island surveyed), mid-August 1985 (Alexander 1986)
- 19 birds, late July 1985 (Alexander 1986)
- 51 birds, late July to mid-August 1982 (Hogg et al. 1986)

12. South of Tuktoyaktuk - Red

Molting, non-breeding Tundra Swans are concentrated in this upland area. Use of marine waters is expected to be minimal.

i. Tundra Swans - molting
- 100 to 200 non-breeders, most years (Barry unpubl. data)

13. Tuktoyaktuk to Hutchison Bay - Green

It should be noted that several species are scattered in small numbers throughout this region: molting Brant in tidal marsh areas; feeding Pacific and Red-throated Loons in offshore areas; staging and broodrearing shorebirds in coastal and tidal marsh areas; and feeding Glaucous Gulls throughout. Flocks of molting diving and dabbling ducks may be present at times in offshore areas (Alexander 1986; Hogg et al. 1986).

14. Bays southeast of Toker Point - Red

Large flocks of molting Red-breasted and Common Mergansers use this system of sheltered bays. The west end of Liverpool Bay is the only other location where there have been reports of concentrations of Common Mergansers along the Beaufort Sea coast. Other species present in the bays are feeding Pacific and Red-throated Loons, Glaucous Gulls, and Arctic Terns. Molting Brant use salt marsh areas along the shoreline of the bay. All information is from Sirois and Dickson (in prep.).

i. Red-breasted Mergansers - molting
- only small numbers from mid-June to September 1987
- 600 birds plus 300 unidentified mergansers, mid-July 1986
- 630 birds, late July 1986
- 700 birds, mid-August 1986

ii. Common Mergansers - molting
- flocks of 50 to 1500 birds (maximum count of 1700 birds on one day), mid-July to mid-August 1987
- 400 birds, mid-July 1986

15. Parlaiyut Bay - Red

Parlaiyut Bay is used by large numbers of molting scaup, Oldsquaw, and Red-breasted Mergansers, and to a lesser extent by molting scoters. However, use by individual species appears to vary between years from low to high. Pacific and Red-throated Loons, and Glaucous Gulls feed in the bay. Glaucous Gulls nest around the bay and in a small colony at the mouth of the bay.

Numbers of birds reported below for 1980 and 1981 are maximum counts from surveys that covered the area from Tuktoyaktuk to Hutchison Bay (from Barry et al. (1981) and Barry and Barry (1982) respectively). However, most birds were seen in Parlaiyut Bay. The accompanying bird densities were reported in Dickson et al. (1983), and come from the same 1980/81 surveys, but represent average densities of birds seen only in Parlaiyut Bay.

i. Scaup - molting
- 2 birds mid-August 1985, and zero birds mid-August 1986 (Alexander 1986; Alexander unpubl. data)
- 1599 birds (93.4/km^2), late July to mid-August 1981
- 5076 birds (174.0/km^2), late July to mid-August 1980
- in both 1980 and 1981, numbers increased from late July to mid-August

ii. Oldsquaw - molting
- 464 birds (40.0/km^2), mid-August 1986 (Alexander unpubl. data)
- 609 birds (52.5/km^2), late July 1985 (Alexander 1986)
- 1704 birds (59.7/km^2), late July to mid-August 1981
- 75 birds (3.5/km^2), late July to mid-August 1980

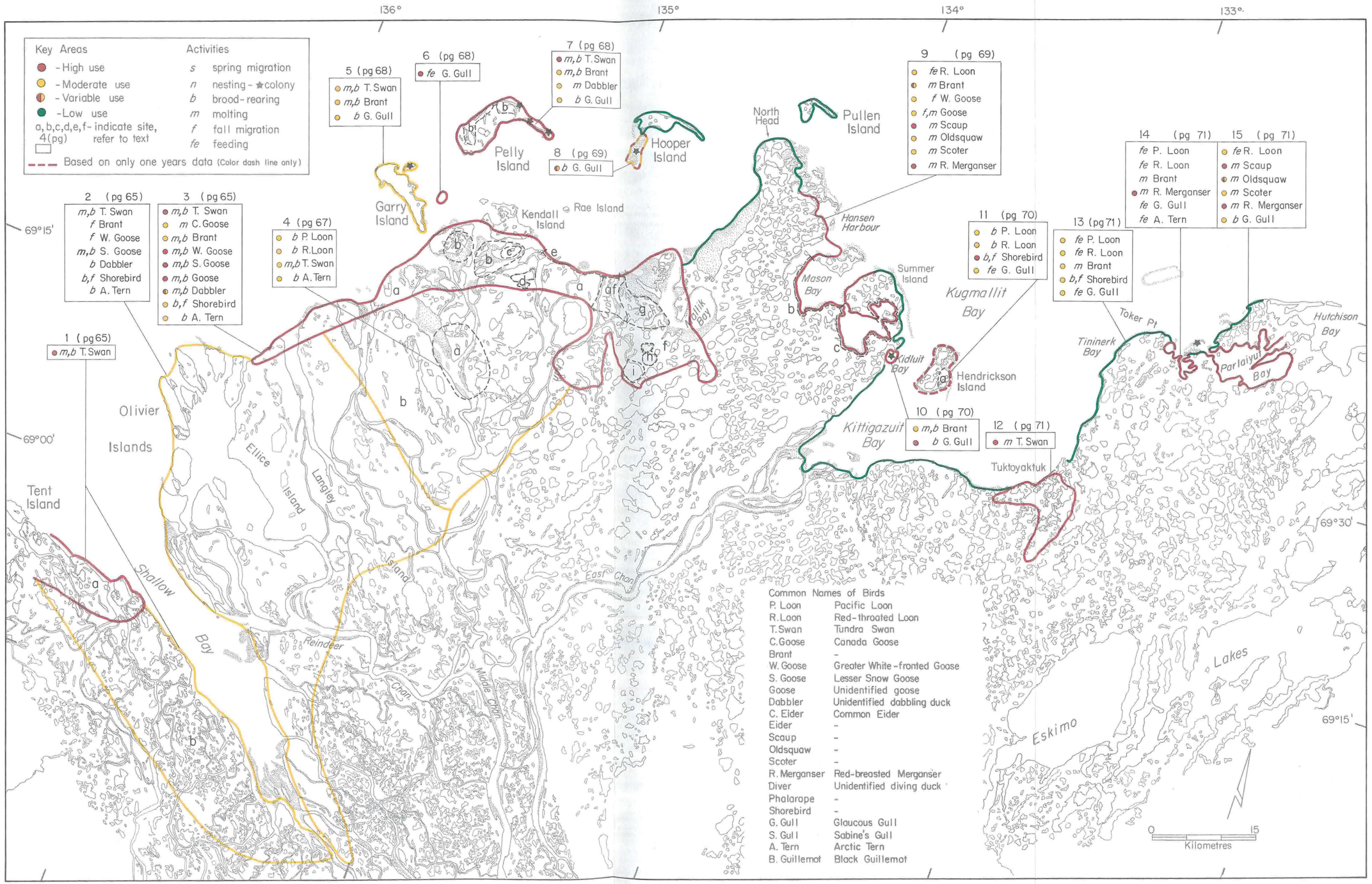
iii. Scoters - molting
- 294 birds (25.3/km^2), mid-August 1986 (Alexander unpubl. data)
- 360 birds (31.0/km^2), late July 1985 (Alexander 1986)
- 206 birds (12.0/km^2), late July to mid-August 1981
- 494 birds (10.3/km^2), late July to mid-August 1980

iv. Red-breasted Mergansers - molting
- 853 birds (54.7/km^2), mid-August 1986 (Alexander unpubl. data)
- 940 birds (81.0/km^2), late July 1985 (Alexander 1986)
- 33 birds (3.4/km^2), late July to mid-August 1981
- 171 birds (0.9/km^2), late July to mid-August 1980

v. Unidentified diving ducks (probably mostly scaup, Oldsquaw, and Red-breasted Mergansers)
- 3500 birds, late July to mid-August 1974 (Kuyt pers. comm.)
- 4400 birds, mid-August 1974 (Kuyt pers. comm.) (this was a survey of the entire bay)

vi. Glaucous Gulls - broodrearing
- 10 birds (0.6/km^2), mid-August 1986 (Alexander unpubl. data)
- 86 birds (7.4/km^2), late July 1985 (Alexander 1986)
- 3.1/km^2, late July to mid-August 1980, and 9.6/km^2, late July to mid-August 1981

Figure 6: Key areas for birds during mid-July to mid-August: Mackenzie Delta.



C. MID-AUGUST TO LATE SEPTEMBER (FIGURE 7)

1. Shallow Bay to Mallik Bay - Red

The western and northern part of the Mackenzie Delta (to Mallik Bay) consists of low-lying, coastal tundra vegetation which can be affected by storm tides for about 5 km inland. During fall migration it is used by large numbers of Lesser Snow Geese, Brant, Greater White-fronted Geese, Canada Geese, and, towards Mallik Bay, dabbling ducks. Late molting and broodrearing Tundra Swans occur in the area. Lesser Snow Geese are found throughout the area. Brant and Greater White-fronted Geese are more likely to be found nearer marine water. Canada Geese are found in inner channels of the Mackenzie River delta. The area is likely used extensively by fall migrating shorebirds, but very little data is available.

a. Entire area

i. Lesser Snow Geese - staging
- from late August to late September, unless specified otherwise
- 17848 birds, 1983 (Barry and Barry in prep.)
- 6000 birds, 1982 (Barry and Barry in prep.)
- 80 000 birds, 1981 (Barry and Barry in prep.)
- 18 363 birds, 1976 (Koski 1977b)
- 685 305 birds, 1975 (Koski 1977b)
- 28 913 birds, 1974 (Koski 1977b)
- 86 520 birds, 1973 (Koski 1977b)
- up to 20 675 birds, late September 1973 (Slaney 1974a)
- up to 42 171 birds, late September 1973 (Koski and Gollop 1974)
- 175 000 birds, autumn 1968 (Barry et al. in prep.)

ii. Glaucous Gulls - staging
- 214 birds (8.8/km^2), mid-September 1981 (survey extended along the coastline from Shallow Bay to Kugmallit Bay) (Barry and Barry 1982)

b. Shallow Bay area

i. Lesser Snow Geese - staging
- 4382 birds, early September 1983 (Barry and Barry in prep.)
- 30 000 birds, mid-September 1972 (Slaney 1973)

c. Northwest and southwest Shallow Bay

i. Pacific Loons - broodrearing
- 221 birds (0.2/km^2), early September 1972 (Campbell and Weber 1973) (these birds were observed in a larger area including the Blow River delta and Shallow Bay region in the Yukon map area)

ii. Tundra Swans - molting, broodrearing, staging
- 778 adults and 171 young, early September 1972 (Campbell and Weber 1973) (these birds were observed in a larger area including the Blow River delta and Shallow Bay region in the Yukon map area)

iii. Greater White-fronted Geese - staging
- 855 birds, early September 1972 (Campbell and Weber 1973) (these birds were observed in a larger area including the Blow River delta and Shallow Bay region in the Yukon map area)

iv. Lesser Snow Geese - staging
- 77578 birds, early September, and 30442 birds approaching mid-September 1975 (Koski 1977a)

d. Northwest Shallow Bay
i. Brant - staging
- 250+ birds, late August and September 1975 (Koski 1977a)
- 50 to 250 birds, late August and September 1973 and 1974 (Koski 1975)

ii. Greater White-fronted Geese - staging
- 500+ birds, late August and September 1975 (Koski 1977a)
- 50 to 200 birds, late August and September 1973 and 1974 (Koski 1975)

e. Southwest Shallow Bay
i. Brant - staging
- 1000 to 2000 birds, late August and September 1973 and 1974 (Koski 1975)

ii. Greater White-fronted Geese - staging
- 250+ birds, late August and September 1976 (Koski 1977b)
- 1000+ birds, late August and September 1975 (Koski 1977a)

iii. Unidentified geese (probably Canada or Greater White-fronted Geese(Koski 1977a)) - staging
- 500+ birds, late August and September 1976 (Koski 1977b)

f. Southeast Shallow Bay to west side Kendall Island bird sanctuary
i. Lesser Snow Geese - staging
- 80651 birds, early September, and 89643 birds, mid-September 1975 (Koski 1977a)

g. Southeast Shallow Bay
i. Tundra Swans - molting, broodrearing, staging
- 50+ birds, late August and September 1975 (Koski 1977a)

ii. Canada Geese - staging
- 2000 to 3000 birds, September 1965 (Barry unpubl. data)

iii. Brant - staging
- 250+ birds, late August and September 1975 (Koski 1977a)
- 500 to 1000 birds, late August and September 1973 and 1974 (Koski 1975)

iv. Greater White-fronted Geese - staging
- 1500+ birds, late August and September 1975 (Koski 1977a)
- 1100 to 2500 birds, late August and September 1973 and 1974 (Koski 1975)

v. Unidentified geese (probably Canada or Greater White-fronted Geese (Koski 1977a)) - staging
- 500+ birds, late August and September 1976 (Koski 1977b)

h. Northeast Shallow Bay
i. Tundra Swans - molting, broodrearing, staging
- 150+ birds, late August and September 1975 (Koski 1977a)

ii. Brant - staging
- 115 birds along coastline, mid-September 1985 (Alexander 1986)
- 250+ birds, late August and September 1975 (Koski 1977a)

iii. Greater White-fronted Geese - staging
- 4500+ birds, late August and September 1975 (Koski 1977a)
- 1750 to 3550 birds, late August and September 1973 and 1974 (Koski 1975)

iv. Lesser Snow Geese - staging
- 9470 birds, mid-September 1974 (Koski 1975)
- 8510 birds, late September 1973 (Koski and Gollop 1974)
- 10850 birds, late September 1973 (Slaney 1974a)

i. Olivier Islands to west side Kendall Island Bird Sanctuary
i. Brant - staging
- 1000 to 3000 birds, most years (Barry unpubl. data)

j. Olivier Islands
i. Greater White-fronted Geese - staging
- about 500 birds, late August and September 1975 (Koski 1977a)

ii. Lesser Snow Geese - staging
- 3175 birds, late September 1973 (Slaney 1974a)

k. Ellice Island to west side of Kendall Island Bird Sanctuary
i. Lesser Snow Geese - staging
- 17330 birds, late September, and 16995 birds later September 1973 (Koski and Gollop 1974)

l. Ellice Island area
i. Brant - staging
- 250+ birds and 750+ birds at the south and north ends of the island, respectively, late August and September 1975 (Koski 1977a)

ii. Greater White-fronted Geese - staging
- 2000+ birds, late August and September 1975 (Koski 1977a)
- 905 to 2100 birds, late August and September 1973 and 1974 (Koski 1975)

iii. Lesser Snow Geese - staging
- 5790 birds, mid-September, and 5500 birds, late September 1973 (Slaney 1974a)

m. Ellice Island to west side of Kendall Island Bird Sanctuary
i. Tundra Swans - molting, broodrearing, staging
- 60+ birds, late August and September 1976 (Koski 1977b)

ii. Brant - staging
- 150 to 300 birds, late August and September 1973 and 1974 (Koski 1975)
- 295 birds, late August 1973 (Slaney 1974a)

iii. Greater White-fronted Geese - staging
- 500+ birds, late August and September 1975 (Koski 1977a)
- 720 birds, late August 1973 (Slaney 1974a)

iv. Lesser Snow Geese - staging
- 7130 birds, mid-September, and 7065 birds, late September 1973 (Slaney 1974a)

v. Unidentified geese (probably Canada or Greater White-fronted Geese (Koski 1977a)) - staging
- 100 to 300 birds, late August and September 1973 and 1974 (Koski 1975)
- 190 birds, late August 1973 (Slaney 1974a)

n. West side of Kendall Island Bird Sanctuary to Swan Channel
i. Tundra Swans - molting, broodrearing, staging
- 60+ birds, late August and September 1976 (Koski 1977b)
- 150+ birds, late August and September 1975 (Koski 1977a)

ii. Brant - staging
- 100 to 500 birds south of Kendall Island, late August to mid-September most years (these birds were observed in a larger area including Pelly Island) (Barry unpubl. data)
- 760 to 1015 birds, late August 1973 (Slaney 1974a)

iii. Greater White-fronted Geese - staging
- 200 to 700 birds, late August and September 1973 and 1974 (Koski 1975)
- 595 birds, late August, and 600 birds early September 1973 (Slaney 1974a)

iv. Lesser Snow Geese - staging
- 6790 birds, early September, and 7010 birds, late September 1973 (Slaney 1974a)

v. Shorebirds - staging
- 310 birds, late August 1974 (Kuyt pers. comm.) (surveyed only a small part of total area)

o. East of Kendall Island Bird Sanctuary
i. Dabbling ducks - staging
- 5000 to 8000 birds, late August to mid- September 1969 (Barry unpubl. data)

p. Mallik Bay area
   i. Tundra Swans - molting, broodrearing, staging
      - 150+ birds, late August and September 1975 (Koski 1977a)
      - 70 birds, late August 1974, in a small area near Mallik Bay (Kuyt pers. comm.)

   ii. Brant - staging
      - 250+ birds, late August and September 1976 (Koski 1977b)

   iii. Greater White-fronted Geese - staging
      - 500+ birds, late August and September 1975 (Koski 1977a)

q. North of Mallik Bay
   i. Brant - staging
      - 105 birds, late August 1973 (Slaney 1974a)

2. South Garry Island - Red

Habitats in this area consist of upland shrub vegetation and gravel and sand beaches (Slaney 1975); both Brant and Greater White-fronted Geese have been observed on this island.

   i. Brant - staging
      - 51 to 150 birds, late August and September 1973 and 1974 (Koski 1975)

   ii. Greater White-fronted Geese - staging
      - 1000+ birds, late August and September 1973 and 1974 (Koski 1975)

3. Pelly Island - Red

A sand spit extends eastward from the northeast edge of the island. Patches of vegetated tidal flat are found on the east side of the island and in a lagoon system extending inland from the west side. Molting and broodrearing swans use the entire island including upland habitats. Brant, dabbling ducks, and shorebirds are concentrated in the lagoon system and spit area during fall migration. Glaucous Gulls are found in areas around the island.

   i. Tundra Swans - molting, broodrearing
      - 120 birds, late August, and 75 birds, early September 1974 (Kuyt pers. comm.)

   ii. Brant - staging
      - 100 to 500 birds, late August and mid-September most years (Barry unpubl. data) (these birds were observed in a larger area including south of Kendall Island)

   iii. Unidentified geese (probably Brant (Slaney 1975)) - migrating
      - 700 birds, late August 1974 (Kuyt pers. comm.)

iv. Dabbling ducks
- 80 birds, late August 1974 (Kuyt pers. comm.)

v. Shorebirds - staging
- 100 birds, late August 1974 (Kuyt pers. comm.)

vi. Glaucous Gulls - staging
- 48 birds (15.0/km^2), on spit, mid-September 1985 (Alexander 1986)

4. Hansen Harbour to South of Summer Island - Yellow

The protected bays are used by large flocks of molting and staging Red-breasted Mergansers, and scaup during mid to late August with diminishing use in September. In August this area is considered Red (see page --). Small numbers of other diving ducks and loons are present in late August and September. Glaucous Gulls (probably migrants) feed throughout this area.

i. Red-breasted Mergansers - staging
- 654 birds, early September 1986 (Alexander unpubl. data)

ii. Glaucous Gulls - staging
- 47 birds (1.8/km^2), early September 1986 (Alexander unpubl. data)
- 50 birds (2.3/km^2), mid-September 1985 (Alexander 1986)
- 131 birds (7.0/km^2), mid-September 1981 (Barry and Barry 1982) (these birds were observed in a larger area including from Summer Island to Tuktoyaktuk)

5. South of Kidluit Bay - Green

This area consists of a narrow sand and gravel beach bounded by a cliff with low shrub wetland at the top. At the northeast end, there is a small amount of monocot wetland. Although at least 4 years of survey data are available, moderate numbers of molting and broodrearing Tundra Swans were found in only one year.

i. Tundra Swans - molting, broodrearing
- 50 birds, late August and September 1975 (Koski 1977a)

6. Kittigazuit Bay Area - Red

This is a low-lying area of coastal tundra vegetation used by moderate numbers of Tundra Swans, Brant, and Canada, Lesser Snow and Greater White-fronted Geese during fall migration.

i. Tundra Swans - broodrearing
- 173 adults and 53 young, early September 1972 (Campbell and Weber 1973) (these birds were seen in a larger area extending southwest into the delta)

ii. Canada Geese - staging
- concentration area, September 1976 (Koski 1977b)
- concentration area, September 1975 (Koski 1977a)

iii. Brant - staging
- 250+ birds, late August and September 1976 (Koski 1977b)

iv. Greater White-fronted Geese - staging
- 250+ birds, late August and September 1976 (Koski 1977b)
- 500+ birds, late August and September 1975 (Koski 1977a)
- 151 to 350 birds, late August and September 1973 and 1974 (Koski 1975)

v. Lesser Snow Geese - staging
- 3350 birds, early September, and 1965 birds mid-September 1975 (Koski 1977a)

7. Tuktoyaktuk to Toker Point (Terrestrial) - Yellow

High numbers of Lesser Snow Geese were reported in this location during fall migration only once in many years of surveys.

i. Lesser Snow Geese - staging
- 10000 birds, early September, and 18 850 birds, mid-September 1983 (Barry and Barry in prep.)

8. Toker Point to Hutchison Bay - Yellow

Offshore waters of this area are used periodically by migrating diving ducks, and by feeding Pacific and Red-throated Loons. Staging Glaucous Gulls are common offshore and along the coast.

i. Oldsquaw - staging
- 150 birds (13.9/km^2), early September 1986 (Alexander unpubl. data)

ii. Red-breasted Mergansers - staging
- 141 birds, mid-September 1985 (Alexander 1986)

iii. Glaucous Gulls - staging
- 115 birds (14.4/km^2), mid-September 1985 (Alexander 1986)

9. Parlaiyut Bay - Red/Yellow

Throughout August this bay is considered to be a Red area (see page --). Scaup, Oldsquaw, scoters, and Red-breasted Mergansers continue to use the bay in September but at lower numbers. Pacific and Red-throated Loons and Glaucous Gulls feed in the bay, with numbers diminishing into September.

Surveys by Barry and Barry (1982) extended from Tuktoyaktuk to the west side of Hutchison Bay but most birds were observed in Parlaiyut Bay. Density values were computed for the complete transect.

i. Scaup - staging
   - 90 birds (10.2/km^2), mid-September 1985 (Alexander 1986)
   - 611 birds (20.0/km^2), mid-September 1981 (Barry and Barry 1982)

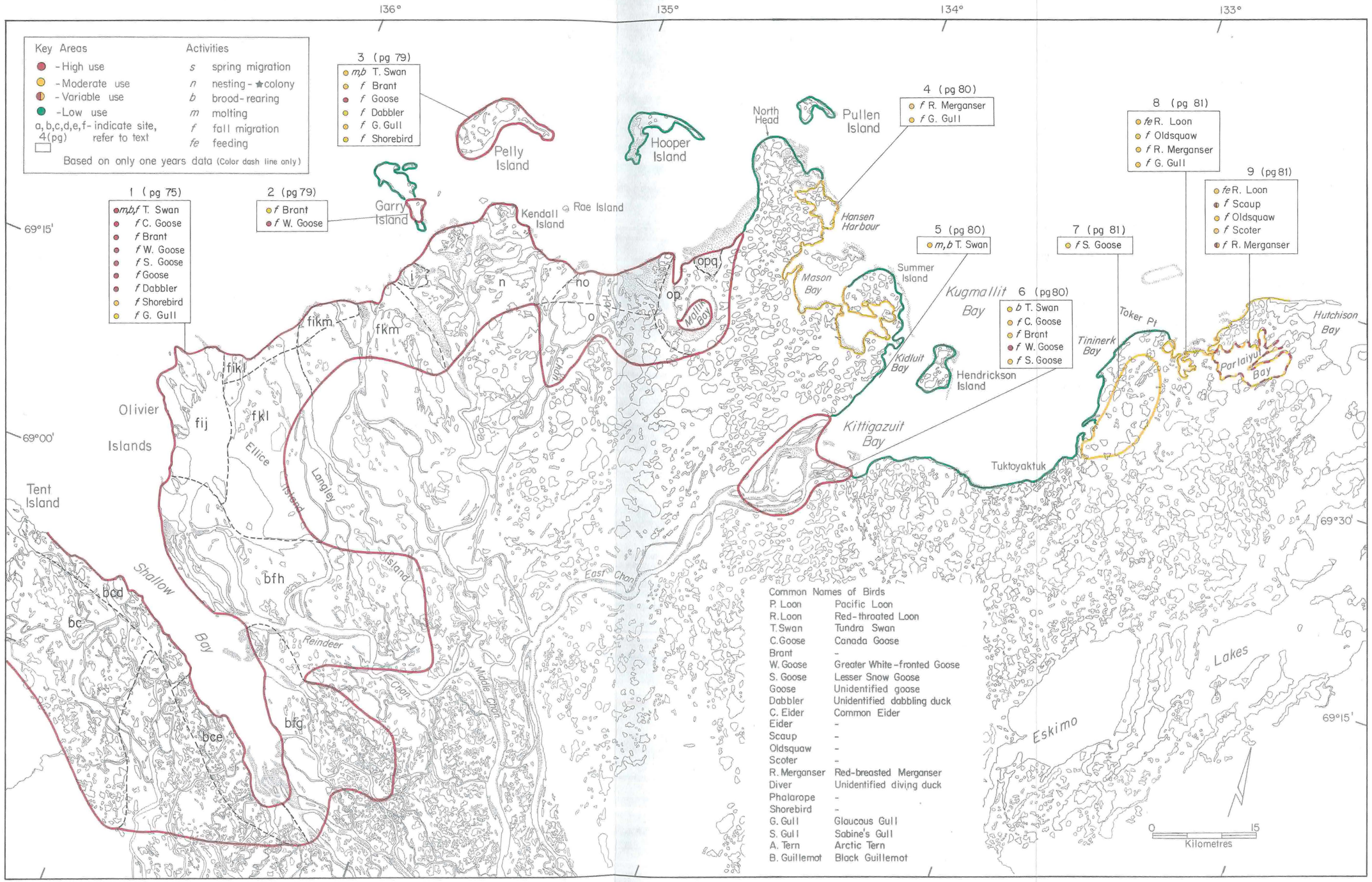
ii. Oldsquaw - staging
   - 64 birds (5.5/km^2), early September 1986 (Alexander unpubl. data)
   - 748 birds (24.5/sqkm), mid-September 1981 (Barry and Barry 1982)

iii. Scoters - staging
   - 95 birds (8.2/km^2), early September 1986 (Alexander unpubl. data)
   - 286 birds (9.4/km^2), early September 1981 (Barry and Barry 1982)

iv. Red-breasted Mergansers - staging
   - 90 birds (7.7/km^2), mid-September 1985 (Alexander 1986)
   - 313 birds (10.3/sqkm), mid-September 1981 (Barry and Barry 1982)

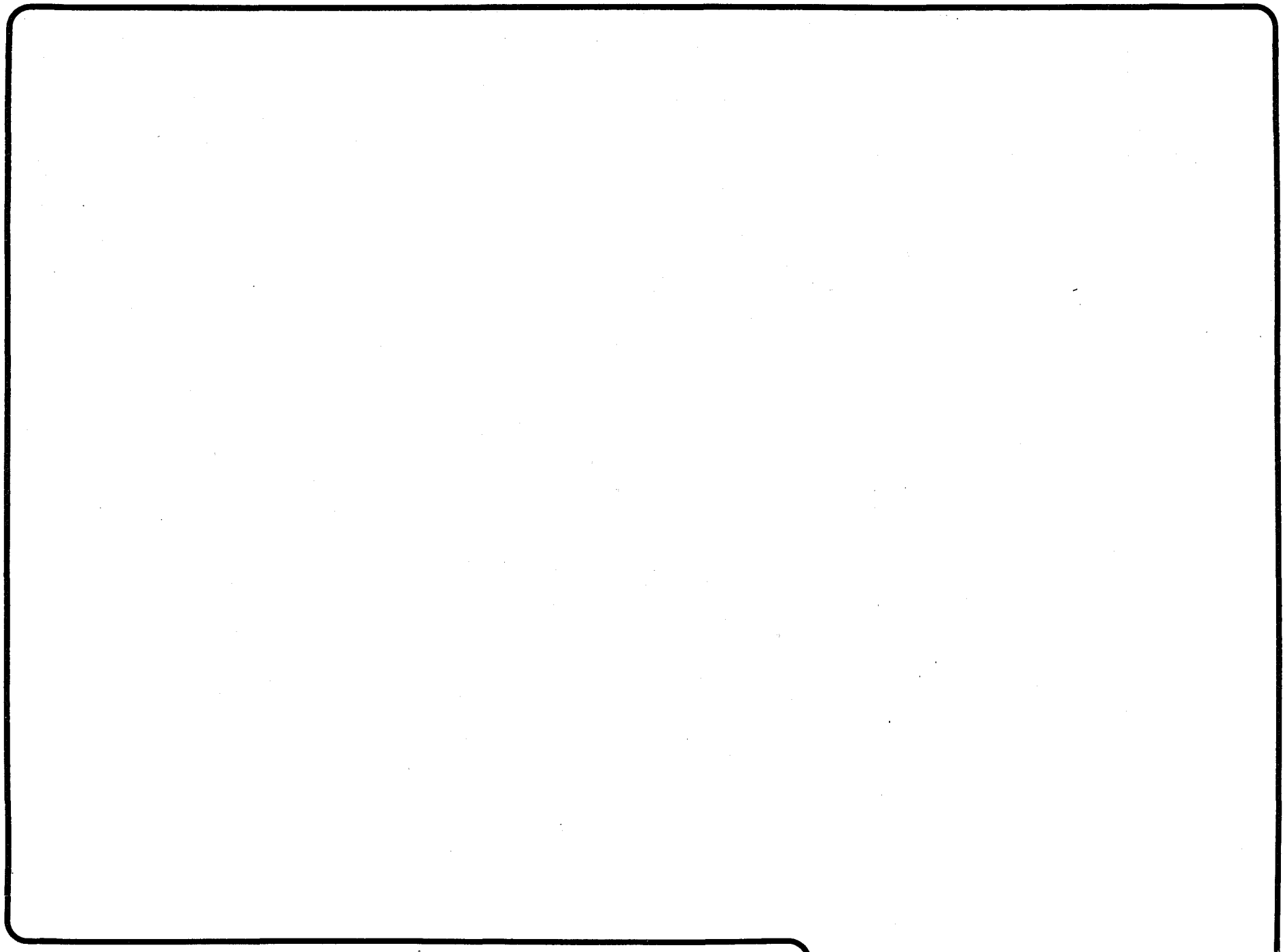
v. Unidentified diving ducks (probably scaup, Oldsquaw, scoters and Red-breasted Mergansers (Alexander 1986; Barry and Barry 1982))
   - 3200 birds (137.9/km^2 est.), late August, and 2900 birds (125.0/km^2 est.), early September 1974 (Kuyt pers. comm.)

Figure 7. Key areas for birds during mid-August to late September: Mackenzie Delta.



Common Names of Birds

P. Loon	Pacific Loon
R. Loon	Red-throated Loon
T. Swan	Tundra Swan
C. Goose	Canada Goose
Brant	-
W. Goose	Greater White-fronted Goose
S. Goose	Lesser Snow Goose
Goose	Unidentified goose
Dabbler	Unidentified dabbling duck
C. Eider	Common Eider
Eider	-
Scaup	-
Oldsquaw	-
Scoter	-
R. Merganser	Red-breasted Merganser
Diver	Unidentified diving duck
Phalarope	-
Shorebird	-
G. Gull	Glaucous Gull
S. Gull	Sabine's Gull
A. Tern	Arctic Tern
B. Guillemot	Black Guillemot



TUKTOYAKTUK PENINSULA

A. EARLY JUNE TO MID-JULY (FIGURE 8)

1. Long Spit northeast of Hutchison Bay - Green

In most years, 4 to 8 scattered pairs of Glaucous Gulls nest on this sand and gravel spit (Barry unpubl. data).

2. Small island south of area 1 - Yellow

Part of this island is raised, and in most years, colonial nesting Glaucous Gulls are present. These and other local gulls feed in surrounding marine and terrestrial areas.

i. Glaucous Gulls - nesting
- 20 to 40 pairs, most years (Barry unpubl. data)
- 66 nests, late June 1987 (Alexander and Hawkings 1988)

3. Spit southwest of Atkinson Point - Green

In most years, 4 to 10 scattered pairs of Glaucous Gulls nest on this sand and gravel spit (Barry unpubl. data).

4. South of Atkinson Point - Red

Several colonies of nesting Brant and Glaucous Gulls are found throughout this area. Once the young Brant have hatched starting in July, these birds gather in molting flocks in tidal marsh areas along the west coast of McKinley Bay, and between east Hutchison Bay and McKinley Bay.

i. Brant - nesting
- several colonies totalling 30 to 60 pairs, June most years (Barry unpubl. data)
- 55+ nests (9 colonies), 1984 (Arner et al. 1985)

ii. Glaucous Gulls - nesting
- 75 adults and 37 nests (4 colonies), 1984 (Arner et al. 1985)

5. McKinley Bay lagoon - Red

This region is a tidal marsh with both vegetated and unvegetated mudflats, and is important for molting non-breeding Tundra Swans, molting geese and feeding Glaucous Gulls.

i. Tundra Swans - molting
- 125 non-breeders, June 1984 (Barry unpubl. data)

ii. Unidentified geese (probably Brant and Greater White-fronted Geese (Cornish and Dickson 1984; Scott-Brown et al. 1981; Barry unpubl.data)) - molting
- 150 birds, mid-July 1974 (Kuyt pers. comm.)

iii. Glaucous Gulls - feeding
- 100 to 300 non-breeding birds, most years (Barry unpubl. data)

6. McKinley Bay to Cape Dalhousie - Green

This region of highly convoluted shoreline is used very little by birds during June. Specific locations of moderate use by nesting species are discussed below. Starting in mid-July, however, the offshore waters of this area become increasingly important to several species of molting diving ducks (see page 104).

Areas 7 to 15 inclusive are small sand beach islands with raised and well vegetated portions. Groups of nesting Brant, Common Eiders and Glaucous Gulls are usually present on these islands. In some years, large groups of Sabine's Gulls and Arctic Terns nest on certain islands.

Unpublished data from Dickson reported below were collected during surveys in late July 1981. They are included here because nesting by the indicated bird species would have been initiated in this time period.

7. Small island immediately south of Phillips Island - Yellow

i. Common Eiders - nesting
- 5 to 25 nests, most years (Barry unpubl. data)
- 12 nests, late June 1987 (Alexander and Hawkings 1988)
- 18 nests (46 adults), late July 1981 (Dickson unpubl. data)

ii. Glaucous Gulls - nesting
- 10 to 20 pairs, most years (Barry unpubl. data)
- 2 nests (62 adults), late June 1987 (Alexander and Hawkings 1988)
- 11 nests (70 adults, 7 young), late July 1981 (Dickson unpubl. data)

8. Island east of Phillips Island - Yellow

i. Common Eiders - nesting
- 22 nests (44 adults), late July 1981 (Dickson unpubl. data)

ii. Arctic Terns - nesting
- 50 adults, late June 1987 (Alexander and Hawkings 1988)
- 120 adults and 1 young, late July 1981 (Dickson unpubl. data)

9. Island east of Phillips Island - Yellow

i.Common Eiders - nesting
- 3 nests, late June 1987 (Alexander and Hawkings 1988)

ii.Glaucous Gulls - nesting
- 13 nests (67 adults), late June 1987 (Alexander and Hawkings 1988)

10. Island southeast of Phillips Island - Yellow

    i. Brant - nesting
    - 6 nests, late June 1987 (Alexander and Hawkings 1988)

    ii. Common Eiders - nesting
    - 26 nests, late June 1987 (Alexander and Hawkings 1988)

    iii. Glaucous Gulls - nesting
    - 7 nests (97 adults), late June 1987 (Alexander and Hawkings 1988)

11. Island southeast of Phillips Island - Yellow

    i. Common Eider - nesting
    - 16 nests, late June 1987 (Alexander and Hawkings 1988)

    ii. Glaucous Gulls - nesting
    - 8 nests (87 adults). late June 1987 (Alexander and Hawkings 1988)

12. Island east of Phillips Island - Yellow

    i. Brant - nesting
    - 4 to 10 pairs, June most years (Barry unpubl. data)

    ii. Glaucous Gulls - nesting
    - 10 to 20 pairs, occasional year (Barry unpubl. data)

13. Island south of Nuvorak Point - Yellow

    i. Common Eiders - nesting
    - 5 to 25 nests, most years (Barry unpubl. data)

14. Island east side of Russell Inlet - Red/Yellow

    i. Common Eiders - nesting
    - 5 to 25 pairs, most years (Barry unpubl. data)
    - 3 nests, late June 1987 (Alexander and Hawkings 1988)
    - 7 nests (13 adults, 4 young), late July 1981 (Dickson unpubl. data)

    ii. Glaucous Gulls - nesting
    - 37 adults and nest scrapes, late June 1987 (Alexander and Hawkings 1988)
    - 40 adults and 6 young, July 1981 (Dickson unpubl. data)

    iii. Sabine's Gulls - nesting
    - 5 nests (23 adults, many nest scrapes), late June 1987 (Alexander and Hawkings 1988)
    - 125 adults and 17 young, July 1981 (Dickson unpubl. data)

iv. Arctic Terns - nesting
- 50 adults, 2 young and 2 nests, July 1981 (Dickson unpubl. data)

15. Spit at Cape Dalhousie - Red

i. Arctic Terns - nesting
- 100 to 500 birds, June to August most years (Barry unpubl. data)
- 25 birds sitting (probably nesting), 50+ adults, late June 1987 (Alexander and Hawkings 1988)

ii. Sabine's Gulls - nesting
- 50 to 100 birds, occasionally (Barry unpubl. data)
- 40 adults, late June 1987 (Alexander and Hawkings 1988)

16. West Liverpool Bay - Red and Yellow

This area includes Campbell Island as well as the Smoke, Moose, and Kugaluk river deltas. All are low-lying areas of sedge-grass meadows and marshes. The narrow beaches are sand and silt. During spring ice break-up, large numbers of mergansers and Glaucous Gulls feed on herring in open water areas primarily along the Smoke River delta, but also around the Moose River delta and Thumb Island (Barry and Barry 1982; S.J. Barry pers. comm.). Large numbers of Glaucous Gulls feed on the delta flats in the spring. Moderate numbers of Brant and Lesser Snow Geese nest in the deltas and on Campbell Island, as do small numbers of Tundra Swans. Very large concentrations of Tundra Swans have been observed in the Kugaluk River delta. Dabbling ducks nest throughout the area including the "fingers" of Liverpool Bay. Shorebirds likely nest throughout the area. Starting in late June or early July, non-breeding Tundra Swans, Canada Geese and Greater White-fronted Geese begin to gather in large flocks to molt. Numbers of geese are highly variable between years, and within years the geese are quite mobile making their exact location unpredictable.

a. Campbell Island, and Smoke and Moose river deltas

i. Tundra Swans - nesting, molting
- 500 non-breeders, July most years (Barry unpubl. data)
- 3 nests and 37 non-breeders, June 1984 (Barry unpubl. data)

ii. Brant - nesting
- 25 to 100 pairs on the deltas, and up to 50 pairs on Campbell Island, June most years (Barry unpubl. data)

iii. Canada Geese - molting
- 10 000 to 20 000 birds, starting late June or very early July most years (Barry unpubl. data)

iv. Greater White-fronted Geese - molting
- 7000 to 15 000 birds, starting late June or very early July most years (Barry unpubl. data)

b. Moose River delta
   i. Glaucous Gulls - feeding
      - 3000 non-breeders, early June most years (Barry unpubl. data)

c. Smoke River delta
   i. Lesser Snow Geese - nesting
      - 10 to 100 pairs, most years (Barry unpubl. data)
      - 40 pairs, late June 1987 (Alexander unpubl. data)

d. Kugaluk River delta
   i. Tundra Swans
      - 900 birds, late June 1987 (Alexander unpubl. data)

   ii. Glaucous Gulls
      - 63 birds, 50 of which appeared to be in a colony, late June 1987 (Alexander unpubl. data)

e. Spring open water areas
   i. Red-breasted and Common Mergansers - feeding
      - up to 3000 birds, some years (A. Voudrach pers. comm. in Dickson et al. 1983)

   ii. Glaucous Gulls - feeding
      - up to 1000 sub-adults, some years (A. Voudrach pers. comm. in Dickson et al. 1983)

17. Island southwest of Campbell Island - Red

This raised and well vegetated island is used by a moderately large colony of nesting Glaucous Gulls. For a short period in the spring, these birds feed on herring, but their primary food appears to be blue mussels from surrounding marine areas (Barry and Barry 1982). Small numbers of Brant nest on the island.

   i. Brant - nesting
      - 2 to 6 pairs, June most years (Barry unpubl. data)

   ii. Glaucous Gulls - nesting
      - 60+ pairs, most years (Barry unpubl. data)
      - 75 birds, mid-July 1985 (Alexander 1986)

18. Site on east side of Nicholson Peninsula - Yellow

This site is used in most years by 10 to 15 pairs of nesting Glaucous Gulls (Barry unpubl. data). These birds likely feed in surrounding offshore and coastal areas.

19. Anderson River delta and Wood Bay - Red

This area includes the islands of the Anderson River delta, the lower Anderson River valley, and the mouths of three small creeks flowing into Wood Bay. The outer Anderson River delta is low and muddy, and becomes progressively more vegetated upstream. The west side of Wood Bay is an area of low rolling hills except in the deltas of the three small creeks. The islands of the outer Anderson River delta provide habitat for the larger of the two southeastern Beaufort Sea Lesser Snow Goose colonies. Large numbers of Brant nest scattered throughout the delta. Numbers of both species are highly variable between years, as is the proportion of breeders to non-breeders. Nesting success is also highly variable between years. In some years virtually no young are produced, whereas in very successful years, the average number of young produced per pair can be as high as 3.5 for both species (Barry unpubl. data). Once the goslings have hatched (late June and into July), both species gather into flocks for the adult molt, and move about to various feeding sites in the delta and coastal areas, including the three creek mouths along the west side of Wood Bay and the Mason River delta. Non-breeders leave the area in late June to molt elsewhere. During the molt and broodrearing period, these geese are likely to swim across areas of marine water between feeding sites, and will enter water if disturbed making them susceptible to water-borne pollutants. Furthermore, storm surge flooding of the delta could result in the contamination of feeding areas and ponds.

Canada and Greater White-fronted Geese nest scattered throughout the tributaries and creeks of the delta area, and begin gathering in molting flocks in mid-July. Greater White-fronted Geese move downstream through the molt period to regions within the inner delta, whereas Canada Geese remain in more upstream areas. Nesting Tundra Swans are scattered throughout the area, and large numbers of non-breeders gather to molt in the delta channels. Dabbling ducks, Oldsquaw, shorebirds and Glaucous Gulls are common nesters in the Anderson River delta area and Wood Bay creeks, and there is a moderately large colony of nesting Glaucous Gulls on Gull Islet in the outer delta.

a. Outer Anderson River delta
   i. Brant - nesting
      - up to 2500 breeders, scattered, June most years (Barry unpubl. data)

   ii. Lesser Snow Geese - nesting
      - 3000 to 9000 breeders and non-breeders, June to September, most years (Barry unpubl. data)
      - 8360 breeders and 878 non-breeders, June 1981 (Kerbes 1983)
      - 3826 breeders and 1017 non-breeders, June 1976 (Kerbes 1983)

b. Anderson River delta
   i. Glaucous Gulls - nesting
      - 40 to 60 pairs in colony on Gull Islet, plus 10 to 20 pairs scattered on delta, most years (Barry unpubl. data)

c. Anderson River delta and valley
   i. Tundra Swans - nesting, molting
      - 75 pairs, most years (Barry unpubl. data) (this number includes birds nesting at the southern most creek marked in the area)
      - 1200 non-breeders, most of which gather in large flocks in the channels in areas a and b (Barry unpubl. data)

   ii. Dabbling ducks - nesting
      - 400 pairs, most years (Barry unpubl. data) (this number includes birds nesting along all three creek mouths marked in the area)

20. Mason River delta and Valley - Yellow

Mason River delta is low-lying, muddy, progressively more heavily vegetated upstream, and surrounded by low, rolling hills. This area has nesting populations of Tundra Swans, Brant, Oldsquaw, and dabbling ducks. Greater White-fronted Geese nest scattered along tributary streams of the Mason River. There is a colony of nesting Glaucous Gulls on an island in the outer delta (indicated by a star on Figure 8). Non-breeding Tundra Swans, Brant, and Greater White-fronted Geese gather in the area to molt, and some Lesser Snow Geese from the Anderson River colony use the area in July for molting and broodrearing.

a. Outer Mason River delta
   i. Brant - nesting
      - 100 pairs, June most years (Barry unpubl. data)

   ii. Glaucous Gulls - nesting
      - 30 to 50 pairs in colony, most years (Barry unpubl. data)

b. Mason River delta
   i. Dabbling ducks - nesting
      - 80 pairs, June to early July most years (Barry unpubl. data)

c. Mason River valley
   i. Tundra Swans - nesting
      - 40 pairs, June most years (Barry unpubl. data)

21. Wood Bay and Harrowby Bay - Green

These bays are rated green because during June they are used very little by bird species. However, starting in July, they become increasingly important to molting Oldsquaw, scoters and, in some years, scaup. These areas are rated Red from mid-July to late September (Figures 9 and 10).

22. Ikpisugyuk Point area - Yellow

There is a colony of 5 to 25 pairs of nesting Common Eiders and 10 to 20 scattered pairs of nesting Glaucous Gulls on this sand spit (Barry unpubl. data).

23. South side of Harrowby Bay - Green

Most years there are 5 to 15 pairs of nesting Glaucous Gulls scattered along this sand spit (Barry unpubl. data).

24. East of Harrowby Bay - Red

Starting around 26 June there is a rapid build-up of molting non-breeding Canada and Greater White-fronted Geese along the channels and tributary creeks of the old Horton River east of Harrowby Bay. The birds remain flightless until around the beginning of August.

i. Canada Geese - molting
- 10 000 to 20 000 birds, most years (Barry unpubl. data)

ii. Greater White-fronted Geese - molting
- 5000 to 15 000 birds, most years (Barry unpubl. data)

25. Baillie Islands Area - Red and Yellow

There are nesting colonies of Common Eiders and Glaucous Gulls on this sand spit. Snow Goose Passage, and particularly the area around the Cape Bathurst and Baillie Island spits, become increasingly important in July to molting Oldsquaw and scoters.

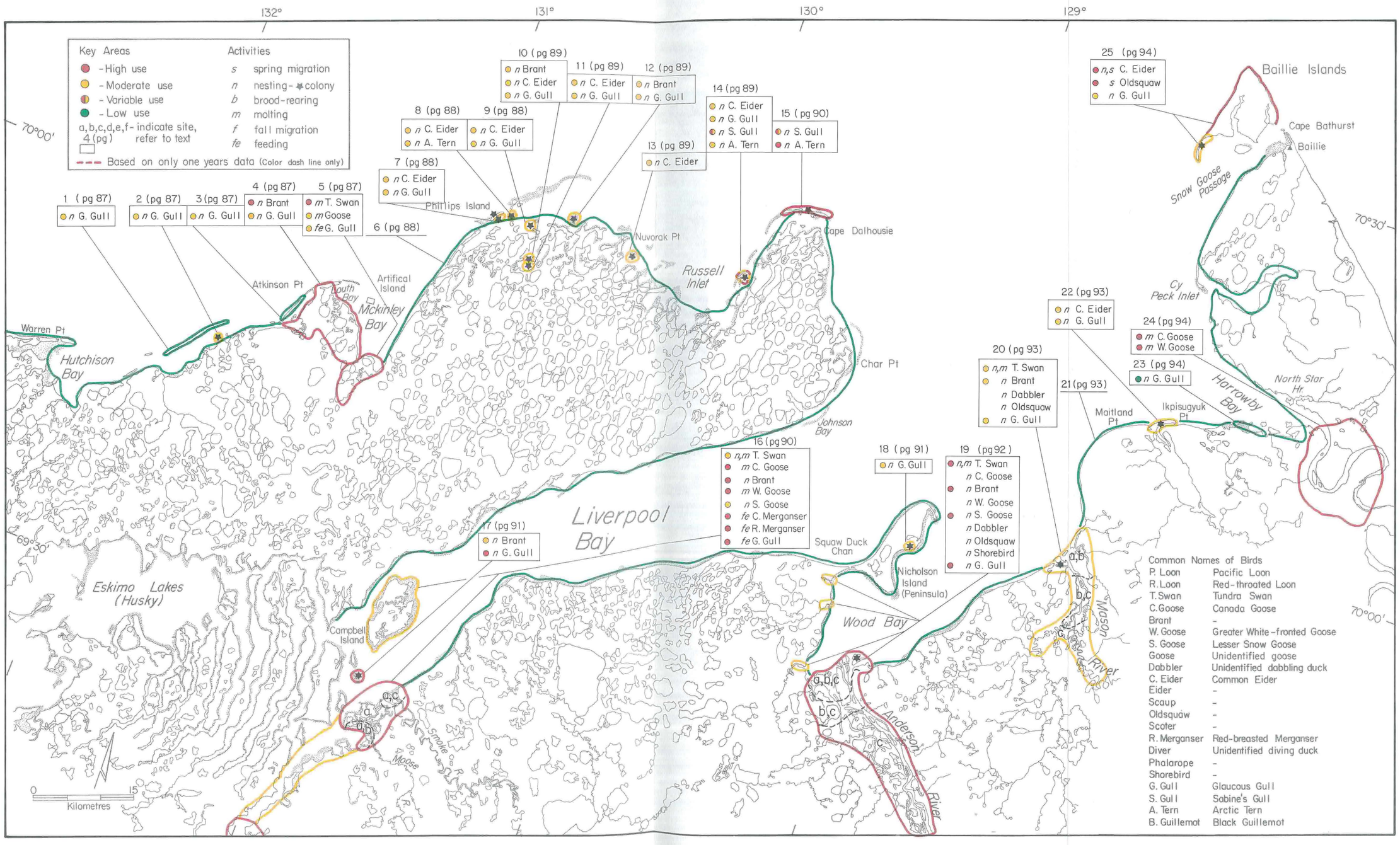
Open water leads off the Baillie Islands and extending west to off McKinley Bay are extremely important to Common Eiders, King Eiders, and Oldsquaw during eastward spring migration. A westward molt migration of large numbers (no estimate available but probably in the order of tens of thousands based on narrative accounts) of male King and Common Eiders past Cape Bathurst begins in late June and continues well into July (Anderson 1913; Anderson 1937; Alexander et al. 1988). See page 13 for further details.

a. Baillie Island spit
   i. Common Eiders - nesting
      - 25 nests, mid-July 1971 (Barry unpubl. data)

   ii. Glaucous Gulls - nesting
      - 5 to 10 pairs, most years (Barry unpubl. data)

b. Open water leads
   See section on spring migration starting page 9.

Figure 8. Key areas for birds during early June to mid-July: Tuktoyaktuk Peninsula.



B. MID-JULY TO MID-AUGUST (FIGURE 9)

1. Hutchison Bay - Red

A sand spit stretches from the northwest side of the bay to Warren Point, and another runs parallel to shore on the northeast side. Beaches are sand or silt and parts of the coast are low and marshy. Hutchison Bay provides habitat for major concentrations of molting Oldsquaw and scoters. Between 1982 and 1985, population estimates for these species varied from 9300 to 14 000 birds, and for all diving ducks, from 10 100 to 17 300 birds (Cornish and Dickson 1986; Cornish and Dickson 1985). The lower numbers were observed in a year when dense broken ice remained in much of the bay throughout July and most of August (Cornish and Dickson 1986). In that year, unusually high numbers of Oldsquaw and scoters were observed in Liverpool Bay and the Eskimo Lakes (Alexander 1986; Barry pers. observation).

During low wind and wave conditions, Oldsquaw are most heavily concentrated in the region south and east of Warren Point spit (area d on Figure 9), whereas scoters are concentrated both there and along the east side of the bay (area e on Figure 9). Both species are also found in lower densities throughout the bay (Cornish and Dickson 1986). The distribution of birds in Hutchison Bay during high wind and wave conditions has not been documented. In general, Oldsquaw and scoters tend to form tight flocks and to move into sheltered areas during periods of high winds and waves (Cornish and Allen 1983; Vermeer and Anweiler 1975).

Small numbers of scaup and Red-breasted Mergansers molt in the area. Studies by Hogg et al. (1986) (areas a and b on Figure 9) suggest that the wetlands and coastal areas around Hutchison Bay are used by large numbers of molting dabbling ducks, and broodrearing and fall staging shorebirds. The south shore of the bay, and the mouths of tributary creeks are used by molting Greater White-fronted Geese. Molting Brant are consistently observed feeding on tidal flats in the southwest portion of the bay (area a). Pacific and Red-throated Loons feed in the marine waters near the coast. Migrating and local Glaucous Gulls and Arctic Terns frequent the sand spits and coastline.

a. Southwest side

i. Brant - molting
- 90 birds, mid-August 1986 (Alexander unpubl. data.)
- 65 birds, early August 1985 (Cornish and Dickson 1986)
- 60 birds, early August 1984 (Cornish and Dickson 1985)
- 97 birds, late July to mid-August 1981 and 1982 (Hogg et al. 1986)

ii. Dabbling ducks - molting
- 231 birds (222.8/km^2), late July to mid-August 1981 and 1982 (Hogg et al. 1986)

iii. Scaup - molting
- 25 birds (31.3/km^2), late July to mid-August 1981 and 1982 (Hogg et al. 1986)

iv. Oldsquaw - molting
- 50 birds (33.8/km^2), late July to mid-August 1981 and 1982 (Hogg et al. 1986)

v. Red-breasted Mergansers - molting
- 110 birds, mid-August 1985 (Alexander 1986)
- 27 birds (15.0/km^2), late July to mid-August 1981 and 1982 (Hogg et al. 1986)

vi. Shorebirds - broodrearing, staging
- 242 birds (14% Semipalmated/Baird's Sandpipers), late July to mid-August 1981 and 1982 (Hogg et al. 1986)

vii. Glaucous Gulls - broodrearing
- 34 birds (3.7/km^2), late July to mid-August 1981 and 1982 (Hogg et al. 1986)

viii. Arctic Terns - broodrearing
- 15 birds, late July to mid-August 1981 and 1982 (Hogg et al. 1986)

b. East side of Hutchison Bay

i. Brant - molting
- 85 birds, mid-August 1985 (Alexander 1986)
- 110 birds, late July to early August 1981 (Hogg et al. 1986)

ii. Unidentified geese (probably Brant and Greater White-fronted Geese (Cornish and Dickson 1984))
- 350 birds, mid-August 1974 (Kuyt pers. comm.)

iii. Dabbling ducks - molting
- 463 birds (525.5/km^2), late July to early August 1981 (Hogg et al. 1986)
- 275 birds, mid-August 1974 (Kuyt pers. comm.)

iv. Unidentified diving ducks (probably Oldsquaw and scoter (Cornish and Dickson 1984; Cornish and Allen 1983)) - molting
- 1150 birds, late July to mid- August 1974 (Kuyt pers. comm.)

v. Arctic Terns - broodrearing
- 18 birds, late July to mid-August 1981 (Hogg et al. 1986)

c. Entire bay

Observed numbers, densities and population estimates with 95% confidence limits listed below for diving ducks come from surveys conducted in early August 1982 (Cornish and Allen 1983), 1983 (Cornish and Dickson 1984), 1984 (Cornish and Dickson 1985), and 1985 (Cornish and Dickson 1986), unless noted otherwise.

i. Pacific loons - feeding
- 6 birds (0.3/km^2), early August 1983 (Cornish and Dickson 1984)

ii. Red-throated Loons - feeding
- 10 birds (0.6/km^2), early August 1983 (Cornish and Dickson 1984)

iii. Scaup - molting
- 102 birds (5.7/km^2; 576±349 birds), 1985
- 159 birds (8.9/km^2; 897±423 birds), 1984
- 99 birds (5.6/km^2; 559±322 birds), 1983
- 122 birds (6.9/km^2; 689±282 birds), 1982

iv. Oldsquaw - molting
- 563 birds (34.3/km^2), mid-August 1986 (Alexander unpubl. data.)
- 872 birds (49.0/km^2; 4924±1306 birds), 1985
- 1488 birds (83.6/km^2; 8401±1185 birds), 1984
- 578 birds (32.5/km^2; 3263±1117 birds), 1983
- 778 birds (43.7/km^2; 4393±419 birds), 1982

v. Scoters - molting
- 734 birds (44.8/km^2), mid-August 1986 (Alexander unpubl. data)
- 785 birds (44.1/km^2; 4432±2049 birds), 1985
- 1006 birds (56.5/km^2; 5680±1461 birds), 1984
- 1571 birds (88.3/km^2; 8870±1532 birds), 1983
- 1156 birds (64.9/km^2; 6527±4143 birds), 1982

vi. Red-breasted Mergansers - molting
- 275 birds, mid-August 1986 (Alexander unpubl. data.)
- 157 birds, mid-August 1982 (Cornish and Allen 1983)

vii. Glaucous Gulls - broodrearing, feeding
- 114 birds (6.9/km^2), mid-August 1986 (Alexander unpubl. data.)
- 62 birds (3.8/km^2), late July 1985 (Alexander 1986)
- 78 birds (4.4/km^2), early August 1983 (Cornish and Dickson 1984)
- 107 birds (6.0/km^2), late July 1982 (Cornish and Allen 1983)

viii. Arctic Terns - broodrearing
- 46 birds, mid-August 1986 (Alexander unpubl. data.)
- 13 birds, early August 1983 (Cornish and Dickson 1984)
- 13 birds, late July 1982 (Cornish and Allen 1983)

2. Hutchison Bay to Atkinson Point - Red/Yellow and Yellow

Two long sand and gravel spits, one extending northeast from Hutchison Bay, the other southwest from Atkinson Point, give rise to an extensive area of sheltered water. Large concentrations of molting scoters have at times been observed in this area, but it is not known how regularly these and other diving duck species concentrate in the area. Nearshore waters along the mainland coastline appear to be used by moderate numbers of Oldsquaw and scoters.

Several tidal marsh areas and small creek mouths are found along the mainland shoreline. These areas are used for feeding by small flocks of molting and broodrearing Brant and Greater White-fronted Geese, and starting in mid to late August, by numerous small migrating flocks. Migrating shorebirds likely stage along the coastline. Glaucous Gulls nesting in the area rear young until they fledge starting in early August. Large numbers of migrating Glaucous Gulls and Arctic Terns may feed throughout this area.

a. Long spit northeast of Hutchison Bay
   i. Scaup - molting
      - 325 birds, late July 1981 (Dickson unpubl. data)

   ii. Oldsquaw - molting
      - 197 birds, late July 1981 (Dickson unpubl. data)

   iii. Scoters - molting
      - 1675 birds, late July 1981 (Dickson unpubl. data)

b. Long spit northeast of Hutchison Bay plus mainland coastline southeast of the spit
   i. Unidentified geese (probably Brant and Greater White-fronted Geese (Hogg et al. 1986)) - molting
      - 300 birds, mid-August 1974 (Kuyt pers. comm.)

   ii. Dabbling ducks - molting
      - 370 birds, mid-August 1974 (Kuyt pers. comm.)

   iii. Unidentified diving ducks (probably scaup, Oldsquaw and scoters (Dickson unpubl. data; Barry et al. 1981; Barry and Barry 1982)) - molting
      - 1200 birds, late July, and 2300 birds, mid-August 1974 (Kuyt pers. comm.)

c. Long spit northeast of Hutchison Bay, spits southwest of Atkinson Point, plus the water between these two areas
   i. Scaup - molting
      - 637 birds (33.0/km^2), mid-July 1981 (Barry and Barry 1982)
      - 809 birds (47.8/km^2), mid-July 1980 (Barry et al. 1981)
      - during both studies, most birds were behind spits northeast of Hutchison Bay and southwest of Atkinson Point

   ii. Oldsquaw - molting
      - 874 birds (45.3/km^2), mid-July 1981 (Barry and Barry 1982)
      - 210 birds (12.4/km^2), late July 1980 (Barry et al. 1981)

   iii. Scoters - molting
      - 600 birds (31.1/km^2), mid-July 1981 (Barry and Barry 1982)
      - 270 birds (16.0/km^2), mid-August 1980 (Barry et al. 1981)

   iv. Red-breasted Mergansers - molting
      - 223 birds, mid-August 1981 (Barry and Barry 1982)

   v. Glaucous Gulls - brodrearing
      - 228 birds (14.9/km^2), mid-July 1981 (Barry and Barry 1982)
      - 182 birds (10.8/km^2), late July 1980 (Barry et al. 1981)

d. Mainland coast of entire area
   i. Brant - molting, staging
      - 50 birds, mid-August 1986 (Alexander unpubl. data.)
      - 275 birds, on coast southeast of center part of long spit, late July 1985 (Alexander 1986)
      - 175 birds, mid-August 1985 (Alexander 1986)

   ii. Oldsquaw - molting
      - 185 birds (21.0/km^2), mid-August 1986 (Alexander unpubl data)

   iii. Scoters - molting
      - 60 birds (6.8/km^2), mid-August 1986 (Alexander unpubl. data)
      - 319 birds (36.3/km^2), late July 1985 (Alexander 1986)

   iv. Glaucous Gulls - broodrearing, migrating
      - 145 birds (17.3/km^2), mid-August 1986 (Alexander unpubl data)
      - 81 birds (9.6/km^2), mid-August 1985 (Alexander 1986)

   v. Arctic Terns - migrating, feeding
      - 200 birds, along spit southwest of Atkinson Point, mid-August 1986 (Alexander unpubl. data)

e. Small island southeast of east end of long spit (indicated with star on Figure 9)
   i. Glaucous Gull (colony) - broodrearing
      - 45 birds, mid-August 1986 (Alexander unpubl. data)
      - 70 birds, late July, and 80 birds, mid-August 1985 (Alexander 1986)

f. Mainland coast between spits
   i. Red-throated Loons - feeding
      - 14 birds (5.1/km^2), late July to mid-August 1982 (Hogg et al. 1986)

   ii. Brant - molting
      - 102 birds, late July to mid-August 1982 (Hogg et al. 1986)

   iii. Greater White-fronted Geese - molting
      - 65 birds, late July to mid-August 1982 (Hogg et al. 1986)

   iv. Dabbling ducks - molting
      - 235 birds (37.4/km^2), late July to mid-August 1982 (Hogg et al. 1986)

   v. Shorebirds - broodrearing, staging
      - 148 birds (33% Semipalmated and Baird's Sandpipers, 18% Stilt Sandpipers), late July to mid-August 1982 (Hogg et al. 1986)

g. Tidal flats south of Atkinson Point
   i. Brant - molting
      - 85 birds, early August 1982 (Cornish and Allen 1983)
      - 50 birds, late July, and 261 birds, early August 1981 (Scott-Brown et al. 1981)

3. McKinley Bay - Red

McKinley Bay is a shallow, sheltered bay with barrier beaches at both the northeast and northwest corners. Most of the coastline is sand beaches; however, there are tidal marshes in the area east of Louth Bay and around the lagoon system at the south end of the bay. McKinley Bay provides habitat for major concentrations of molting Oldsquaw and scoters. Between 1981 and 1985, population estimates for these species varied from 6300 to 13 200 birds, and for all diving ducks, from 6900 to 17 200 birds (Cornish and Dickson 1986; Cornish and Dickson 1985). Oldsquaw numbers were similar in all years. The lower numbers of birds other than Oldsquaw were observed in a year when dense broken ice remained in much of the bay throughout July and most of August (Cornish and Dickson 1986). In that year, unusually high numbers of both scoters and Oldsquaw were observed in Liverpool Bay and the Eskimo Lakes (Alexander 1986; Barry pers. observation).

During low wind and wave conditions, Oldsquaw and scoters are found dispersed in loose flocks throughout McKinley Bay, but are most heavily and consistently concentrated south of Atkinson Point spit (area e on Figure 9), and, for scoters only, in the south end of the bay (area f on Figure 9). High densities of Oldsquaw and scoters are also often found just south of the artificial island, and around the tip of the long spit on the east side of the bay (areas g and h on Figure 9) (Cornish and Dickson 1986). The distribution of birds in McKinley Bay during high wind and wave conditions has not been thoroughly documented. However, during high winds of a northerly flow, the ducks tend to form tight flocks in the lee of Atkinson Point spit, and likely also the artificial island (Cornish and Allen 1983)

Molting scaup and Red-breasted Mergansers are usually present in small numbers; however, large concentrations of scaup have been observed in some years. Molting Brant and Greater White-fronted Geese are found in the lagoon system at the south end of McKinley Bay, and in the tidal flats east of Louth Bay (areas b and c on Figure 9). Starting in mid to late August, these two areas are used for feeding by numerous small flocks of migrating dark geese. Tundra Swans use the lagoon system as well as terrestrial areas adjacent to the bay. Gulls and terns are mainly on the spits and in the wetlands west of the bay. Migrating and broodrearing shorebirds are likely abundant in the wetlands. Loons feed throughout the bay.

a. Entire bay (excluding areas b and c)
Observed numbers, densities and population estimates with 95% confidence limits listed below for diving ducks come from surveys conducted in early August 1981 (Scott-Brown et al. 1981), 1982 (Cornish and Allen 1983), 1983 (Cornish and Dickson 1984), 1984 (Cornish and Dickson 1985), and 1985 (Cornish and Dickson 1986), unless otherwise noted.

i. Pacific loons - feeding
- 8 birds (0.4/km^2), early August 1983 (Cornish and Dickson 1984)

ii. Red-throated Loons
- 9 birds (0.5/km^2), early August 1983 (Cornish and Dickson 1984)

iii. Eiders - molting
- 60 birds (9.4/km^2), early August 1981 (Barry and Barry 1982)

iv. Scaup - molting
- 70 birds (3.6/km^2; 387±242 birds), 1985
- 34 birds (1.7/km^2; 188±71 birds), 1982
- 369 birds (18.8/km^2; 2036±836 birds), 1981
- 1055 birds (33.7/km^2), late July 1980 (Barry et al. 1981)

v. Oldsquaw - molting
- 996 birds (50.8/km^2; 5514±1533 birds), 1985
- 913 birds (46.6/km^2; 5054±1140 birds), 1984
- 814 birds (41.5/km^2; 4506±1364 birds), 1983
- 1063 birds (54.2/km^2; 5884±2153 birds), 1982
- 910 birds (46.4/km^2; 5038±777 birds), 1981
- 1007 birds (158.6/km^2), mid-July 1981 (Barry and Barry 1982)
- 1920 birds (61.4/km^2), mid-August 1980 (Barry et al. 1981)

vi. Scoters - molting
- 148 birds (7.6/km^2; 819±127 birds), 1985
- 1466 birds (74.8/km^2; 8116±3970), 1984
- 990 birds (50.5/km^2; 5480±1007 birds), 1983
- 785 birds (40.1/km^2; 4346±1023 birds), 1982
- 613 birds (31.2/km^2; 3387±469 birds), 1981
- 630 birds (99.2/km^2), early August 1981 (Barry and Barry 1982)
- 1075 birds (34.4/km^2), mid-August 1980 (Barry et al. 1981)

vii. Red-breasted Mergansers - molting
- 125 birds (4.0/km^2), mid-August 1980 (Barry et al. 1981)

viii. Shorebirds - broodrearing, staging
- 81 birds, early August 1983 (Cornish and Dickson 1984)
- 101 birds, mid-August 1981 (Scott-Brown et al. 1981)

ix. Glaucous Gulls - broodrearing, feeding
- 312 birds (24.4/km^2), mid-August 1986 (Alexander unpubl data)
- 39 birds (2.0/km^2), 1984
- 82 birds (4.2/km^2; 454±162 birds), 1983
- 117 birds (6.0/km^2; 648±322 birds), 1982
- 146 birds (5.7/km^2), late July 1981 (Scott-Brown et al. 1981)
- 76 birds (12.0/km^2), early August 1981 (Barry and Barry 1982)
- 171 birds (8.1/km^2), mid-July 1980 (Barry et al. 1981)

x. Arctic Terns - broodrearing
- 68 to 81 birds, mid-August 1981 (Scott-Brown et al. 1981)
- 35 birds, mid-August 1980 (Karasiuk and Boothroyd 1982)

b. McKinley Bay lagoon

i. Tundra swans - molting, broodrearing
- 69 birds, late July 1985 (Alexander 1986)
- 107 birds, late July 1981 (Scott-Brown et al. 1981)
- 120 birds, late July to early August 1974 (Kuyt pers. comm.)

ii. Brant - molting
- 98 birds, mid-August 1985 (Alexander 1986)
- 45 birds, early August 1984 (Cornish and Dickson 1985)
- 137 birds, early August 1981 (Scott-Brown et al. 1981)

iii. Greater White-fronted Geese - molting, staging
- 50 birds, mid-August 1986 (Alexander unpubl. data.)
- 59 birds, early August 1984 (Cornish and Dickson 1985)
- 87 birds, late July 1981 (Scott-Brown et al. 1981)

iv. Unidentified geese (probably Brant and Greater White-fronted Geese (Cornish and Dickson 1984; Cornish and Allen 1983)) - molting, staging
- 200 birds, mid-August 1974 (Kuyt pers. comm.)

v. Dabbling ducks - molting
- 100 birds, late July to early August 1974 (Kuyt pers. comm.)

c. Tidal flats east of Louth Bay
i. Brant - molting, staging
- 50 birds, mid-August 1985 (Alexander 1986)
- 70 birds, early August 1983 (Cornish and Dickson 1984)
- 50 birds, late August 1982 (Cornish and Allen 1983)
- 70 birds, early August 1981 (Scott-Brown et al. 1981)

ii. Greater White-fronted Geese - molting, staging
- 30 birds, early August 1983 (Cornish and Dickson 1984)
- 22 birds, early August 1981 (Scott-Brown et al. 1981)

d. Atkinson Point spit
i. Greater White-fronted Geese - staging
- 512 birds, mid-August 1986 (Alexander unpubl. data)

4. McKinley Bay to Cape Dalhousie - Yellow and Red/Yellow

This area is a long series of small bays with sand beaches and the occasional tidal marsh. Many small islands dot the offshore areas. The nearshore waters of these sheltered bays are used by molting Oldsquaw, scoters and in some years scaup, plus small numbers of Red-breasted Mergansers and eiders. Small numbers of Common Eiders rear young in this area. Large numbers of Oldsquaw and scoters have at times been observed in offshore areas of Russell Inlet (Alexander 1986; Alexander unpubl. data). In the eastern half of the region, both the littoral zone and terrestrial areas are used in some years for feeding by large numbers of Brant during molt migration. These areas are probably also used extensively for staging by Brant during the westward fall migration. During August, large flocks of migrating Glaucous Gulls are often found feeding offshore throughout the area. Migrating Arctic Terns probably feed in much of this area, particularly around the large spits and bars northeast of Phillips Island and north of Cape Dalhousie. Large numbers of Sabine's Gulls nest in parts of this area in some years, and rear young throughout the early part of this time period (see pages 88 to 90 for a more detailed discussion of nesting in this area).

a. Entire area

i. Brant - staging
- 325 birds in several small flocks along the coast, mid-August 1986 (Alexander unpubl. data)
- 132 birds, mid-August 1985 (Alexander 1986)

ii. Eiders - molting
- 74 birds (1.1/km^2), early August 1981 (Barry and Barry 1982)

iii. Scaup - molting
- 1128 birds (16.4/km^2), mid-July 1981 (Barry and Barry 1982)
- 932 birds (40.5/km^2), mid-July 1980 (Barry et al. 1981)

iv. Oldsquaw - molting
- 484 birds (12.3/km^2), mid-August 1986 (Alexander unpubl data)
- 1148 birds (29.3/km^2), late July 1985 (Alexander 1986)
- 3878 birds (56.5/km^2), mid-July 1981 (Barry and Barry 1982)
- 2481 birds (57.1/km^2), mid-August 1980 (Barry et al. 1981)

v. Scoters - molting
- 503 birds (12.9/km^2), mid-August 1986 (Alexander unpubl data)
- 1051 birds (26.8/km^2), late July 1985 (Alexander 1986)
- 1831 birds (26.7/km^2), mid-July 1981 (Barry and Barry 1982)
- 694 birds (30.2/km^2), mid-July 1980 (Barry et al. 1981)

vi. Red-breasted Mergansers - molting
- 131 birds (3.3/km^2), mid-August 1986 (Alexander unpubl. data)
- 172 birds (4.4/km^2), mid-August 1985 (Alexander 1986)
- 123 birds (1.8/km^2), early August 1981 (Barry and Barry 1982)
- 116 birds (5.0/km^2), mid-July 1980 (Barry et al. 1981)

vii. Glaucous Gulls - brodrearing, staging
- 702 birds (17.9/km^2), most in eastern third of area, mid-August 1986 (Alexander unpubl data)
- 38 birds, late July, and 371 birds (9.5/km^2), mid-August 1985 (Alexander 1986)

b. Russell Inlet to Cape Dalhousie

i. Brant - molting
- 3000 non-breeders, the occasional year (Barry unpubl. data)

c. Offshore (this area is not indicated on Figure 9 because of uncertainty in the locations of birds observed)

i. Oldsquaw - molting
- 100 birds, late July, and 5000+ birds, mid-August 1985 (Alexander 1986)

ii. Scoters - molting
- 325 birds, late July, and one large raft, mid-August 1985 (Alexander 1986)

iii. Unidentified diving ducks (probably a combination of Oldsquaw and scoters) - molting
- 700+ birds, late July 1985 (Alexander 1986)

5. Bay northeast of Johnson Bay - Red/Yellow

During surveys in early to mid-August 1974, 1350 unidentified geese (probably Brant (Barry unpubl. data)) were observed around this bay (Kuyt pers. comm.). In some years, large numbers of Brant molt along the coastline of Russel Inlet, and it is not clear how regularly the area between Cape Dalhousie and Johnson Bay is use.

6. North Liverpool Bay - Yellow and Green

The following are general comments applicable to all of Liverpool Bay. The offshore waters of Liverpool Bay are used primarily by molting diving ducks. However, numbers of birds are highly variable between years. Due to the large size of the bay, birds can be quite dispersed, and are found both along the coastline and in the outer open parts of the bay. In general, west Liverpool Bay around Campbell Island is the most consistently used area; large flocks are at times found in north and north-central Liverpool Bay, and the southern stretch recieves very little use. Liverpool Bay may be more important during years when heavy ice clutters the more exposed coastlines of the Beaufort Sea, such as in 1985 (Alexander 1986; Cornish and Dickson 1986).

Molting Oldsquaws, scoters, Red-breasted Mergansers, and in some years, scaup are found in Johnson Bay, in the three sheltered bays that indent the north coast of Liverpool Bay, and along the coast near these bays. Birds appear to be more abundant in the western portion of the area. Small flocks of molting Red-breasted Mergansers and Glaucous Gulls are often found on the little spits along the coastline. Glaucous Gulls feed and rest all along the coastline. At times, large flocks of Oldsquaw and scoters are found in offshore central portions of the bay. Small numbers of Red-throated Loons feed in the offshore waters.

a. Coastal area

i. Scaup - molting
- 45 birds (2.7/km^2), late July 1985, but no birds, mid-August 1985 and 1986 (Alexander 1986; Alexander unpubl. data)
- 479 birds (13.4/km^2), late July 1980 (Barry et al. 1981)

ii. Oldsquaw - molting
- 162 birds (6.0/km^2), mid-August 1986 (Alexander unpubl. data)
- 895 birds (33.4/km^2), mid-August 1985 (Alexander 1986)
- 687 birds (19.2/km^2), late July 1980 (Barry et al. 1981)

iii. Scoters - molting
- 108 birds (4.0/km^2), mid-August 1986 (Alexander unpubl. data)
- 875 birds (52.1/km^2), late July, and 1485 birds (55.4/km^2), mid-August 1985 (Alexander 1986)
- 866 birds (24.2/km^2), mid-August 1980 (Barry et al. 1981)

iv. Red-breasted Mergansers - molting
- 172 birds (6.4/km^2), mid-August 1986 (Alexander unpubl. data)
- 154 birds (9.2/km^2), late July 1985 (Alexander 1986)
- 272 birds (7.6/km^2), mid-August 1980 (Barry et al. 1981)

v. Glaucous Gulls - broodrearing, feeding
- 60 birds (2.2/km^2), mid-August 1986 (Alexander unpubl. data.)
- 251 birds (9.4/km^2), mid-August 1985 (Alexander 1986)
- 133 birds (3.7/km^2), late July 1980 (Barry et al. 1981)

b. Western-most of three unnamed bays
i. Unidentified diving ducks (probably scaup, Oldsquaw, scoters and Red-breasted Mergansers (Barry et al. 1981)) - molting
- 1300 birds, late July to early August 1974 (Kuyt pers. comm.)

c. Between unnamed bays and Johnson Bay
i. Unidentified diving ducks (probably scaup, Oldsquaw, scoters and Red-breasted Mergansers (Barry et al. 1981)) - molting
- 1250 birds, late July to early August 1974 (Kuyt pers. comm.)

d. Johnson Bay
i. Unidentified diving ducks (probably scaup, Oldsquaw, scoters and Red-breasted Mergansers (Barry et al. 1981)) - molting
- 700 birds, mid-August 1974 (Kuyt pers. comm.)

e. Offshore areas
i. Scoters - molting
- 900+ birds, mid-August 1985 (Alexander 1986)

ii. Unidentified diving ducks (probably Oldsquaw and scoters (Alexander 1986)) - molting
- 1500+ birds, mid-August 1985 (Alexander 1986)

7. West Liverpool Bay - Red

This area includes Campbell Island, the Smoke, Moose and Kugaluk river deltas, and the adjacent water. Campbell Island and the river deltas are low-lying areas of sedge-grass meadows and marshes. The area provides habitat for important concentrations of molting Canada and Greater White-fronted Geese. Towards mid-August these birds regain flight and leave for staging grounds in the Mackenzie Delta. Molting and broodrearing Brant and Lesser Snow Geese are present in small numbers. The beaches are sand and gravel. The nearshore marine water along Campbell and Thumb islands, and south to the river deltas, is an important area for molting scoters, and in some years, scaup and Red-breasted Mergansers. Oldsquaw molt in the area but in lower numbers. High densities of feeding Red-throated Loons have been recorded. All of these diving and fish-eating birds likely use offshore waters around Campbell Island, and between the island and the river deltas. Glaucous Gulls at the nesting colony south of Campbell Island rear young during this period. These birds feed primarily on blue mussel from marine waters (Barry and Barry 1982).

a. Nearshore water
i. Red-throated Loon - feeding
- 18 birds (1.3/km^2), late July 1985 (Alexander 1986)

ii. Scaup - molting
- 687 birds (31.2/km^2), mid-August 1980 (Barry et al. 1981)

iii. Oldsquaw - molting
- 159 birds (10.2/km^2), mid-August 1985 (Alexander 1986)
- 401 birds (18.2/km^2), late July 1980 (Barry et al. 1981)

iv. Scoters - molting
- 1096 birds (62.3/km^2), mid-August 1986 (Alexander unpubl. data)
- 2210 birds (100.3/km^2), late July 1980 (Barry et al. 1981)

v. Red-breasted Mergansers - molting
- 221 birds (15.8/km^2), late July 1985 (Alexander 1986)
- 497 birds (22.6/km^2), late July 1980 (Barry et al. 1981)

vi. Glaucous Gulls - brogdrearing, feeding
- 298 birds (13.5/km^2), late July 1980 (Barry et al. 1981)

b. Island southwest of Campbell Island
i. Glaucous Gulls - broodrearing
- 75 birds, late July 1985 (Alexander 1986)

c. South Campbell Island, and Smoke, Moose and Kugaluk river deltas
i. Canada Geese - molting
- 10000 to 20000 non-breeders, most years (Barry unpubl. data)

d. Smoke, Moose and Kugaluk river deltas
i. Tundra Swans - molting
- 500 non-breeders, most years (Barry unpubl. data)

ii. Greater White-fronted Geese - molting
- 7000 to 15 000 non-breeders, most years (Barry unpubl. data)

e. Smoke and Moose river delats
i. Brant - molting, broodrearing
- 100 to 250 birds, most years (Barry unpubl. data)

ii. Greater White-fronted Geese - molting
- 535 birds along shoreline, late July 1985 (Alexander 1986)

iii. Lesser Snow Geese - molting, broodrearing
- 20 to 150 adults and young, most years (Barry unpubl. data)

8. Anderson River delta and Wood Bay - Red

The outer Anderson River delta is low and muddy, and becomes progressively more vegetated upstream. Off the west side of Wood Bay is an area of low rolling hills with three deltas formed by small creeks. The vegetated flats in these areas provide important habitat for feeding by broodrearing and molting Lesser Snow Geese and Brant from the Anderson River colony (see page 92 for a more detailed discussion). Most Lesser Snow Geese have left the delta by the third week of August. Large numbers of molting (including many non-breeders) and broodrearing Greater White-fronted Geese are present on the flats and in the channels of the inner deltas, and to a lesser

extent the outer deltas. This includes the creek deltas, but numbers are much higher in the Anderson Delta. Large numbers of molting (including many non-breeders) and broodrearing Tundra Swans are found scattered and in large flocks in the channels of the Anderson River delta. Large flocks of migrating Northern Pintails, American Wigeons, and scaup stage and rest along the channels of the delta throughout August.

Outer Wood Bay (areas e and f on Figure 9) is a major site for molting and migrating Oldsquaw and scoters. The combined population of molting ducks in 1986 was estimated to approach 20 000 birds (Alexander unpubl. data). However, there is no data on the variability of population levels. The number of birds stopping-over during migration is unknown but is expected to be greater than the molting population. The inner part of Wood Bay is heavily influenced by the Anderson River effluent resulting in high turbidity and consequently reduced visibility for diving ducks. Oldsquaw and scoters are rarely seen on inner Wood Bay. The distribution of birds in the outer Wood Bay area is highly influenced by wind conditions. When winds are strong enough to make the sea choppy, birds are more likely to be found along the shoreline and in sheltered areas, particularly along the west and south shores of Nicholson Island. Preferred coastlines will be dictated by wind direction. When winds are light, both species are found dispersed throughout the area. Large flocks are sometimes seen in the area between outer Wood Bay and Harrowby Bay (another major molting site). Movement of birds between these two areas may occur. In some years scaup are present in large numbers. Small numbers of Red-breasted Mergansers molt in the area, and feeding Glaucous Gulls are present throughout.

a. Anderson River delta and three creek mouths
   i. Lesser Snow Geese - molting, broodrearing
      - 4000 to 8000 breeders, plus 0 to 2 young per pair but may be as high as 3.5 young per pair, most years (Barry unpubl. data)

b. Anderson River delta
   i. Tundra Swans - molting, broodrearing
      - 200 to 300 breeders and young, and 1200 non-breeders, July and August most years (Barry unpubl data) (small numbers at creeks)

   ii. Brant - molting, broodrearing
      - 3000 birds, plus up to 3.5 young per pair, most years (Barry unpubl. data) (includes birds in the three creek mouths)

c. Anderson River valley and three creek mouths
   i. Greater White-fronted Geese - molting, broodrearing
      - 1000 to 4000 birds, mostly non-breeders, most years (Barry unpubl. data)

d. Anderson River delta and valley (all areas along the Anderson River circled on Figure 9)
   i. Dabbling ducks - molting, staging
      - 3000 to 5000 birds, early July to early August most years (Barry unpubl. data)

e. Nearshore waters of outer Wood Bay
   i. Scaup - molting
      - 4 birds, late July, and no birds mid-August 1985 and mid-August 1986 (Alexander 1986; Alexander unpubl. data)
      - 950 birds (41.6/km^2), early August 1981 (Barry and Barry 1982)
      - 6719 birds (219.2/km^2), mid-August 1980 (Barry et al. 1981)

   ii. Oldsquaw - molting
      - 973 birds (60.8/km^2), mid-August 1986 (Alexander unpubl data)
      - 2006 birds (87.8/km^2), early August 1981 (Barry and Barry 1982)
      - 2285 birds (74.6/km^2), mid-August 1980 (Barry et al. 1981)

   iii. Scoters - molting
      - 441 birds (27.6/km^2), mid-August 1985 (Alexander 1986)
      - 993 birds (43.4/km^2), early August 1981 (Barry and Barry 1982)
      - 2024 birds (66.0/km^2), mid-August 1980 (Barry et al. 1981)

   iv. Red-breasted Mergansers - molting
      - 154 birds (6.7/km^2), early August 1981 (Barry and Barry 1982)
      - 159 birds (5.2/km^2), mid-August 1980 (Barry et al. 1981)

f. Offshore outer Wood Bay
   i. Oldsquaw - molting
      - 1367 birds (39.4/km^2), mid-August 1986 (Alexander unpubl. data)

   ii. Scoters - molting
      - 1130 birds (32.6/km^2), mid-August 1986 (Alexander unpubl. data)

9. Mason River delta to Maitland Point - Red and Red/Yellow

Mason River delta is low-lying, muddy, progressively more heavily vegetated upstream, and surrounded by low, rolling hills. The delta area provides habitat for molting and broodrearing Tundra Swans (local birds), Brant (local birds plus some from the Anderson River colony), and Lesser Snow Geese from the Anderson River colony. Greater White-fronted Geese and dabbling ducks molt upstream along the Mason River and its tributaries. The delta flats are used by staging shorebirds but the extent of use is unknown. Large numbers of molting Oldsquaw and scoters, and smaller numbers of scaup concentrate in the nearshore marine waters off the Mason River delta. The marine area is contiguous with Wood Bay, and is considered a part of the outer Wood Bay system (see page 108 for further discussion). Large flocks of molting Oldsquaw and scoters are sometimes seen in the water along the exposed and highly eroding shoreline between the delta and Maitland Point; therefore, the area is considered to have variable but potentially high use, and is coded Red/Yellow.

a. Mason River delta
   i. Tundra Swans - molting
      - 75 to 100 non-breeders, molting, July and August most years (Barry unpubl. data)

   ii. Brant - molting, broodrearing
      - 200 to 500 birds, most years (Barry unpubl. data)

   iii. Lesser Snow Geese - molting, broodrearing
      - 100 to 500 birds, most years (Barry unpubl. data)

   iv. Glaucous Gulls - broodrearing
      - 50 birds at colony site, mid-August 1986 (Alexander unpubl. data)

b. Mason River valley
   i. Dabbling ducks - molting
      - 400 to 600 birds, early July to early August, most years (Barry unpubl. data)

c. Mason River valley
   i. Greater White-fronted Geese - molting
      - 1000+ non-breeders, most years (Barry unpubl. data)

d. Nearshore marine water at Mason River delta
   i. Oldsquaw - molting
      - 304 birds (13.3/km^2), early August 1981 (Barry and Barry 1982)
      - 1082 birds (89.2/km^2), mid-August 1980 (Barry et al. 1981)
      - the area surveyed in both 1980 and 1981 extended from Wood Bay to Maitland Point, but most birds were at Mason River delta

e. Nearshore marine water north of Mason River delta to Maitland Point
   i. Oldsquaw - molting
      - 380 birds (45.2/km^2), mid-August 1986 (Alexander unpubl data)
      - 913 birds (108.7/km^2), mid-August 1985 (Alexander 1986)

   ii. Scoters - molting
      - 163 birds (19.4/km^2), mid-August 1985 (Alexander 1986)
      - 97 birds (4.2/km^2), early August 1981 (Barry and Barry 1982)
      - 6000 birds (494.6/km^2), late July 1980 (Barry et al. 1981)
      - the area surveyed in both 1980 and 1981 extended from Wood Bay to Maitland Point, however most birds were north of the Mason River delta

f. Nearshore marine water from west side Mason River delta to Maitland Point
   i. Scaup - molting
      - zero birds seen, late July and mid-August 1985, and mid-August 1986 (Alexander 1986; Alexander unpubl. data)
      - 852 birds (37.3/km^2), early August 1981 (Barry and Barry 1982)
      - 281 birds (23.2/km^2), mid-August 1980 (Barry et al. 1981)

ii. Red-breasted Mergansers - molting
- 160 birds (7.0/km^2), early August 1981 (Barry and Barry 1982)
- 107 birds (8.8/km^2), late July 1980 (Barry et al. 1981)

iii. Glaucous Gulls - broodrearing
- 235 birds (10.3/km^2), early August 1981 (Barry and Barry 1982)
- 72 birds (5.9/km^2), late July 1980 (Barry et al. 1981)
- many of these birds were probably seen on the Mason River outer delta

10. Maitland Point and Ikpisugyuk Bay - Red

The mouth of Ikpisugyuk Bay consists of an opening across a sand and gravel spit to the south, a larger and more direct opening in the north, and tidal mudflats dividing the two openings. Molting Oldsquaw, scaup, and at times, migrating eiders are found throughout the bay, but tend to be more concentrated off the seaward side of the spits, and in the channels of the mouth of the bay. Scoters and Red-breasted Mergansers molt in the area in small numbers, although scoters from Harrowby Bay may at times venture into waters off Ikpisugyuk Bay. Small numbers of dabbling ducks, Glaucous Gulls and shorebirds feed on the tidal mudflats. Small flocks of molting or migrating geese are occasionally seen on the flats and marsh areas around the bay and at its mouth. Large numbers of Greater White-fronted Geese molt in the creek valley that enters the southeast end of the bay.

a. Bay and mouth

i. Eiders - migrating
- very few birds seen, late July and mid-August 1985, and mid-August 1986 (Alexander 1986; Alexander unpubl. data)
- 271 birds (42.7/km^2), early August 1981 (Barry and Barry 1982)
- 150 birds (16.8/km^2), late July 1980 (Barry et al. 1981)

ii. Scaup - molting
- 154 birds (12.0/km^2), mid-August 1986 (Alexander unpubl data)
- 674 birds (106.1/km^2), mid-July 1981 (Barry and Barry 1982)
- 1405 birds (157.2/km^2), late July 1980 (Barry et al. 1981)

iii. Oldsquaw - molting
- 698 birds (54.5/km^2), mid-August 1986 (Alexander unpubl data)
- 225 birds (28.1/km^2), late July 1985 (Alexander 1986)
- 128 birds (20.2/km^2), mid-July 1981 (Barry and Barry 1982)
- 216 birds (15.4/km^2), mid-July 1980 (Barry et al. 1981)

iv. Scoters - molting
- 114 birds (8.9/km^2), mid-August 1986 (Alexander unpubl. data)
- 69 birds (10.7/km^2), mid-July 1981 (Barry and Barry 1982)
- 401 birds (44.9/km^2), mid-August 1980 (Barry et al. 1981)

v. Red-breasted Mergansers - molting
- 82 birds (12.9/km^2), early August 1981 (Barry and Barry 1982)
- 99 birds (7.0/km^2), mid-July 1980 (Barry et al. 1981)

vi. Glaucous Gulls - broodrearing, feeding
- 24 birds (3.8/km^2), mid-July 1981 (Barry and Barry 1982)
- 83 birds (9.3/km^2), late July 1980 (Barry et al. 1982)

b. Flats at mouth of bay
i. Greater White-fronted Geese - molting
- 30 birds, late July 1985 (Alexander 1986)

ii. Unidentified geese - molting
- 100 birds, mid-August 1986 (Alexander unpubl. data)

iii. Northern Pintails - feeding
- 60 birds, mid-August 1986 (Alexander unpubl. data)

c. Southwest shore of bay
i. Brant - molting
- 40 birds, mid-August 1986 (Alexander unpubl. data)

d. Southeast end of bay (mostly terrestrial)
i. Greater White-fronted Geese - molting
- 500 to 1000 non-breeders, most years (Barry unpubl. data)

11. Harrowby Bay - Red

The south shore of the bay is a marshy lowland protected by barrier beaches and spits. The north shore has low cliffs with sand and gravel beaches and spits. The main part of the bay is fully open to the Beaufort Sea. This is a major site for molting Oldsquaw and scoters, and in some years, scaup. The combined population of Oldsquaw and scoters was estimated in 1986 to approach 20 000 birds (Alexander unpubl. data). However, there is no data on the variability of population levels. Distribution of the Oldsquaw and scoters appears to be dependent on wind conditions. During winds high enough to at least make the sea choppy, birds are more likely to be found in large, tight flocks in nearshore waters, particularly around spits on both the north and south shores, although the south shore appears to be preferred. When winds are light, birds will be dispersed in loose, or smaller more scattered flocks, throughout the inner part of the bay. Fewer birds are found in offshore areas in the western part of the bay and its mouth.

Starting around 26 June there is a rapid build-up of molting non-breeding Canada and Greater White-fronted Geese along the channels and tributary creeks of the old Horton River east of Harrowby Bay. The birds remain flightless in the area until around the beginning of August. Flocks of molting Brant and Greater White-fronted Geese are found along both shores but more along the south shore. Later in August, large concentrations of staging Lesser Snow Geese are found in upland areas north and east around the bay. There are small numbers of migrating eiders, molting Red-breasted Mergansers, and feeding Glaucous Gulls feed throughout the area. There is no data on shorebird use of this area.

a. Nearshore areas
   i. Eiders - migrating
      - 33 birds (1.3/km^2), early August 1981 (Barry and Barry 1982)
      - 177 birds (6.4/km^2), early August 1980 (Barry et al. 1981)

   ii. Scaup - molting
      - 1 bird, mid-August 1986, but no birds, late July and mid-August 1985 (Alexander 1986; Alexander unpubl. data)
      - 777 birds (30.6/km^2), early August 1981 (Barry and Barry 1982)
      - 2055 birds (74.0/km^2), late July 1980 (Barry et al. 1981)

   iii. Oldsquaw - molting
      - 2534 birds (162.4/km^2), mid-August 1986 (Alexander unpubl. data)
      - 1284 birds (50.6/km^2), mid-July 1981 (Barry and Barry 1982)
      - 2172 birds (91.9/km^2), mid-July 1980 (Barry et al. 1981)

   iv. Scoters - molting
      - 1290 birds (82.7/km^2), mid-August 1986 (Alexander unpubl. data)
      - 2938 birds (115.7/km^2), early August 1981 (Barry and Barry 1982)
      - 3269 birds (117.7/km^2), late July 1980 (Barry et al. 1981)

   v. Red-breasted Mergansers - molting
      - 107 birds (6.9/km^2), mid-August 1986 (Alexander unpubl. data)
      - 31 birds (1.2/km^2), mid-August 1981 (Barry and Barry 1982)
      - 56 birds (2.4/km^2), mid-July 1980 (Barry et al. 1981)

   vi. Glaucous Gulls - broodrearing, staging
      - 103 birds (4.1/km^2), early August 1981 (Barry and Barry 1982)
      - 197 birds (7.1/km^2), mid-August 1980 (Barry et al. 1981)

b. Offshore and nearshore areas
   i. Oldsquaw - molting
      - 1588 birds (58.5/km^2), mid-August 1986 (Alexander unpubl. data)

   ii. Scoters - molting
      - 1006 birds (37.0/km^2), mid-August 1986 (Alexander unpubl. data)

c. South shore
   i. Brant - molting
      - 130 birds, late July 1985 (Alexander 1986)

   ii. Greater White-fronted Geese - molting
      - 56 birds, mid-August 1986 (Alexander unpubl. data)
      - 90 birds, mid-August 1985 (Alexander 1986)

d. East of Harrowby Bay
   i. Canada Geese - molting
      - 10 000 to 20 000 birds, most years (Barry unpubl. data)

   ii. Greater White-fronted Geese - molting
      - 5000 to 15 000 birds, most years (Barry unpubl. data)

12. Harrowby Bay to the Baillie Islands - Yellow and Red

The coastline between Harrowby Bay and the west side of Snow Goose Passage is predominantly heavily eroding frozen mud cliffs. Cy Peck Inlet is well sheltered and shallow with mud flats. Flocks of molting Oldsquaw, scoters, and at times, migrating and broodrearing eiders are found in these areas. Small numbers of molting scaup and Red-breasted Mergansers are also present. The Snow Goose Passage area is used by larger numbers of Oldsquaw and scoters. Westward migrating eiders are present throughout July (see page 94). The most heavily and consistently used part is the water east of the spit off the southwest corner of the large Baillie Island. Other heavily used areas are the spit off Cape Bathurst and the sheltered side (dependent on wind conditions) of the smaller Baillie Island. With calm conditions between the islands and the mainland, birds are found dispersed in offshore areas, as well as around the Baillie Island spit. The outer edge of the Baillie Islands is very exposed, and the turbid water becomes deep very close to shore. Few birds have been observed there.

a. Entire area (Yellow)
   i. Scaup - molting
      - 968 birds (39.1/km^2), early August 1981 (Barry and Barry 1982)
      - 54 birds (2.4/km^2), mid-August 1980 (Barry et al. 1981)

   ii. Scoters - molting
      - 417 birds (16.8/km^2), early August 1981 (Barry and Barry 1982)
      - 440 birds (16.6/km^2), mid-July 1980 (Barry et al. 1981)

   iii. Glaucous Gulls - brodrearing, migrating
      - 321 birds (13.0/km^2), mid-July 1981 (Barry and Barry 1982)
      - 303 birds (11.4/km^2), mid-July 1980 (Barry et al. 1981)

b. Harrowby Bay to west side of Snow Goose Passage
   i. Eiders
      - 177 birds, north of Cy Peck Inlet, mid-August 1986 (Alexander unpubl. data)

   ii. Oldsquaw - molting
      - 990 birds (50.5/km^2), throughout area, mid-August 1986 (Alexander unpubl. data)
      - 1002 birds (51.1/km^2), mostly in Cy Peck Inlet, late July 1985 (Alexander 1986)

   iii. Scoters - molting
      - 575 birds (29.3/km^2), throughout area, mid-August 1986 (Alexander unpubl. data)
      - 260 birds (13.3/km^2), throughout area, late July 1985 (Alexander 1986)

c. Cape Bathurst and Baillie Islands spits (Red)
   i. Eiders
      - 768 birds (31.0/km^2), early August 1981 (Barry and Barry 1982)
      - 2040 birds (77.0/km^2), mid-July 1980 (Barry et al. 1981)

   ii. Oldsquaw - molting
      - 1784 birds (72.0/km^2), early August 1981 (Barry and Barry 1982)
      - 1272 birds (48.0/km^2), mid-July 1980 (Barry et al. 1981)

   In both 1980 and 1981, the survey extended from Harrowby Bay to Baillie Islands; however, most eiders and Oldsquaw were in these two areas

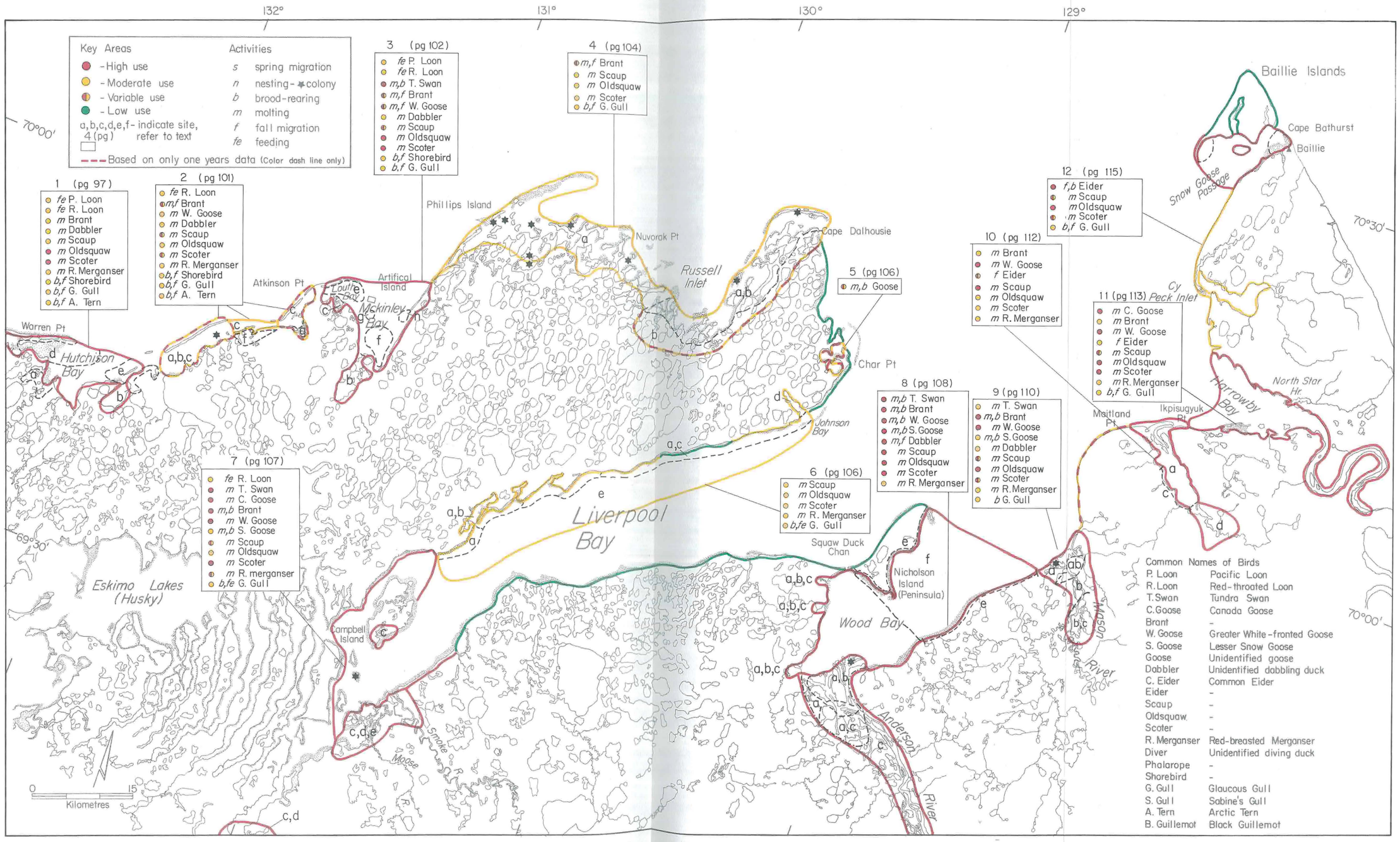
d. South shore of big Baillie Island, including spit and little Baillie Island
   i. Eiders
      - 688 birds (86.0/km^2), mid-August 1986 (Alexander unpubl data)

   ii. Oldsquaw - molting
      - 1205 birds (150.6/km^2), mid-August 1986 (Alexander unpubl. data)
      - 471 birds (58.9/km^2), late July 1985 (Alexander 1986)

   iii. Scoters - molting
      - 1478 birds (184.7/km^2), mid-August 1986 (Alexander unpubl. data)
      - 177 birds (23.3/km^2), mid-August 1985 (Alexander 1986)

e. Cape Bathurst spit
   i. Oldsquaw - molting
      - 436 birds (218.0/km^2), mid-August 1986 (Alexander unpubl. data)

Figure 9. Key areas for birds during mid-July to mid-August: Tuktoyaktuk Peninsula.



C. MID-AUGUST TO LATE SEPTEMBER (FIGURE 10)

1. Hutchison Bay - Red and Red/Yellow

A sand spit stretches from the northwest side of the bay to Warren Point, and another runs parallel to shore on the northeast side. Beaches are sand and silt, and parts of the coast are low and marshy. From late July through to mid or late August, Hutchison Bay is a major site for molting Oldsquaw and scoters (see page 97 for a detailed discussion). Once these species begin to migrate, the bay appears to be used intermittently by large flocks of birds. A similar pattern is apparent for the region between Hutchison Bay and Atkinson Point (section 2 below). Numerous small flocks of migrating Brant feed along the tidal marshes in this area from the latter part of August to mid-September. Migrating Glaucous Gulls feed throughout this area.

a. West side of Hutchison Bay (Red/Yellow)
   i. Brant - staging
      - 60 birds, mid-September 1985 (Alexander 1986)

   ii. Scaup - staging
      - 75 birds (9.4/km^2), early September 1986 (Alexander unpubl. data)

   iii. Red-breasted Mergansers - staging
      - 90 birds, early September 1986 (Alexander unpubl. data)
      - 256 birds, mid-September 1985 (Alexander 1986)

   iv. Glaucous Gulls - staging
      - 70 birds (8.8/km^2), early September 1986 (Alexander unpubl. data)
      - 68 birds (8.5/km^2), mid-September 1985 (Alexander 1986)

b. East side of Hutchison Bay (Red)
   i. Unidentified geese (probably Brant (Barry unpubl. data)) - staging
      - 850 birds, late August 1974 (Kuyt pers. comm.)

   ii. Scoters - staging
      - 4455 birds, early September 1986 (Alexander unpubl. data)

2. Hutchison Bay to Atkinson Point - Red and Yellow

Two long sand and gravel spits, one extending northeast from Hutchison Bay, the other southwest from Atkinson Point, give rise to an extensive area of sheltered water. During the molt period (see page 99) this area appears to be used intermittently by large flocks of Oldsquaw and scoter, and the pattern of intermittent use seems to continue into September. However, during the fall migration there may be a large turnover of flocks of migrating birds. Several tidal marshes and small creek mouths are found along the mainland shoreline. Numerous small flocks of westward migrating Brant feed in these areas. Greater White-fronted Geese migrate through this area, but the extent of use is not clear. Migrating shorebirds likely feed along the coastline, and migrating Glaucous Gulls feed throughout.

a. Mainland coast of entire area
   i. Scaup - staging
      - 327 birds (16.9/km^2), mid-September 1981 (Barry and Barry 1982)

   ii. Oldsquaw - staging
      - 86 birds (6.7/km^2), early September 1986 (Alexander unpubl. data)
      - 2774 birds (143.7/km^2), mid-September 1981 (Barry and Barry 1982)

   iii. Scoters - staging
      - 412 birds (32.2/km^2), early September 1986 (Alexander unpubl. data)
      - 164 birds (8.5/km^2), mid-September 1981 (Barry and Barry 1982)

   iv. Glaucous Gulls - staging
      - 47 birds (3.7/km^2), mid-September 1985 (Alexander 1986)
      - 47 birds (2.4/km^2), mid-September 1981 (Barry and Barry 1982)

b. Long spit northeast of Hutchison Bay, leeward marine water, and mainland coastline southeast of the spit
   i. Unidentified geese (probably Brant, Greater White-fronted Geese (Alexander 1986)) - staging
      - 2200 birds, late August 1974 (Kuyt pers. comm.)

   ii. Unidentified diving ducks (probably scaup, Oldsquaw, scoters (Alexander unpubl. data; Barry and Barry 1982)) - staging
      - 375 birds, late August-early September 1974 (Kuyt pers. comm.)

c. Spit southwest of Atkinson Point and mainland coast
   i. Unidentified geese (probably Brant, Greater White-fronted Geese (Alexander 1986; Scott-Brown et al. 1981)) - staging
      - 1250 birds, late August 1974 (Kuyt pers. comm.)

3. McKinley Bay - Yellow

McKinley Bay is a shallow, sheltered bay with barrier beaches at both the northeast and northwest corners. Most of the coastline is sand beach; however, there are tidal marshes in the area east of Louth Bay, and around the lagoon system at the south end of the bay. During July and August, McKinley Bay is a major site for molting Oldsquaw and scoters (see page 102). During migration, use appears to be reduced, but large flocks may be present from time to time, such as at Hutchison Bay. Tidal marsh areas are used for feeding by numerous flocks of migrating Brant, Greater White-fronted Geese, and shorebirds.

a. Entire area
   i. Greater White-fronted Geese - staging
      - 167 birds, late August 1980 (Karasiuk and Boothroyd 1982)

ii. Oldsquaw - staging
- 635 birds (49.6/km^2), early September 1986 (Alexander unpubl. data)
- 180 birds (14.1/km^2), mid-September 1985 (Alexander 1986)

iii. Scoters - staging
- 788 birds (61.6/km^2), early September 1986 (Alexander unpubl. data)
- 102 birds (16.1/km^2), mid-September 1981 (Barry and Barry 1982)

iv. Glaucous Gulls - staging
- 51 birds (4.0/km^2), early September 1986 (Alexander unpubl data)
- 199 birds (7.9/km^2), late August 1980 (Karasiuk and Boothroyd 1982)

b. Atkinson Point spit
i. Brant - staging
- 400 birds, late August 1965 (Barry unpubl. data)

c. McKinley Bay Lagoon
i. Unidentified geese (probably Brant, Greater White-fronted Geese (Barry unpubl. data; Karasiuk and Boothroyd 1982) - staging
- 650 birds, late August 1974 (Kuyt pers. comm.)

4. McKinley Bay to Cape Dalhousie - Yellow

This area is a long series of small bays with sand beaches and the occasional tidal marsh. Many small islands dot the offshore areas. The nearshore waters of this area are used by migrating Oldsquaw, scoters and small numbers of eiders. Migrating Brant feed in the tidal marsh areas along the coastline. Migrating Glaucous Gulls are found throughout this area, but in greater numbers in the western portion. These birds are sometimes found in flocks of several hundred individuals.

a. Entire area
i. Eiders - staging
- 54 birds (1.4/km^2), early September 1986 (Alexander unpubl. data)
- 93 birds (1.4/km^2), mid-September 1981 (Barry and Barry 1982)

ii. Oldsquaw - staging
- 258 birds (6.6/km^2), early September 1986 (Alexander unpubl. data)
- 2074 birds (30.2/km^2), mid-September 1981 (Barry and Barry 1982)

iii. Scoters - staging
- 754 birds (19.2/km^2), early September 1986 (Alexander unpubl. data)

iv. Glaucous Gulls - staging
- 98 birds (2.5/km^2), early September 1986 (Alexander unpubl data)
- 142 birds (3.6/km^2), mid-September 1985 (Alexander 1986)
- 193 birds (2.8/km^2), mid-September 1981 (Barry and Barry 1982)

b. McKinley Bay to west of Nuvorak Point
   i. Brant - staging
      - 132 birds, mid-August 1985 (Alexander 1986)

5. Anderson River delta - Red

From about mid-August to mid-September most years, this area is used as a resting and feeding site by between 5000 and 20 000 migrating dabbling ducks (Barry unpubl. data). Some Brant and Greater White-fronted Geese remain in the delta area through to late August. In the spring, the outer Anderson River delta provides habitat for several thousand nesting Lesser Snow Geese and Brant (see pages 92 and 108 for more detailed discussions).

6. Outer Wood Bay - Red

Outer Wood Bay is a major stopover site for molting and migrating Oldsquaw and scoters. On one day in early September 1986, more than 10 000 individuals of these two species were estimated to be present in the bay (Alexander unpubl. data). The turnover of individuals during the migration period is unknown (see page 108 for additional information, and see page 5 for a general discussion on fall migration).

i. Scaup - staging
   - 579 birds (25.3/km^2), mid-September 1981 (Barry and Barry 1982)

ii. Oldsquaw - staging
   - 378 birds (6.8/km^2) in coastal and offshore areas, early September 1986 (Alexander unpubl. data)
   - 300 birds (18.7/km^2) in coastal areas, mid-September 1985 (Alexander 1986)

iii. Scoters - staging
   - 1228 birds (22.1/km^2) in coastal and offshore areas, early September 1986 (Alexander unpubl. data)

7. Mason River to Maitland Point - Red/Yellow

This area appears to be used at times by large numbers of migrating Oldsquaw and smaller numbers of scaup. It is likely that it is also used by scoters during migration. Migrating Brant feed on tidal flats in the Mason River delta. The turnover rate of migrating birds is unknown (see page 5 for a general discussion on fall migration).

i. Scaup - staging
   - 378 birds (17.4/km^2), mid-September 1981 (Barry and Barry 1982)

ii. Oldsquaw - staging
   - 275 birds (22.2/km^2), mid-September 1985 (Alexander 1986)
   - 1762 birds (77.1/km^2), mid-September 1981 (Barry and Barry 1982)

8. Harrowby Bay - Red/Yellow

The south shore of the bay is a marshy lowland protected by barrier beaches and spits. The north shore has low cliffs with sand and gravel beaches and spits. The main part of the bay is fully open to the Beaufort Sea. In July and August, this area is a major site for molting Oldsquaw and scoters (see page 113 for a detailed discussion). Into September, the area appears to be of reduced importance; however, this may be an artifact of sampling (see page 5 for a general discussion on fall migration). Large numbers of scaup have at times been observed in the bay in September. Small numbers of Red-breasted Mergansers and Glaucous Gulls are present.

i. Scaup - staging
- 40 birds (2.6/km^2), early September 1986 (Alexander unpubl. data)
- 1130 birds (44.5/km^2), mid-September 1981 (Barry and Barry 1982)

ii. Oldsquaw - staging
- 143 birds (3.7/km^2) in coastal and offshore areas, early September 1986 (Alexander unpubl. data)
- 423 birds (16.7/km^2), mid-September 1981 (Barry and Barry 1982)

iii. Scoters - staging
- 141 birds (3.7/km^2) in coastal and offshore areas, early September 1986 (Alexander unpubl. data)
- 172 birds (11.0/km^2) in coastal areas, mid-September 1985 (Alexander 1986)

9. Harrowby Bay to the Baillie Islands - Yellow and Red/Yellow

The coastline in this area is generally very exposed but shelter is provided by the south shore and spit on the large Baillie Island, the spit off Cape Bathurst, and by the little Baillie Island. These sheltered locations are more heavily used by migrating Oldsquaw, scoters, eiders, and Glaucous Gulls than other parts of the overall region. Flocks of a few hundred individuals are at times found in more exposed areas. Red-breasted Mergansers are present in small numbers. In general, this area appears to be less heavily used by migrating birds than, for example, Wood Bay; however, the turnover rate is not known and large numbers may use this area.

i. Eiders - staging
- 418 birds (230 by Baillie Island spit), early September 1986 (Alexander unpubl. data)

ii. Oldsquaw - staging
- 160 birds (most by Baillie Island spit), early September 1986 (Alexander unpubl. data)
- 297 birds (13.3/km^2) throughout area, mid-September 1985 (Alexander 1986)

iii. Scoters - staging
- 425 birds (325 along south shore of large Baillie Island and spit), early September 1986 (Alexander unpubl. data)
- 128 birds (5.7/km^2) throughout area, mid-September 1985 (Alexander 1986)

iv. Red-breasted Mergansers - staging
- 192 birds (most around Cy Peck Inlet), mid-September 1985 (Alexander 1986)

v. Glaucous Gulls - staging
- 177 birds (6.0/km^2), early September 1986 (Alexander unpubl. data)
- 157 birds (6.3/km^2), mid-September 1981 (Barry and Barry 1982)

10. Southeast of McKinley Bay (Terrestrial) - Red/Yellow

Lesser Snow Geese were present in high numbers during fall migration in only one of many years of surveys.

i. Lesser Snow Geese - staging
- 453 to 1690 birds, late August 1983 (Barry and Barry in prep.)
- 10 000 birds, early September 1983 (Barry and Barry in prep.)
- 2620 birds, mid-September 1983 (Barry and Barry in prep.)

11. South of Liverpool Bay (Terrestrial) - Red/Yellow

Lesser Snow Geese were present in this upland area in high numbers during fall migration in only one of many years of surveys.

i. Lesser Snow Geese - staging
- 20 000 birds, early September 1983 (Barry and Barry in prep.)

12. East of Harrowby Bay (Terrestrial) - Red

The lush sedge-grass vegetation of the old Horton River bed is a primary fall staging area for Lesser Snow Geese (Barry and Barry in prep.)

i. Lesser Snow Geese - staging
- 16 600 birds, early September 1973 (Koski and Gollop 1974)

13. Bathurst Peninsula and Baillie Islands (Terrestrial) - Red

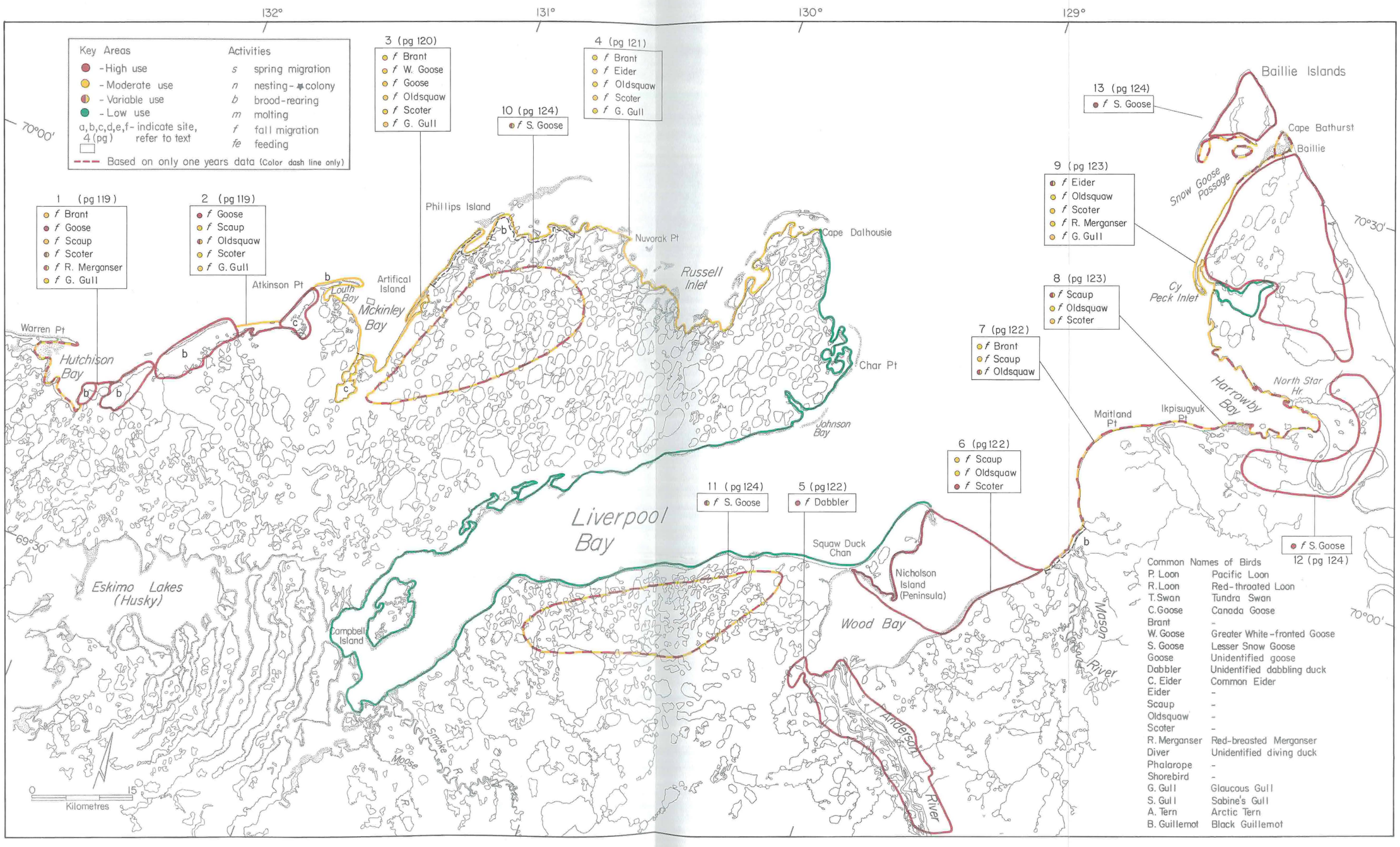
Upland, non-coastal areas are used by large numbers of Lesser Snow Geese during fall migration. Large flocks have occasionally been observed in the water just north of the Baillie Islands (Barry pers. observation).

a. Entire area
   i. Lesser Snow Geese - staging
      - 29 330 birds, late August-early September 1983 (Barry and Barry in prep.)

b. Bathurst Peninsula
   i. Lesser Snow Geese - staging
      - 4695 birds, early September 1982 (Barry et al. in prep.)
      - 8250 birds, early September 1983 (Koski and Gollop 1974)

c. Baillie Islands
   i. Lesser Snow Geese - staging
      - 6550 birds, early September 1973 (Koski and Gollop 1974)

Figure 10. Key areas for birds during mid-August to late September: Tuktoyaktuk Peninsula.



LITERATURE CITED

Alexander, S.A. 1986. Beaufort Sea coastal bird surveys, 1985 season. Can. Wildl. Serv., Unpubl. Rep. Edmonton. 80 pp.

Alexander, S.A., D.M. Ealey, and S.J. Barry. 1988. Spring migration of eiders, Oldsquaw and Glaucous Gulls along offshore leads of the Canadian Beaufort Sea. In press: Tech. Rep. Ser., Can. Wildl. Serv., Western and Northern Region. Alberta.

Alexander, S.A., and J. Hawkings. 1988. Breeding bird survey of coastal islands of the outer Mackenzie Delta and northern Tuktoyaktuk Peninsula, 1987. Tech. Rep. Ser. No. 39, Can. Wildl. Serv., Western and Northern Region. Alberta.

Anderson, R.M. 1913. Report on the natural history collections of the expedition. Pages 436-527 in V. Stefansson "My life with the Eskimo." The MacMillan Co., N.Y.

Anderson, R.M. 1937. Mammals and birds. Pages 97-122 in Canada's Western Northland. Parks and Forest Branch. Ottawa. King's Printer.

Arner, B.D., D.L. Dickson, and G. Verreault. 1985. Bird observations from Atkinson Point, Northwest Territories, 1984. Can. Wildl. Serv., Unpubl. Rep. Edmonton. 37pp.

Barry, S.J., and T.W. Barry. 1982. Sea-bird surveys in the Beaufort Sea, Amundsen Gulf, and Prince of Wales Strait 1981 season. Unpubl. report for Dome Petroleum Ltd., Esso Resources Canada Ltd., Canadian Wildlife Service. 52pp.

Barry, S.J., and T.W. Barry. In prep. Monitoring of snow geese in the western arctic 1983 season. Can. Wildl. Serv. Edmonton.

Barry, T.W. 1968. Observations on natural mortality and native use of eider ducks along the Beaufort Sea coast. Can. Field-Nat. 82: 140-144.

Barry, T.W. 1976. Seabirds of the southeastern Beaufort Sea: summary report. Beaufort Sea Tech. Rep. 3a. Can. Dept. of Env. Victoria. 41pp.

Barry, T.W. 1983. Beaufort Sea region. Pages 78-130 in H.L. Dickson, T.W. Barry, K.J. McCormick, and R.W. Prach. Areas of interest to the Canadian Wildlife Service (within the Beaufort Sea hydrocarbon production zone and associated transportation corridors). Can. Wildl. Serv., Unpubl. Rep. Edmonton.

Barry, T.W. 1986. Eiders of the western Canadian Arctic. Pages 74-80 in A. Reed (ed.). Eider ducks in Canada. Can. Wildl. Serv. Rep. Ser. 47. 177 pp.

Barry, T.W., S.J. Barry, and B. Jacobson. 1981. Sea-bird surveys in the Beaufort Sea, Amundsen Gulf, Prince of Wales Strait and Viscount Melville Sound--1980 season. Unpubl. report for Dome Petroleum Ltd. and Esso Resources Canada Ltd., Calgary. 69 pp.

Barry, T.W., S.J. Barry, and B. Jacobson. in prep. Snow geese of the western arctic baseline report, 1958-1983. Can. Wildl. Serv. Edmonton.

Barry, T.W., and R. Spencer. 1976. Wildlife response to oil well drilling. Can. Wildl. Serv. Progress Notes No. 67. 15 pp.

Bergman, R.D., R.L. Howard, K.F. Abraham, and M.W. Weller. 1977. Water birds and their wetland resources in relation to oil development at Storkersen Point, Alaska. U.S.D.I. Fish and Wildlife Service, Resource Publication No. 129. 38 pp.

Boothroyd, P.N. 1983. Nesting habitat and food selection of some arctic birds. Can. Wildl. Serv., Unpubl. Rep. Edmonton. 83 pp.

Campbell, R.W. 1973. Baseline study of selected nesting waterbirds on the northwestern MacKenzie Delta, N.W.T. and Y.T. 1972. In Towards an environmental impact assessment of the portion of the Mackenzie gas pipeline from Alaska to Alberta. Interim Rep. No. 3, Appendix 3, Ornithology. Environmental Protection Board, Winnipeg. 33 pp.

Campbell, R.W., and W.C. Weber. 1973. Abundance and species composition of birds in selected areas along the pipeline route 1972. In Towards an environmental impact assessment of the portion of the Mackenzie gas pipeline from Alaska to Alberta. Interim Rep. No. 3, Appendix 3, Ornithology. Environmental Protection Board, Winnipeg. 33 pp.

Connors, P.G., J.P. Myers, and F.A. Pitelka. 1979. Seasonal habitat use by arctic Alaskan shorebirds. Studies in Avian Biology 2:101-111.

Cornish, B.J., and D.L. Allen. 1983. Waterbird surveys of McKinley Bay, Northwest Territories, 1982. Can. Wildl. Serv., Unpubl. Rep. Edmonton. 77 pp.

Cornish, B.J., and D.L. Dickson. 1984. Waterbird surveys of McKinley Bay, Northwest Territories, 1983. Can. Wildl. Serv., Unpubl. Rep. Edmonton. 64 pp.

Cornish, B.J., and D.L. Dickson. 1985. Waterbird surveys of McKinley Bay, Northwest Territories, 1984. Can. Wildl. Serv., Unpubl. Rep. Edmonton. 68 pp.

Cornish, B.J., and D.L. Dickson. 1986. Waterbird surveys of McKinley Bay, Northwest Territories, 1985. Can. Wildl. Serv., Unpubl. Rep. Edmonton. 61 pp.

Dickson, D.L. 1985. Bird surveys at King Point, Yukon in 1981 to assess the potential impact of development. Can. Wildl. Serv., Unpubl. Rep. Edmonton. 113 pp.

Dickson, D.L., H.L. Dickson, and G.M. Aiudi. 1988. Bird surveys at Stokes Point and Phillips Bay, Yukon in 1983. Tech. Rep. Ser. No. 40, Can. Wildl. Serv., Western and Northern Region, Alberta.

Dickson, H.L., T.W. Barry, K.J. McCormick, and R.W. Prach. 1983. Areas of interest to the Canadian Wildlife Service (within the Beaufort Sea hydrocarbon production zone and associated transportation corridors). Can. Wildl. Serv., Unpubl. Rep. Edmonton. 222 pp.

Ealey, D.M., S.A. Alexander, and B. Croft. 1988. Fall migration and staging of phalaropes and other waterbirds in the vicinity of Nunaluk Spit, Yukon Territory: 1987. In press: Tech. Rep. Ser., Can. Wildl. Serv., Western and Northern Region, Alberta.

Fuller, R.J. 1980. A method for assessing the ornithological interest of sites for conservation. Biological Conserv. 17:229-239.

Gollop, M.A., and R.A. Davis. 1974. Autumn bird migration along the Yukon Arctic coast, July, August, September, 1972. Arctic Gas Biol. Rep. Ser. 13:83-163.

Gollop, M.A., and W.J. Richardson. 1974. Inventory and habitat evaluation of bird breeding and moulting areas along the Beaufort Sea coast from Prudhoe Bay, Alaska to Shingle Point, Yukon Territory, July 1973. Arctic Gas Biol. Rep. Ser. 26(1):1-61.

Hawkings, J. 1986 Breeding bird survey of the Whitefish Station area, Mackenzie Delta, 1985. Can. Wildl. Serv., Tech. Rep. Ser. 4. Pacific and Yukon Region. 22 pp.

Hogg, E.H., H.L. Dickson, and D.L. Dickson. 1986. Ground surveys to evaluate habitat use by birds along the Beaufort Sea coast, Yukon and Northwest Territories, 1981-1982. Can. Wildl. Serv., Unpubl. Rep. Edmonton. 70 pp.

Howard, R.L. 1974. Aquatic invertebrate-waterbird relationships on Alaska's arctic coastal plan. M.Sc. Thesis, Iowa State University, Ames, Iowa.

Jacobson, J.O. 1974. Potential impact of the Mackenzie Gas Pipeline on bird populations in the Yukon and Northwest Territories. Pages 121-176 in Environmental Impact Assessment of the portion of the Mackenzie Gas Pipeline from Alaska to Alberta. Vol. IV. Research report. Environmental Protection Board, Winnipeg.

Johnson, L.L. 1971. The migration, harvest, and importance of waterfowl at Barrow, Alaska. M.Sc. Thesis. Univ. Alaska, Fairbanks. 87 pp.

Johnson, S.R. 1984. Habitat use and behavior of nesting common eiders and molting oldsquaws at Thetis Island, Alaska, during a period of industrial activity. Prepared by LGL Alaska Research Assoc., Inc. for Sohio Alaska Petroleum Company.

Johnson, S.R., W.J. Adams, and M.R. Morrell. 1975. The birds of the Beaufort Sea . Part I. Waterbirds of the Beaufort Sea: a literature review. Canada Dept. of Environment. Victoria, B.C. 310 pp.

Karasiuk, D.J., and P.N. Boothroyd. 1982. Preliminary environmental assessment of proposed harbour sites at McKinley Bay and Baillie Islands, Northwest Territories. Vol. I: Migratory bird habitat and bird use. Can. Wildl. Serv., Unpubl. Rep. Yellowknife. 91 pp.

Kerbes, R.H. 1983. Lesser snow goose colonies in the western Canadian arctic. J. Wildl. Manage. 47(2):523-526.

Koski, W.R. 1975. Study of the distribution and movement of snow geese, other geese, and whistling swans on the Mackenzie Delta, Yukon north slope and Alaskan north slope in August and September, 1974, including a comparison with similar data from 1973. Arctic Gas Biol. Rep. Ser. 30(1):1-58.

Koski, W.R. 1977a. A study of the distribution and movements of snow geese, other geese, and whistling swans on the Mackenzie Delta, Yukon north slope and Alaskan north slope in August and September 1975. Arctic Gas Biol. Rep. Ser. 35(2):1-54.

Koski, W.R. 1977b. A study of the distribution and movements of snow geese, other geese, and whistling swans on the Mackenzie Delta, Yukon north slope, and eastern Alaskan north slope in August and September, 1976. Unpubl. LGL Ltd. report for Canadian Arctic Gas Study Ltd., Calgary. 69 pp.

Koski, W.R., and M.A. Gollop. 1974. Migration and distribution of staging snow geese on the MacKenzie Delta, Yukon and eastern Alaskan north slope, August and September, 1973. Arctic Gas Biol. Rep. Ser. 27(1):1-38.

Koski, W.R., and C.E. Tull. 1981. Birds of the coastal Beaufort Sea region. Unpubl. LGL Ltd. report for Hardy Associates (1978) Ltd., Calgary. 128 pp.

Kuyt, E., B.E. Johnson, P.S. Taylor, and T.W. Barry. 1976. Black guillemots' breeding range extended into the western Canadian arctic. Can. Field-Nat. 90:75-76.

Marko, J. 1975. Satellite observations of the Beaufort Sea ice cover. Beafort Sea Tech. Rep. 34. Can. Dept. Env. Victoria. 137 pp.

McCormick, K.J., M.E. Adams, C.J. Stephenson, and A.S. Goodman. 1984. Key migratory bird terrestrial habitat sites in the Northwest Territories. Can. Wildl. Serv., Unpubl. Rep. Yellowknife. 175 pp.

Mossop, D. 1974. Bird notes from Arctic coast area. Yukon Game Branch, Unpubl. Rep. Whitehorse. 29 pp.

Mossop, D. 1975. Waterfowl counts and observations from the coastal plain, Yukon Territory 1975. In: Annual report of game branch activity in the northern Yukon Territory, 1975. Yukon Game Branch, Unpubl. Rep. Whitehorse.

Richardson, W.J., and S.R. Johnson. 1981. Waterbird migration near the Yukon and Alaskan coast of the Beaufort Sea: I. timing, routes and numbers in spring. Arctic 34(2):108-121.

Richardson, W.J., M.R. Morrell, and S.R. Johnson. 1975. Bird migration along the Beaufort Sea coast: radar and visual observations in 1975. Beaufort Sea Tech. Rep. 3c. Can. Dept. Env. Victoria. 131 pp.

Schweinsburg, R.E. 1974. An ornithological study of proposed gas pipeline routes in Alaska, Yukon Territory and the Northwest Territories, 1971. Arctic Gas Biol. Rep. Ser. 10. 215 pp.

Scott-Brown, M., L. Allen, and N.A. Roe. 1981. 1981 waterbird surveys, McKinley Bay, Northwest Territories. Can. Wildl. Serv., Unpubl. Rep. Edmonton. 31 pp.

Searing, G.F., E. Kuyt, W.J. Richardson, and T.W. Barry. 1975. Seabirds of the southeastern Beaufort Sea: aircraft and ground observations in 1972 and 1974. Beaufort Sea Tech. Rep. 3-b. Victoria, B.C. 257 pp.

Sharp, P.L. 1978. Preliminary tests of bird-scare devices on the Beaufort Sea coast. Arctic Petroleum Operators Association Rep. 114-1, Calgary.

Sirois, J., and D.L. Dickson. In prep. Birds of Toker Point, Tuktoyaktuk Peninsula, Northwest Territories. 1985-1987. Can. Wildl. Serv. Yellowknife.

Slaney, F.F., and Co. Ltd. 1973. Environmental impact assessment Immerk artificial island construction, Mackenzie Bay, N.W.T. Vol. II. Environmental studies. Unpubl. report for Imperial Oil Ltd., Calgary. 59 pp.

Slaney, F.F., and Co. Ltd. 1974a. 1972-1974 environmental program, Mackenzie Delta, N.W.T., Canada. Vol. 4. Birds. Unpubl. report for Imperial Oil Ltd., Gulf Oil Canada Ltd., Shell Canada Ltd., and Canadian Arctic Gas Study Ltd., Calgary. 124 pp.

Slaney, F.F., and Co. Ltd. 1974b. 1972-1974 environmental program Mackenzie Delta, N.W.T., Canada. Vol. 8. Winter study supplement. Unpubl. report for Imperial Oil Ltd., Gulf Oil Canada Ltd., Shell Canada Ltd., and Canadian Arctic Gas Study Ltd., Calgary. 74 pp.

Slaney, F.F., and Co. Ltd. 1975. 1974 summer environmental program, Mackenzie River estuary. Vol. 2. Terrestrial studies. Unpubl. report for Imperial Oil Ltd. and Sun Oil Co. Ltd., Calgary. 65 pp.

Smith, M., and B. Rigby. 1981. Distribution of polynyas in the Canadian Arctic. Pages 7-28 in: I. Stirling, H. Cleator (eds.). Polynyas in the Canadian Arctic. Can. Wildl. Serv., Occas. Paper 45.

Smith, T.G. 1973. The birds of the Holman region, western Victoria Island. Can. Field-Nat. 87:35-42.

Talarico, D., and D. Mossop. 1986. A three year summary of avifauna research on Herschel Island. An interim report for use in park management and interpretive programs. Yukon Deptartment of Renewable Resources, Whitehorse. 71 pp.

Timson, R.S. 1976. Late summer migration at Barrow, Alaska. Pages 364-399 In: Environmental Assessment of the Alaskan Continental Shelf. Vol.1. Principal Investigators' Reports, April-June 1976. Environmental Research Laboratories, Boulder, CO.

Vermeer, K., and G.G. Anweiler. 1975. Oil threat to aquatic birds along the Yukon coast. Wilson Bull. 87:467-480.

Ward, R., and D. Mossop. 1986. The birds of Herschel Island relative to its use as a territorial park. Unpubl. Rep., Yukon Dept. of Renewable Resources, Whitehorse. 40 pp.

Woodby, D.A., and G.J. Divoky. 1982. Spring migration of eiders and other waterbirds at Point Barrow, Alaska. Arctic 35:403-410.

Appendix A

Scientific names of species cited

COMMON NAME	SCIENTIFIC NAME
Pacific Loon *	Gavia pacifica
Red-throated Loon *	Gavia stellata
Tundra Swan *	Cygnus columbianus
Canada Goose *	Branta canadensis
Brant *	Branta bernicla
Pacific (Black) Brant *	Branta bernicla nigricans
Greater White-fronted Goose *	Anser albifrons
Lesser Snow Goose *	Chen caerulescens caerulescens
Dabbling ducks *	Anas sp.
Mallard	Anas platyrhynchos
Northern Pintail	Anas acuta
American Wigeon	Anas americana
Green-winged Teal	Anas crecca
Scaup *	Aythya sp.
Lesser Scaup	Aythya affinis
Greater Scaup	Aythya marila
Eider *	Somateria sp.
Common Eider *	Somateria mollissima
Pacific Eider	Somateria mollissima v. nigra
King Eider *	Somateria spectabilis
Oldsquaw *	Clangula hyemalis
Scoter *	Melanitta sp.
White-winged Scoter	Melanitta fusca
Surf Scoter	Melanitta perspicillata
Red-breasted Merganser *	Mergus serrator
Common Merganser *	Mergus merganser
Shorebirds *	
Lesser Golden-Plover	Pluvialis dominica
Whimbrel	Numenius phaeopus
Hudsonian Godwit	Limosa haemastica
Stilt Sandpiper	Micropalama himantopus
Pectoral Sandpiper	Calidris melanotos
Baird's Sandpiper	Calidris bairdii
Semipalmated Sandpiper	Calidris pusilla
Long-billed Dowitcher	Limnodromus scolopaceus
Phalarope *	Phalaropus sp.
Red-necked Phalarope *	Phalaropus lobatus
Red Phalarope	Phalaropus fulicaria
Glaucous Gull *	Larus hyperboreus
Sabine's Gull *	Xema sabini
Arctic Tern *	Sternus paradisaea
Black Guillemot *	Cepphus grylle

Note: asterisked species and species groups were used in initial evaluations of importance of regions (see Methods).

Appendix B

Habitat use and timing of events for selected species of birds in the Beaufort Sea area

1. Pacific Loons

ACTIVITY	TIME	HABITAT
Spring arrival	late May-early June	- coastal bays, Mackenzie River, early melting ponds and lakes
Nesting		- tundra lakes & large ponds both upland & floodplain, often on islands
Egg-laying	mid June-early July	
Hatching	mid-late July	
Fledging	late Aug-mid Sept	
Fall migration	mid Aug-late Sept	- marine areas near coast plus nesting habitats
Feeding		-mainly large lakes, also marine water

Sources: Barry et al. 1981; Bergman et al. 1977; Boothroyd 1983; Howard 1974; Johnson et al. 1975; Koski and Tull 1981; Slaney 1973; Slaney 1974a; Slaney 1974b

2. Red-throated Loons

ACTIVITY	TIME	HABITAT
Spring arrival	late May-early June	- coastal bays, Makenzie River, early melting ponds and lakes, shoreleads
Nesting		- small tundra ponds both upland & floodplain, near the coast
Egg-laying	mid June-early July	
Hatching	mid-late July	- upon fledging, families move into marine areas
Fledging	late Aug-mid Sept	
Fall migration	mid Aug-early Sept	- marine water coastal or offshore
Feeding		-marine water coastal or offshore

Sources: Alexander et al. 1988; Barry et al. 1981; Bergman et al. 1977; Boothroyd 1983; Johnson et al. 1975; Koski and Tull 1981; Slaney 1973; Slaney 1974a; Slaney 1974b

3. Tundra Swans

ACTIVITY	TIME	HABITAT
Spring arrival	mid May-mid June	-lowlands (sedge meadows, river channels)
Nesting		-upland & floodplain lakes, river
Egg-laying	late May-early June	channels; coastal areas, lagoons
Hatching	late June-mid July	-nest on dry, raised spot (eg. ridge
Fledging	early-late Sept	or hummock), not always near water
Molting		-same as nesting
non-breeders	June-July	
breeders	mid July-late Aug	
Fall migration		-coastal mudflats, river channels
non-breeders	early Sept- ?	
families	late Sept-early Oct	

Sources: Barry 1976; Barry et al. in prep.; Boothroyd 1983; Hogg et al. 1986; Jacobson 1974; Johnson et al. 1975; Koski and Tull 1981; Slaney 1973; Slaney 1974a; Slaney 1974b

4. Canada Geese

ACTIVITY	TIME	HABITAT
Spring arrival	mid May-early June	
Nesting		-interior areas near lakes & creeks,
Egg-laying	early-mid June	also mudflats
Hatching	early-mid July	-dry & elevated nest site
Fledging	mid-late Aug	
Molting		-mudflats, coastal areas, open deep
non-breeders	late June-early July	lakes & ponds
breeders	late July-early Aug	
Fall migration	mid Aug-early Oct	-same as molting
Feeding		-adults & young feed in river floodplain areas

Sources: Barry 1976; Barry et al. in prep.; Boothroyd 1983; Howard 1974; Jacobson 1974; Johnson et al. 1975; Koski and Tull 1981; Slaney 1973; Slaney 1974a; Slaney 1974b

5. Brant

ACTIVITY	TIME	HABITAT
Spring arrival	late May-mid June	-littoral zone, coastal wetlands, tidal flats, river & creek deltas
Nesting		-often colonial
Egg-laying	early-mid June	-littoral zone, coastal meadows, lagoons, offshore islands, tidal pools & flats, small islets & spits
Hatching	late June-mid July	-edge of freshwater pools
Fledging	mid Aug	-inlets in small lakes & estuaries
		-close to sea (often within 1.5 km of high tide), often affected by storm tides
Molting		-littoral zone, tidal flats, brackish lagoons,low-lying shoreline,mudflats
non-breeders	late June-late July	
males	early-late July	
females	mid July-mid Aug	
Fall migration	mid Aug-mid Sept	-littoral zone-coastal wetlands

Sources: Barry 1976; Barry et al. 1981; Barry et al. in prep.; Bergman et al. 1977; Boothroyd 1983; Jacobson 1974; Johnson et al. 1975; Koski and Tull 1981; Slaney 1973; Slaney 1974a; Slaney 1974b

6. Greater White-fronted Geese

ACTIVITY	TIME	HABITAT
Spring arrival	mid May-early June	
Nesting		-well-vegetated elevated sites near lakes & rivers
Egg-laying	late May-early June	-most dense along streams & in scrub willow tundra; rarely tidal flats
Hatching	late June-early July	
Fledging	mid-late Aug	
Molting		-same as nesting plus large, deep lakes
non-breeders	late June-early July	
breeders	mid July-early Aug	
Fall migration	late Aug-early Oct	-sedge and mudflats

Sources: Barry 1976; Barry et al. in prep.; Bergman et al. 1977; Howard 1974; Jacobson 1974; Johnson et al. 1975; Koski and Tull 1981; Slaney 1973; Slaney 1974a; Slaney 1974b

7. Lesser Snow Geese

ACTIVITY	TIME	HABITAT
Spring arrival		-river deltas and channels
breeders	mid May-early June	
yearlings	early-mid May	
Nesting		-colonial
Egg-laying	early-mid June	-within 8 km of salt water
Hatching	late June-early July	-floodplains (influenced by river channels and, in some cases, storm tides)
Fledging	mid Aug	-wet mossy grass or gravel areas, or slightly raised areas
Molting		-inland sedge flats & floodplains
non-breeders	late June-mid July	-coastal shorelines & lagoons
breeders	mid July-early Aug	
Fall migration	mid Aug-late Sept	-same as molting

Sources: Barry and Barry in prep; Barry 1976; Barry et al. 1981; Barry et al. in prep.; Boothroyd 1983; Jacobson 1974; Johnson et al. 1975; Koski 1977a; Koski 1977b; Koski and Tull 1981; Slaney 1973; Slaney 1974b

8. Dabbling ducks

ACTIVITY	TIME	HABITAT
Spring arrival	late May-mid June	-freshwater lakes, wetlands, & floodplains, coastal tundra
Nesting		-freshwater lakes & ponds (on, near, or far from water)
Egg-laying	June	-occasionally brackish, flooded coastal ponds
Hatching	early-mid July	
Fledging	mid Aug-early Sept	
Molting		-freshwater lakes & ponds
migration	early July	-coastal lagoons & mudflats (males first, females & young later)
molt	early July-late Aug	
Fall migration	mid Aug-early Oct	-same as molting

Sources: Barry 1976; Howard 1974; Jacobson 1974; Johnson et al. 1975; Koski and Tull 1981; Slaney 1973; Slaney 1974a; Slaney 1974b

9. Scaup

ACTIVITY	TIME	HABITAT
Spring arrival	late May-early June	-freshwater lakes & ponds
Nesting		-small tundra ponds
Egg-laying	mid June-early July	-well vegetated coastal areas with
Hatching	mid July-early Aug	driftwood & mudflats
Fledging	late Aug-early Sept	
Molting		-nearshore coastal areas
migration	mid July	-less often freshwater ponds & lakes
males	mid July-mid Aug	
females	mid July-early Sept	
Fall migration	Aug-late Sept (males first, then females & broods)	-same as molting

Sources: Barry 1976; Barry et al. 1981; Gollop and Richardson 1974; Johnson et al. 1975; Koski and Tull 1981; Slaney 1973; Slaney 1974a; Slaney 1974b

10. Eiders

ACTIVITY	TIME	HABITAT
Spring arrival	late May-early June	-ice leads
Nesting		-Common Eider: usually colonial on
Egg-laying	mid June-early July	coastal islands; also scattered on
Hatching	mid July-mid Aug	spits, barrier beaches
Creches	mid July-mid Aug	-King Eider: solitary near tundra ponds & lakes; sometimes coastal
Molting		-nearshore marine water & lagoons
migration	late June-late July (predominantly males)	-most birds molt off western Alaska
males	mid July-early Aug	
females	mid Aug-Sept	
Fall migration		-same as molting
males	late July-mid Aug	
females	mid Aug	
broods	early Sept-early Oct	

Sources: Anderson 1913; Alexander et al. 1988; Barry 1976; Barry 1983; Bergman et al. 1977; Boothroyd 1983; Howard 1974; Jacobson 1974; Johnson 1984; Johnson et al. 1975; Koski and Tull 1981; Slaney 1973

11. Oldsquaw

ACTIVITY	TIME	HABITAT
Spring arrival	mid May-mid June	-freshwater lakes & ponds, offshore leads
Nesting		-coastal areas, often well vegetated, with driftwood; lagoons, -sandbars -often freshwater lakes & ponds
Egg-laying	mid June	
Hatching	mid-late July	
Fledging	late Aug	
Molting		-coastal lagoons, islands, sandbars; nearshore marine water; especially leeside of coastal islands & spits -larger freshwater lakes
migration	late June-mid July	
males	mid July-mid Aug	
females	mid July-early Sept	
Fall migration	late Aug-mid Sept	-same as molting
Feeding		-freshwater lakes and ponds, nearshore marine water

Sources: Alexander et al. 1988; Barry 1976; Barry et al. 1981; Bergman et al. 1977; Boothroyd 1983; Gollop and Richardson 1974; Howard 1974; Jacobson 1974; Johnson 1984; Johnson et al. 1975; Koski and Tull 1981; Slaney 1973; Slaney 1974a; Slaney 1974b

12. Scoters

ACTIVITY	TIME	HABITAT
Spring arrival	late May-early June	-freshwater lakes & ponds
Nesting		-freshwater lakes & ponds, usually thickets & shrubs -also well-vegetated coasts with driftwood & mudflats
Egg-laying	mid June-early July	
Hatching	late July-early Aug	
Fledging	late Aug-mid Sept	
Molting		-nearshore marine waters -freshwater lakes & ponds
migration	mid June-mid Aug	
males	mid July-mid Aug	
females	mid July-early Sept	
Fall migration	mid Aug-early Oct	-same as molting
Feeding		-freshwater lakes & ponds, nearshore marine water

Sources: Barry 1976; Barry et al. 1981; Gollop and Richardson 1974; Jacobson 1974; Johnson et al. 1975; Koski and Tull 1981; Slaney 1973; Slaney 1974a,b

13. Red-breasted Mergansers

ACTIVITY	TIME	HABITAT
Spring arrival	late May-early June	river channels, open deltas
Nesting	June-Sept	-shores of freshwater lakes, ponds, rivers; in brush or driftwood
Molting	mid July-mid Aug (males earlier, females later)	-nearshore marine water
Fall migration	mid Aug-mid Sep	

Sources: Barry 1976; Barry et al. 1981; Bergman et al. 1977; Jacobson 1974; Johnson et al. 1975; Slaney 1974b

14. Shorebirds (not including phalaropes)

ACTIVITY	TIME	HABITAT
Spring arrival	mid May-mid June	-inland and coastal wetlands and sedge meadows
Nesting		-upland dry tundra, ridges
Egg-laying	late May-late June	-damp tundra, shorelines of lakes & ponds
Hatching	early-mid July	
Fledging	late July-early Aug	-continuous grass or sedge cover
Fall migration	July-mid Sept (sex, age & species dependent)	-littoral zone: mudflats, spits, lagoons -flooded areas,lake margins -uplands
Feeding		-littoral zone, coastal welands -well & sparcely vegetated inland monocot wetlands

Sources: Barry 1976; Barry et al. 1981; Boothroyd 1983; Connors et al. 1979; Hogg et al. 1986; Howard 1974; Johnson et al. 1975; Koski and Tull 1981; Slaney 1973; Slaney 1974b

15. Phalaropes

ACTIVITY	TIME	HABITAT
Spring arrival	late May-early June	
Nesting		-hummocky sedge-moss tundra, wet meadows, marshy areas, shallow ponds -lagoons
Egg-laying	early June-early July	
Hatching	early-late July	
Fledging	late July-mid Aug	
Fall migration		-mudflats, lagoons, nearshore marine waters, particularly along gravel spits & barrier beaches
female	late June-mid July	
male	early-mid Aug	
young	mid Aug-early Sept	
Feeding	late July-Aug	-adults & fledged young feed in littoral zone, wetlands & nearshore marine water

Sources: Boothroyd 1983; Connors et al. 1979; Ealey et al. 1988; Howard 1974; Johnson et al. 1975; Koski and Tull 1981; Slaney 1973; Slaney 1974a

16. Glaucous Gulls

ACTIVITY	TIME	HABITAT
Spring arrival	mid May-late June	-offshore leads, open deltas
Nesting		-colonial or solitary -coastal areas: low islands, sandbars, spits, (cliffs) -also islets in lakes & ponds
Egg-laying	early-late June	
Hatching	early-mid July	
Fledging	mid Aug-mid Sept	
Fall migration	late Aug-early Oct	-spits, mudflats, lagoons
Feeding		-surface of marine water

Sources: Alexander et al. 1988; Barry 1976; Barry et al. 1981; Barry et al. in prep.; Boothroyd 1983; Gollop and Richardson 1974; Johnson et al. 1975; Koski and Tull 1981; Slaney 1973; Slaney 1974a; Slaney 1974b

17. Arctic Terns

ACTIVITY	TIME	HABITAT
Spring arrival	late May-early June	
Nesting		-solitary or colonial
Egg-laying	mid June-early July	-coastal spits, barrier islands,
Hatching	early-late July	gravel bars, mudflats,
Fledging	late July-late Aug	-also floodplain lakes & tundra (gravel areas)
Fall migration	mid Aug-early Sept	
Feeding		-marine & freshwater surfaces -coastal tundra, well vegetated wetlands

Sources: Barry 1976; Barry et al. 1981; Boothroyd 1983; Hogg et al. 1986; Johnson et al. 1975; Koski and Tull 1981; Slaney 1973; Slaney 1974a; Slaney 1974b

18. Black Guillemots

ACTIVITY	TIME	HABITAT
Spring arrival	mid May	-probably offshore leads
Nesting		-in Beaufort, man-made debris &
Egg-laying	late June-early July	buildings, driftwood piles
Hatching	late July	-usually coastal talus slopes, rock
Fledging	early Sept	rubble, & cliffs
Fall migration	early Sept	
Feeding		-marine water, diving

Sources: Barry 1976; Barry et al. 1981; Johnson et al. 1975; Koski and Tull 1981